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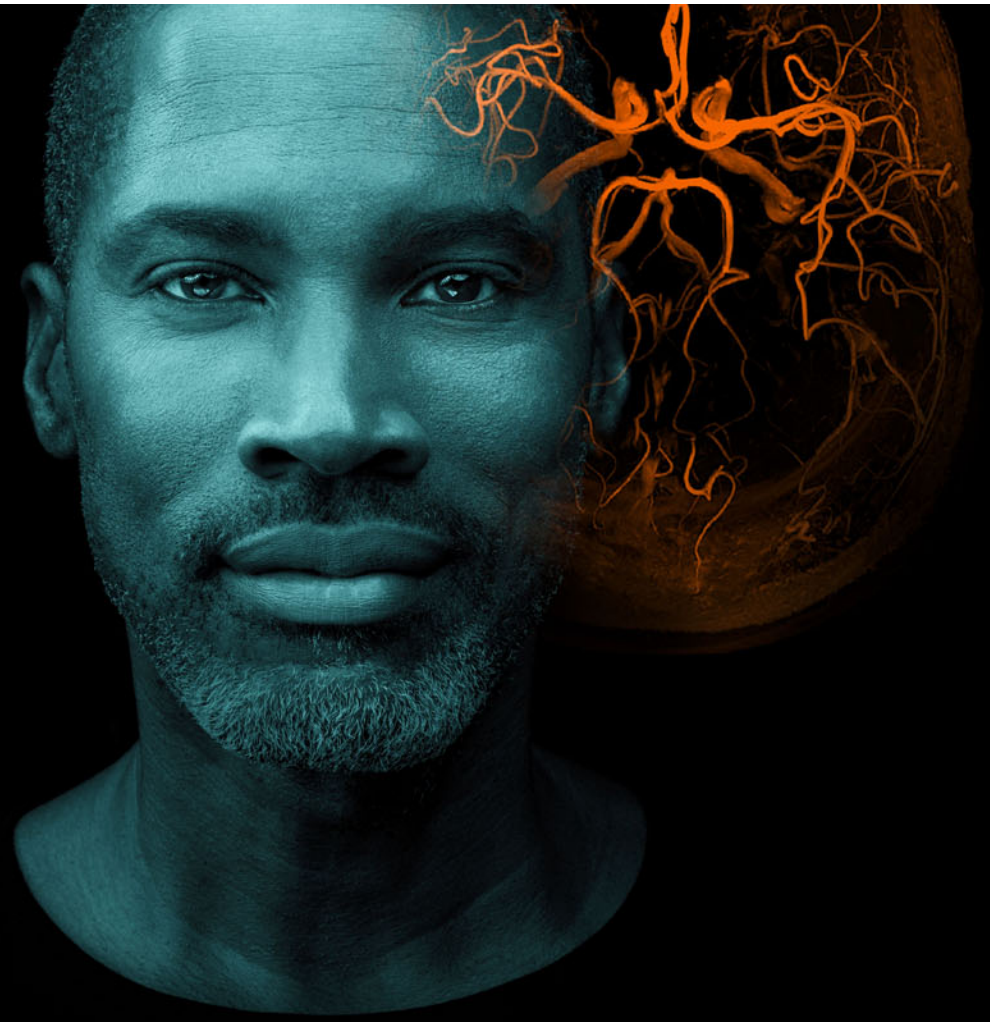
Overview: Scientific Publications

Computed Tomography and COVID-19, June 2020

This review is based on the available information made available online by PubMed. It is not intended to be a complete review of all available resources of CT usage in COVID-19.



Title
The Role of Chest Imaging in Patient Management during the COVID-19 Pandemic: A Multinational Consensus Statement from the Fleischner Society.

Author
Rubin GD, Ryerson CJ, Haramati LB, Sverzellati N, Kanne JP, Raoof S, Schluger NW, Volpi A, Yim JJ, Martin IBK, Anderson DJ, Kong C, Altes T, Bush A, Desai SR, Goldin J, Goo JM, Humbert M, Inoue Y, Kauczor HU, Luo F, Mazzone PJ, Prokop M, Remy-Jardin M, Richeldi L, Schaefer-Prokop CM, Tomiyama N, Wells AU, Leung AN

Abstract
With more than 900,000 confirmed cases worldwide and nearly 50,000 deaths during the first three months of 2020, the COVID-19 pandemic has emerged as an unprecedented healthcare crisis. The spread of COVID-19 has been heterogeneous, resulting in some regions having sporadic transmission and relatively few hospitalized patients with COVID-19 and others having community transmission that has led to overwhelming numbers of severe cases. For these regions, healthcare delivery has been disrupted and compromised by critical resource constraints in diagnostic testing, hospital beds, ventilators, and healthcare workers who have fallen ill to the virus exacerbated by shortages of personal protective equipment. While mild cases mimic common upper respiratory viral infections, respiratory dysfunction becomes the principal source of morbidity and mortality as the disease advances. Thoracic imaging with chest radiography (CXR) and computed tomography (CT) are key tools for pulmonary disease diagnosis and management, but their role in the management of COVID-19 has not been considered within the multivariable context of the severity of respiratory disease, pre-test probability, risk factors for disease progression, and critical resource constraints. To address this deficit, a multidisciplinary panel comprised principally of radiologists and pulmonologists from 10 countries with experience managing COVID-19 patients across a spectrum of healthcare environments evaluated the utility of imaging within three scenarios representing varying risk factors, community conditions, and resource constraints. Fourteen key questions, corresponding to 11 decision points within the three scenarios and three additional clinical situations, were rated by the panel based upon the anticipated value of the information that thoracic imaging would be expected to provide. The results were aggregated, resulting in five main and three additional recommendations intended to guide medical practitioners in the use of CXR and CT in the management of COVID-19.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32255413

Citation
Radiology. 2020 Apr 7;201365. doi: 10.1148/radiol.2020201365.

Title
Differences in Clinical and Imaging Presentation of Pediatric Patients with COVID-19 in Comparison with Adults

Author
Chen A, Huang J, Liao Y, Liu Z, Chen D, Yang C, Yang R, Wei X.

Abstract
Background: Although Coronavirus Disease 2019 (COVID-19) affects patients from all age groups, clinical and radiological features of COVID19 have been mainly described in adults. Objective：To characterize and compare the initial clinical and imaging features of COVID-19 in pediatric and adult patients undergoing chest computed tomography (CT). Materials and Methods: A total of 61 patients, consisting of 47 adults (18 years old or older) and 14 pediatric patients (younger than 18 years old) with laboratory-confirmed COVID-19 by real-time reverse transcriptase polymerase chain reaction (RT-PCR) between January 25, 2020 and February 15, 2020 were enrolled in this study. All patients underwent chest CT within 3 days after the initial RT-PCR. The clinical presentation, serum markers, and CT findings were assessed and compared between the adult and pediatric patients. Results: Fever was less common in pediatric patients than in adults (6/14, 42.9% vs 39/47, 83%; p = 0.008). Leukopenia or normal, lymphopenia or normal, and increased or normal C-reactive protein were common in both groups with no difference (p > 0.05). Compared with the adults, pediatric patients had a lower rate of positive CT findings and a milder clinical grade (p = 0.004, p = 0.001 respectively). On chest CT, the number of pulmonary lobes involved was reduced in pediatric patients when compared to adults (p = 0.012). Subpleural distribution of lung opacities was a dominant feature in both groups, whereas bronchial distribution was more common in the pediatric group (p = 0.048). Among the CT features in adults, ground-glass opacities (GGO) were the most common finding (24/43, 53.5%), followed by GGO with consolidation (14/43, 27.9%). In pediatric patients, GGOs accounted for 42.9% (3/7), bronchial wall thickening occurred in 28.6% (2/7), and GGOs with consolidations and nodular opacities in 14.3% (1/7). However, these CT features did not differ in two groups, except for bronchial wall thickening, which was more commonly found in pediatric patients (p=0.048). Additionally, the semi-quantitative scores of lung involvement were higher in adults than in pediatric patients (8.89 ± 4.54 vs 1.86 ± 2.41, p < 0.001).

Link
https://pubs.rsna.org/doi/full/10.1148/ryct.2020200117

Citation
Radiology, Apr 6 2020 https://doi.org/10.1148/ryct.2020200117

Title
Coronavirus Disease 2019: Initial Detection on Chest CT in a Retrospective Multicenter Study of 103 Chinese Subjects

Author
Wen Z, Chi Y, Zhang L, Liu H, Du K, Li Z, Chen J, Cheng L, Wang D.

Abstract
Background
Coronavirus disease 2019 (COVID-19) is a new viral respiratory disease that has recently emerged from China, becoming a pandemic. However, few studies have analyzed data regarding the clinical performance of chest computed tomography (CT) obtained in subjects with suspected COVID-19 at the initial presentation to medical facilities.

Link
https://pubs.rsna.org/doi/full/10.1148/ryct.2020200092

Citation
Radiology. Apr 6 2020https://doi.org/10.1148/ryct.2020200092

Title
An update on COVID-19 for the radiologist - A British society of Thoracic Imaging statement

Author
Rodrigues JCL, Hare SS, Edey A, Devaraj A, Jacob J, Johnstone A, McStay R, Nair A, Robinson G.

Abstract
In December 2019, Wuhan City (Hubei Province, China) reported a febrile respiratory tract illness of unknown origin in a cluster of patients. Bronchoalveolar lavage of the patients isolated a novel strain of coronavirus (SARScoronavirus-2 [SARS-CoV-2]) as the pathogen.1 The pulmonary infection caused by SARS-CoV-2 was named coronavirus disease 2019 (COVID-19) by the World Health Organization (WHO). As of 14 March 2020, the WHO reported 142,651 worldwide cases with 5,393 deaths.2 Despite the imposition of strict quarantine rules and restricted travel within and from China, the infection has spread rapidly affecting countries worldwide. It continues to escalate. As of 14 March 2020, 797 UK cases have been confirmed, with 10 deaths.3 Testing currently involves a laboratory test from swab samples obtained from the respiratory tract (most commonly a single nose and throat swab). The WHO currently classifies cases into three potential categories: (1) suspected, (2) probable, and (3) confirmed. Suspected cases are primarily those with a febrile respiratory illness and history of travel to a country or region reporting local transmission of COVID-19 disease during the 14 days prior to symptom onset. In the past few weeks, changes to diagnostic criteria (using imaging as an adjunct to real-time transcriptase polymerase chain reaction [RT-PCR]) has led to an increase in reported cases.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7138157/

Citation
Clin Radiol. 2020 May; 75(5): 323–325. Published online 2020 Mar 23. doi: 10.1016/j.crad.2020.03.003

Title
A UK-wide British Society of Thoracic Imaging COVID-19 imaging repository and database: design, rationale and implications for education and research

Author
Hare SS, Rodrigues JCL, Jacob J, Edey A, Devaraj A, Johnstone A, McStay R, Nair A, Robinson G.

Abstract
The number of cases of COVID-19 continues to rise in the UK and around the world. The precise role for computed tomography (CT) in the diagnosis and triage of suspected cases, assessing for complications, and surveillance is subject to change and are explored in other articles in this edition1,2; however, keeping the UK diagnostic community fully informed of emerging guidance during the COVID-19 outbreak is critical. This can be achieved as a collaborative effort by feeding a central library of the medical examples encountered and rapidly sharing expert opinions to frontline medical care staff, nationally and internationally. The British Society of Thoracic Imaging (BSTI), in conjunction with Cimar UK's Imaging Cloud Technology (cimar.co.uk), have designed, built, and deployed a simple, free to use, anonymised, and encrypted online portal to upload and refer imaging of patients with either confirmed or suspected COVID-19. From these cases, the BSTI are providing an imaging database of known UK patient examples for reference and teaching. The aim is to disseminate breaking clinical and diagnostic advice rapidly to frontline healthcare staff nationally, using real imaging examples encountered across the country. All imaging and supporting data are stored at UK Cloud (https://ukcloudhealth.com) with no identifiable metadata.Imaging can be uploaded at http://bit.ly/BSTICovid19_Database. The published teaching library and its content will be accessible without a login via the BSTI website (https://bit.ly/BSTICovid19_Teaching_Library).

Link
https://www.ncbi.nlm.nih.gov/pubmed/32222251

Citation
Clin Radiol. 2020 May;75(5):326-328. doi: 10.1016/j.crad.2020.03.005. Epub 2020 Mar 25.

Title
A British Society of Thoracic Imaging statement: considerations in designing local imaging diagnostic algorithms for the COVID-19 pandemic

Author
Nair A, Rodrigues JCL, Hare S, Edey A, Devaraj A, Jacob J, Johnstone A, McStay R, Denton E, Robinson G.

Abstract
In accordance with guidance from the Chief Medical Officer's office and the Royal College of Radiologists, the British Society of Thoracic Imaging (BSTI) recognises that based on the available evidence computed tomography (CT) currently has no upfront role in the diagnostic work-up of 2019 novel coronavirus (COVID-19) infection (https://www.rcr.ac.uk/college/coronavirus-covid-19-what-rcr-doing/rcr-position-role-ct-patients-suspected-covid-19). Nevertheless, a number of reports have been published highlighting CT appearances in COVID-19, raising the possibility of a role for CT in patient management.1, 2, 3, 4, 5 In response to these reports, the BSTI published a preliminary consensus statement on 6 March 2020.6 We discuss below what role, if any, CT would play in the detection and management of COVID-19 infection in the UK, and the logistics of imaging delivery. This role is heavily predicated on the clinical context as well as the timing of its intended use within the diagnostic pathway, especially relative to the current reference standard diagnostic test, real-time reverse transcriptase polymerase chain reaction (RT-PCR) of a pharyngeal swab,7 and other clinical and laboratory investigations. Although it may not be feasible or desirable for isolation purposes to perform a chest radiograph (CXR), we should acknowledge that pragmatically patients with a respiratory complaint are likely to present via any number of routes (primary care, emergency departments [EDs] or outpatient clinics) having already had a CXR, other than to isolation pods outside a hospital, and work-up of a respiratory complaint would usually include a CXR in such settings. Cognizant of this fact, in the following discussion we have considered how a CXR would also fit into diagnostic algorithms, and in particular, how the use of CT would alter management in settings where a CXR was or was not available.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7128118/

Citation
Clin Radiol. 2020 May; 75(5): 329–334. Published online 2020 Apr 4. doi: 10.1016/j.crad.2020.03.008

Title
CT Imaging and Differential Diagnosis of COVID-19

Author
Dai WC, Zhang HW, Yu J, Xu HJ, Chen H, Luo SP, Zhang H, Liang LH, Wu XL, Lei Y, Lin F.

Abstract
Since the beginning of 2020, coronavirus disease 2019 (COVID-19) has spread throughout China. This study explains the findings from lung computed tomography images of some patients with COVID-19 treated in this medical institution and discusses the difference between COVID-19 and other lung diseases.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32129670

Citation
Can Assoc Radiol J. 2020 May;71(2):195-200. doi: 10.1177/0846537120913033. Epub 2020 Mar 4.

Title
High-resolution Chest CT Features and Clinical Characteristics of Patients Infected with COVID-19 in Jiangsu, China

Author
Dai H, Zhang X, Xia J, Zhang T, Shang Y, Huang R, Liu R, Wang D, Li M, Wu J, Xu Q, Li Y.

Abstract
BACKGROUND: A pneumonia associated with the coronavirus disease 2019 (COVID-19) recently emerged in China. It was recognized as a global health hazard.
METHODS: 234 inpatients with COVID-19 were included. Detailed clinical data, chest HRCT basic performances and certain signs were recorded Ground-glass opacity (GGO), consolidation, fibrosis and air trapping were quantified. Both clinical types and CT stages were evaluated.
RESULTS: Most patients (approximately 90%) were classified as common type and with epidemiologic history. Fever and cough were main symptoms. Chest CT showed abnormal attenuation in bilateral multiple lung lobes, distributed in the lower and/or periphery of the lungs (94.98%), with multiple shapes. GGO and vascular enhancement sign were most frequent seen, followed by interlobular septal thickening and air bronchus sign as well as consolidation, fibrosis and air trapping. There were significant differences in most of CT signs between different stage groups. The SpO2 and OI were decreased in stage IV, and the CT score of consolidation, fibrosis and air trapping was significantly lower in stage I ($P<0.05$). A weak relevance was between the fibrosis score and the value of PaO2 and SpO2 ($P<0.05$).
CONCLUSIONS: Clinical performances of patients with COVID-19, mostly with epidemiologic history and typical symptoms, were critical valuable in the diagnosis of the COVID-19. While chest HRCT provided the distribution, shape, attenuation and extent of lung lesions, as well as some typical CT signs of COVID-19 pneumonia.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32272262

Citation
Int J Infect Dis. 2020 Apr 6. doi: 10.1016/j.ijid.2020.04.003.

Title
CT imaging changes of corona virus disease 2019(COVID-19): a multi-center study in Southwest China

Author
Li X, Zeng W, Li X, Chen H, Shi L, Li X, Xiang H, Cao Y, Chen H, Liu C, Wang J.

Abstract
BACKGROUND: Since the first case of a coronavirus disease 2019 (COVID-19) infection pneumonia was detected in Wuhan, China, a series of confirmed cases of the COVID-19 were found in Southwest China. The aim of this study was to describe the imaging manifestations of hospitalized patients with confirmed COVID-19 infection in southwest China.
METHODS: In this retrospective study, data were collected from 131 patients with confirmed coronavirus disease 2019 (COVID-19) from 3 Chinese hospitals. Their common clinical manifestations, as well as characteristics and evolvement features of chest CT images, were analyzed.
RESULTS: A total of 100 (76%) patients had a history of close contact with people living in Wuhan, Hubei. The clinical manifestations of COVID-19 included cough, fever. Most of the lesions identified in chest CT images were multiple lesions of bilateral lungs, lesions were more localized in the peripheral lung, 109 (83%) patients had more than two lobes involved, 20 (15%) patients presented with patchy ground glass opacities, patchy ground glass opacities and consolidation of lesions co-existing in 61 (47%) cases. Complications such as pleural thickening, hydrothorax, pericardial effusion, and enlarged mediastinal lymph nodes were detected but only in rare cases. For the follow-up chest CT examinations (91 cases), We found 66 (73%) cases changed very quickly, with an average of 3.5 days, 25 cases (27%) presented absorbed lesions, progression was observed in 41 cases (46%), 25 (27%) cases showed no significant changes.
CONCLUSION: Chest CT plays an important role in diagnosing COVID-19. The imaging pattern of multifocal peripheral ground glass or mixed consolidation is highly suspicious of COVID-19, that can quickly change over a short period of time.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=CT+imaging+changes+of+corona+virus+disease+2019(COVID%E2%80%9119)%3A+a+multi%E2%80%91center+study+in+Southwest+China

Citation
J Transl Med. 2020 Apr 6;18(1):154. doi: 10.1186/s12967-020-02324-w.

Title
Predictors for imaging progression on chest CT from coronavirus disease 2019 (COVID-19) patients

Author
Yang Z, Shi J, He Z, Lü Y, Xu Q, Ye C, Chen S, Tang B, Yin K, Lu Y, Chen X.

Abstract
OBJECTIVE:
This study aimed to investigate the potential parameters associated with imaging progression on chest CT from coronavirus disease 19 (COVID-19) patients.
RESULTS:
The average age of 273 COVID-19 patients enrolled with imaging progression were older than those without imaging progression ($p = 0.006$). The white blood cells, platelets, neutrophils and acid glycoprotein were all decreased in imaging progression patients (all $p < 0.05$), and monocytes were increased ($p = 0.025$). The parameters including homocysteine, urea, creatinine and serum cystatin C were significantly higher in imaging progression patients (all $p < 0.05$), while eGFR decreased ($p < 0.001$). Monocyte-lymphocyte ratio (MLR) was significantly higher in imaging progression patients compared to that in imaging progression-free ones ($p < 0.001$). Logistic models revealed that age, MLR, homocysteine and period from onset to admission were factors for predicting imaging progression on chest CT at first week from COVID-19 patients (all $p < 0.05$).
CONCLUSION:
Age, MLR, homocysteine and period from onset to admission could predict imaging progression on chest CT from COVID-19 patients.
METHODS:
The primary outcome was imaging progression on chest CT. Baseline parameters were collected at the first day of admission. Imaging manifestations on chest CT were followed-up at (6±1) days.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32275643

Citation
Aging (Albany NY). 2020 Apr 10;12(7):6037-6048. doi: 10.18632/aging.102999. Epub 2020 Apr 10.

Title
Infection Control against COVID-19 in Departments of Radiology

Author
Yu J, Ding N, Chen H, Liu XJ, He WJ, Dai WC, Zhou ZG, Lin F, Pu ZH, Li DF, Xu HJ, Wang YL, Zhang HW, Lei Y.

Abstract
The COVID-19 epidemic, which is caused by the novel coronavirus SARS-CoV-2, has spread rapidly to become a world-wide pandemic. Chest radiography and chest CT are frequently used to support the diagnosis of COVID-19 infection. However, multiple cases of COVID-19 transmission in radiology department have been reported. Here we summarize the lessons we learned and provide suggestions to improve the infection control and prevention practices of healthcare workers in departments of radiology.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32276755

Citation
Acad Radiol. 2020 May;27(5):614-617. doi: 10.1016/j.acra.2020.03.025. Epub 2020 Apr 8.

Title
CT imaging of one extended family cluster of corona virus disease 2019 (COVID-19) including adolescent patients and "silent infection"

Author
Xu R, Du M, Li L, Zhen Z, Wang H, Hu X.

Abstract
On Jan 27, 2020, we initially enrolled one patient who presented to Panzhou People's Hospital (Guizhou Province, China) with fever, sore throat symptoms. Five other members of this extended family also presented for the assessment of their health conditions. Eventually real-time fluorescence polymerase chain reaction of all the six patient's nasopharyngeal swab and sputum samples were positive for the 2019 novel coronavirus (SARS-CoV-2) nucleic acid.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7136726/

Citation
Quant Imaging Med Surg. 2020 Mar; 10(3): 800–804. doi: 10.21037/qims.2020.02.13

Title
Dynamic Chest CT Evaluation in Three Cases of 2019 Novel Coronavirus Pneumonia

Author
Chen X, Liu S, Zhang C, Pu G, Sun J, Shen J, Chen Y.

Abstract
A recent outbreak of pneumonia in Wuhan, China, was caused by the 2019 novel coronavirus (2019-nCoV). There have been some reports of imaging findings regarding the disease's characteristic features. Here, we report three cases of coronavirus disease 2019 (COVID-19) with dynamic pulmonary CT evaluation. The CT scan showed multiple regions of ground-glass opacities and patchy consolidation in COVID-19 patients and the CT scan was useful in tracking the progression or regression of COVID-19.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32271603

Citation
Arch Iran Med. 2020 Apr 1;23(4):277-280. doi: 10.34172/aim.2020.11.

Title
Lung Involvement Found on Chest CT Scan in a Pre-Symptomatic Person with SARS-CoV-2 Infection: A Case Report

Author
Asadollahi-Amin A, Hasibi M, Ghadimi F, Rezaei H, SeyedAlinaghi S.

Abstract
The novel coronavirus SARS-CoV-2 infection is spreading worldwide, and there are many reports of acute respiratory distress syndrome caused by this infection. However, asymptomatic lung involvement has not been reported. We hereby present the case of a 44-year-old health-care worker, who was found to be infected with the SARS-CoV-2 virus after a CT-scan performed for an unrelated condition revealed a lesion in the lung field compatible with COVID-19 infection. His condition deteriorated initially, but eventually improved with supportive treatment and the compassionate use of antivirals and antimalarials and is now in a stable condition.

Link
https://pubmed.ncbi.nlm.nih.gov/32272630/

Citation
Trop Med Infect Dis. 2020 Apr 7;5(2):E56. doi: 10.3390/tropicalmed5020056.

Title
Proposal of a low-dose, long-pitch, dual-source chest CT protocol on third-generation dual-source CT using a tin filter for spectral shaping at 100 kVp for CoronaVirus Disease 2019 (COVID-19) patients: a feasibility study

Author
Agostini A, Floridi C, Borgheresi A, Badaloni M, Esposto Pirani P, Terilli F, Ottaviani L, Giovagnoni A.

Abstract
To subjectively and objectively evaluate the feasibility and diagnostic reliability of a low-dose, long-pitch dual-source chest CT protocol on third-generation dual-source CT (DSCT) with spectral shaping at 100Sn kVp for COVID-19 patients.

Link
https://pubmed.ncbi.nlm.nih.gov/32239472/

Citation
Radiol Med. 2020 Apr;125(4):365-373. doi: 10.1007/s11547-020-01179-x. Epub 2020 Apr 1.

Title
Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: a descriptive study

Author
Shi H, Han X, Jiang N, Cao Y, Alwalid O, Gu J, Fan Y, Zheng C.

Abstract
Background A cluster of patients with coronavirus disease 2019 (COVID-19) pneumonia caused by infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) were successively reported in Wuhan, China. We aimed to describe the CT findings across different timepoints throughout the disease course.

Link
https://pubmed.ncbi.nlm.nih.gov/32105637/

Citation
Lancet Infect Dis. 2020 Apr;20(4):425-434. doi: 10.1016/S1473-3099(20)30086-4. Epub 2020 Feb 24.

Title
Chest CT Features of COVID-19 in Rome, Italy

Author
Caruso D, Zerunian M, Polici M, Pucciarelli F, Polidori T, Rucci C, Guido G, Bracci B, de Dominicis C, Laghi A.

Abstract
Background The standard for diagnosis of SARS-CoV-2 virus is reverse transcription polymerase chain reaction (RT-PCR) test, but chest CT may play a complimentary role in the early detection of COVID-19 pneumonia. Purpose To investigate CT features of patients with COVID-19 in Rome, Italy, and to compare the accuracy of CT with RT-PCR. Methods In this prospective study from March 4, 2020, until March 19, 2020, consecutive patients with suspected COVID-19 infection and respiratory symptoms were enrolled. Exclusion criteria were: chest CT with contrast medium performed for vascular indications, patients who refused chest CT or hospitalization, and severe CT motion artifact. All patients underwent RT-PCR and chest CT. Diagnostic performance of CT was calculated using RT-PCR as reference. Chest CT features were calculated in a subgroup of RT-PCR-positive and CT-positive patients. CT features of hospitalized patients and patient in home isolation were compared by using Pearson chi squared test. Results Our study population comprised 158 consecutive study participants (83 male and 75 female, mean age 57 y ±17). Fever was observed in 97/158 (61%), cough in 88/158 (56%), dyspnea in 52/158 (33%), lymphocytopenia in 95/158 (60%), increased C-reactive protein level in 139/158 (88%), and elevated lactate dehydrogenase in 128/158 (81%) study participants. Sensitivity, specificity, and accuracy of CT were 97% (60/62)[95% IC, 88-99%], 56% (54/96)[95% IC,45-66%] and 72% (114/158)[95% IC 64-78%], respectively. In the subgroup of RT-PCR-positive and CT-positive patients, ground-glass opacities (GGO) were present in 58/58 (100%), multilobe and posterior involvement were both present in 54/58 (93%), bilateral pneumonia in 53/58 (91%), and subsegmental vessel enlargement (> 3 mm) in 52/58 (89%) of study participants. Conclusion The typical pattern of COVID-19 pneumonia in Rome, Italy, was peripherally ground-glass opacities with multilobe and posterior involvement, bilateral distribution, and subsegmental vessel enlargement (> 3 mm). Chest CT sensitivity was high (97%) but with lower specificity (56%).

Link
https://pubmed.ncbi.nlm.nih.gov/32243238/

Citation
Radiology. 2020 Apr 3;201237. doi: 10.1148/radiol.2020201237.

Title
Radiologic Chest CT Findings From COVID-19 in Orleans Parish, Lousiana.

Author
Danrad R, Smith DL, Kerut EK.

Abstract
Orleans Parish in Louisiana is in the midst of an exponentially increasing number of patient admissions with COVID-19 and respiratory symptoms. Patients have been described having CT findings most consistent with an early-stage (<7 days from symptoms onset) or an advanced stage (8-14 days from symptoms onset). We describe and illustrate those early and advanced stage CT findings from patients with documented COVID-19 who have been admitted to University Medical Center in New Orleans, Louisiana.

Link
https://pubmed.ncbi.nlm.nih.gov/32239525/

Citation
Echocardiography. 2020 Apr 1. doi: 10.1111/echo.14662.

Title
Emerging 2019 Novel Coronavirus (2019-nCoV) Pneumonia

Author
Song F, Shi N, Shan F, Zhang Z, Shen J, Lu H, Ling Y, Jiang Y, Shi Y.

Abstract
Background
The chest CT findings of patients with 2019 Novel Coronavirus (2019-nCoV) pneumonia have not previously been described in detail.

Purpose
To investigate the clinical, laboratory, and imaging findings of emerging 2019-nCoV pneumonia in humans.

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200274

Citation
Radiology. Feb 6 2020https://doi.org/10.1148/radiol.2020200274

Title
Ultra-high-resolution computed tomography can demonstrate alveolar collapse in novel coronavirus (COVID-19) pneumonia

Author
Iwasawa T, Sato M, Yamaya T, Sato Y, Uchida Y, Kitamura H, Hagiwara E, Komatsu S, Utsunomiya D, Ogura T.

Abstract
To review the chest computed tomography (CT) findings on the ultra-high-resolution CT (U-HRCT) in patients with the Novel coronavirus disease 2019 (COVID-19).

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7110271/

Citation
Jpn J Radiol. 2020 Mar 31 : 1–5.doi: 10.1007/s11604-020-00956-y

Title
Serial Quantitative Chest CT Assessment of COVID-19: Deep-Learning Approach

Author
Huang L, Han R, Ai T, Yu P, Kang H, Tao Q, Xia L.

Abstract
Purpose
To quantitatively evaluate lung burden changes in patients with COVID-19 using serial CT scan by an automated deep learning method.

Materials and Methods
Patients with COVID-19 who underwent chest CT between 1st January 2020 and 3rd February 2020 were retrospectively evaluated. Patients were divided into mild, moderate, severe, and critical types, according to their baseline clinical, laboratory, and CT findings. CT lung opacification percentage of the whole lung and five lobes were automatically quantified by a commercial deep learning software, and compared over follow-ups CT scans. Longitudinal changes of the CT quantitative parameter were also compared among the four clinical types.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200075

Citation
Radiology. Mar 30 2020https://doi.org/10.1148/ryct.2020200075

Title
Extension of Coronavirus Disease 2019 (COVID-19) on Chest CT and Implications for Chest Radiograph Interpretation

Author
Choi H, Qi X, Yoon SH, Park SJ, Lee KH, Kim JY, Lee YK, Ko H, Kim KH, Park CM, Kim YH, Lei J, Hong JH, Kim H, Hwang EJ, Yoo SJ, Nam JG, Lee CH, Goo JM.

Abstract
Purpose
To study the extent of pulmonary involvement in COVID-19 with quantitative CT (QCT) and to assess the impact of disease burden on opacity visibility on chest radiographs.

Materials and Methods
This retrospective study included 20 pairs of CT scans and same-day chest radiographs from 17 patients with COVID-19, along with 20 chest radiographs of controls. All pulmonary opacities were semi-automatically segmented on CT images, producing an anteroposterior projection image to match the corresponding frontal chest radiograph. The lung opacification mass (QCTmass) was defined as [(opacity attenuation value+1000 HU)/1000]*1.065(g/mL) * combined volume (cm3) of the individual opacities. Eight thoracic radiologists reviewed the 40 radiographs, and a receiver operating characteristics curve analysis was performed for the detection of lung opacities. Logistic regression analysis was done to identify factors affecting opacity visibility on chest radiographs.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200107

Citation
Radiology. Mar 30 2020https://doi.org/10.1148/ryct.2020200107

Title
Chest CT Severity Score: An Imaging Tool for Assessing Severe COVID-19

Author
Yang R, Li X, Liu H, Zhen Y, Zhang X, Xiong Q, Luo Y, Gao C, Zeng W.

Abstract
Background
Quantitative and semi-quantitative indicators to evaluate the severity of lung inflammation in Coronavirus Disease 2019 (COVID-19) could provide an objective approach to rapidly identify patients in need of hospital admission.

Purpose
To evaluate the value of chest computed tomography severity score (CT-SS) in differentiating clinical forms of COVID-19.

Link
https://pubs.rsna.org/doi/full/10.1148/ryct.2020200047

Citation
Radiology. Mar 30 2020https://doi.org/10.1148/ryct.2020200047

Title
Timely Diagnosis and Treatment Shortens the Time to Resolution of Coronavirus Disease (COVID-19) Pneumonia and Lowers the Highest and Last CT Scores From Sequential Chest CT

Author
Huang G, Gong T, Wang G, Wang J, Guo X, Cai E, Li S, Li X, Yu Y, Lin L.

Abstract
OBJECTIVE. This study aims to assess correlations of the time from symptom onset to diagnosis and treatment with the time to disease resolution and CT scores as based on findings from sequential chest CT examinations. MATERIALS AND METHODS. Thirty patients with coronavirus disease (COVID-19) confirmed by reverse transcription-polymerase chain reaction analysis underwent chest CT examinations. Five patients who did not have positive CT findings or who had not yet fulfilled criteria for discharge from the hospital were excluded. CT scores were determined according to CT findings and lung involvement. The time from symptom onset to diagnosis and treatment was recorded for each patient, and on the basis of this information, patients with COVID-19 were divided into group 1 (patients for whom this interval was ≤ 3 days) and group 2 (those for whom this interval was > 3 days). The CT scores for each group were fitted using a Lorentzian line-shape curve to show the variation tendency during treatment. The differences in age, sex, and last CT scores determined before discharge between the two groups were analyzed, and correlations of the time from symptom onset to diagnosis and treatment with the time to disease resolution as well as with the highest CT score also underwent statistical analysis.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32223665

Citation
AJR Am J Roentgenol. 2020 Mar 30:1-7. doi: 10.2214/AJR.20.23078. [Epub ahead of print]

Title
A Comparative Study of Chest Computed Tomography Features in Young and Older Adults With Corona Virus Disease (COVID-19).

Author
Zhu T, Wang Y, Zhou S, Zhang N, Xia L.

Abstract
Objective: To analyze the most common computed tomography (CT) findings of pneumonia caused by new coronavirus in younger patients (60 and younger) and older adults (older than 60).
Materials and methods: The chest CT images of 72 symptomatic patients with corona virus disease (COVID-19) were analyzed retrospectively, including 44 younger patients (47.5±8.7 y old) and 28 older patients (68.4±6.0 y old). CT findings including density (pure ground-glass opacities, ground-glass opacities with consolidation, consolidation), the number of lobes involved, lesion distribution, and the main accompanying signs were analyzed and compared.

Link
https://pubmed.ncbi.nlm.nih.gov/32235187/

Citation
J Thorac Imaging. 2020 Mar 31. doi: 10.1097/RTI.0000000000000513.

Title
The Role of Emergency Radiology in COVID-19: From Preparedness to Diagnosis

Author
Nasir MU, Roberts J, Muller NL, Macri F, Mohammed MF, Akhlaghpoor S, Parker W, Eftekhari A, Rezaei S, Mayo J, Nicolaou S.

Abstract
Emergency trauma radiology, although a relatively new subspecialty of radiology, plays a critical role in both the diagnosis/triage of acutely ill patients, but even more important in providing leadership and taking the lead in the preparedness of imaging departments in dealing with novel highly infectious communicable diseases and mass casualties. This has become even more apparent in dealing with COVID-19, the disease caused by the novel coronavirus SARS-CoV-2, first emerged in late 2019. We review the symptoms, epidemiology, and testing for this disease. We discuss characteristic imaging findings of COVID-19 in relation to other modern coronavirus diseases including SARS and MERS. We discuss roles that community radiology clinics, outpatient radiology departments, and emergency radiology departments can play in the diagnosis of this disease. We review practical methods to reduce spread of infections within radiology departments.

Link
https://pubmed.ncbi.nlm.nih.gov/32233876/

Citation
Can Assoc Radiol J. 2020 Mar 28;846537120916419. doi: 10.1177/0846537120916419.

Title
Diagnostic performance of chest CT to differentiate COVID-19 pneumonia in non-high-epidemic area in Japan

Author
Himoto Y, Sakata A, Kirita M, Hiroi T, Kobayashi KI, Kubo K, Kim H, Nishimoto A, Maeda C, Kawamura A, Komiya N, Umeoka S.

Abstract
Purpose
To evaluate the diagnostic performance of chest CT to differentiate coronavirus disease 2019 (COVID-19) pneumonia in non-high-epidemic area in Japan.
Materials and methods
This retrospective study included 21 patients clinically suspected COVID-19 pneumonia and underwent chest CT more than 3 days after the symptom onset: six patients confirmed COVID-19 pneumonia by real-time reverse-transcription polymerase chain reaction (RT-PCR) and 15 patients proved uninfected. Using a Likert scale and its receiver operating characteristic curve analysis, two radiologists (R1/R2) evaluated the diagnostic performance of the five CT criteria: (1) ground glass opacity (GGO)-predominant lesions, (2) GGO- and peripheral-predominant lesions, (3) bilateral GGO-predominant lesions; (4) bilateral GGO- and peripheral-predominant lesions, and (5) bilateral GGO- and peripheral-predominant lesions without nodules, airway abnormalities, pleural effusion, and mediastinal lymphadenopathy.

Link
https://pubmed.ncbi.nlm.nih.gov/32232648/

Citation
Jpn J Radiol. 2020 Mar 30. doi: 10.1007/s11604-020-00958-w.

Title
Diagnosis of the Coronavirus disease (COVID-19): rRT-PCR or CT?

Author
Long C, Xu H, Shen Q, Zhang X, Fan B, Wang C, Zeng B, Li Z, Li X, Li H.

Abstract
Purpose: To evaluate the diagnostic value of computed tomography (CT) and real-time reverse-transcriptase-polymerase chain reaction (rRT-PCR) for COVID-19 pneumonia.

Methods: This retrospective study included all patients with COVID-19 pneumonia suspicion, who were examined by both CT and rRT-PCR at initial presentation. The sensitivities of both tests were then compared. For patients with a final confirmed diagnosis, clinical and laboratory data, in addition to CT imaging findings were evaluated.

Link
https://pubmed.ncbi.nlm.nih.gov/32229322/

Citation
Eur J Radiol. 2020 May;126:108961. doi: 10.1016/j.ejrad.2020.108961. Epub 2020 Mar 25.

Title
3D CT of Novel Coronavirus (COVID-19) Pneumonia

Author
Ufuk F.

Abstract
A 38-year-old man presented with complaints of fever, shortness of breath, dry cough, and anosmia for 3 days. The patient had complaints of pleuritic chest pain of several hours duration. Physical examination revealed crackles on lung auscultation, and forehead temperature was 38.6° Celsius. Routine laboratory values were mostly within normal limits, with the exception of C-reactive protein level (51.4 mg/L; normal level, < 5 mg/L) and erythrocyte sedimentation rate (28 mm/h; normal level, 0-15 mm/h). The patient underwent unenhanced chest CT with a preliminary diagnosis of pneumonia.

Chest CT images (Figs 1 and 2) showed peripheral, multilobar areas of ground-glass opacity sign suggesting diagnosis of novel coronavirus (COVID-19) pneumonia (Fig 2). Nasopharyngeal swab obtained 2 hours after CT was positive for COVID-19 with real-time polymerase chain reaction (RT-PCR), and the diagnosis of COVID-19 pneumonia was confirmed. The patient was treated with oxygen inhalation, hydroxychloroquine, oseltamivir, and lopinavir/ritonavir. On day 6 of hospitalization, the patient's body temperature returned to normal, and clinical symptoms improved. Common CT features are peripheral, bilateral, multilobar, and basal predominant distributed consolidation and/or ground-glass opacities, as in the present case (1).

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020201183

Citation
Radiology. Mar 31 2020https://doi.org/10.1148/radiol.2020201183

Title
COVID-19-associated Acute Hemorrhagic Necrotizing Encephalopathy: CT and MRI Features

Author
Poyiadji N, Shahin G, Noujaim D, Stone M, Patel S, Griffith B.

Abstract
Since its introduction to the human population in December 2019, the coronavirus disease 2019 (COVID-19) pandemic has spread across the world with over 330,000 reported cases in 190 countries (1). While patients typically present with fever, shortness of breath, and cough, neurologic manifestations have been reported, although to a much lesser extent (2). We report the first presumptive case of COVID-19–associated acute necrotizing hemorrhagic encephalopathy, a rare encephalopathy that has been associated with other viral infections but has yet to be demonstrated as a result of COVID-19 infection.
A female airline worker in her late fifties presented with a 3-day history of cough, fever, and altered mental status. Initial laboratory work-up was negative for influenza, with the diagnosis of COVID-19 made by detection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) viral nucleic acid in a nasopharyngeal swab specimen using the U.S. Centers for Disease Control and Prevention (CDC) 2019-Novel Coronavirus (2019-nCoV) Real-Time Reverse Transcriptase-Polymerase Chain Reaction assay. The assay was performed on a Roche thermocycler at our institution following “emergency use authorization” from the CDC. Cerebrospinal fluid (CSF) analysis was limited due to a traumatic lumbar puncture. However, CSF bacterial culture showed no growth after 3 days, and tests for herpes simplex virus 1 and 2, varicella zoster virus, and West Nile virus were negative. Testing for the presence of SARS-CoV-2 in the CSF was unable to be performed. Noncontrast head CT images demonstrated symmetric hypoattenuation within the bilateral medial thalami with a normal CT angiogram and CT venogram (Fig 1). Images from brain MRI demonstrated hemorrhagic rim enhancing lesions within the bilateral thalami, medial temporal lobes, and subinsular regions (Fig 2). The patient was started on intravenous immunoglobulin. High-dose steroids were not initiated due to concern for respiratory compromise.

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020201187

Citation
Radiology. Mar 31 2020https://doi.org/10.1148/radiol.2020201187

Title
Chest CT Findings in 2019 Novel Coronavirus (2019-nCoV) Infections from Wuhan, China: Key Points for the Radiologist

Author
Kanne JP.

Abstract
A cluster of patients with an acute severe lower respiratory tract illness linked to a seafood and live animal market was reported by public health officials in Wuhan, Hubei Province, China, in December 2019 (1). Shortly thereafter, the Chinese Center for Disease Control and Prevention commenced an investigation into the outbreak. A previously unknown coronavirus (2019 novel coronavirus [2019-nCoV]) was isolated from respiratory epithelial cells in these patients (2). Initially confined to Wuhan, the infection has spread elsewhere, with 9720 confirmed cases in China and 106 confirmed cases in other countries— including six in the United States as of January 31, 2020 (3,4).

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200241

Citation
Radiology. 2020 Apr;295(1):16-17. doi: 10.1148/radiol.2020200241. Epub 2020 Feb 4.

Title
CT Manifestations of Two Cases of 2019 Novel Coronavirus (2019-nCoV) Pneumonia

Author
Fang Y, Zhang H, Xu Y, Xie J, Pang P, Ji W.

Abstract
Herein, we report two cases of 2019 novel coronavirus (2019-nCoV). Both patients are believed to have exposure related to Wuhan, China (1–4). We demonstrated change in the course of disease over time on CT scans (5,6).

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200280

Citation
Radiology. Feb 7 2020https://doi.org/10.1148/radiol.2020200280

Title
Evolution of CT Manifestations in a Patient Recovered from 2019 Novel Coronavirus (2019-nCoV) Pneumonia in Wuhan, China

Author
Shi H, Han X, Zheng C.

Abstract
A new type of pneumonia caused by the 2019 novel coronavirus (2019-nCoV) broke out in December 2019 in Wuhan City, China (1,2). On January 1, 2020, a 42-year-old man was admitted to the emergency department of Union Hospital (Tongji Medical College, Wuhan, Hubei Province) due to a high-grade fever (39.6°C [103.28°C]), cough, and fatigue for 1 week. Bilateral coarse breath sounds with wet rales distributed at the bases of both lungs were heard on auscultation. Laboratory studies showed leukopenia (white blood cell count, 2.88 × 109/L) and lymphocytosis (lymphocyte cell count, 0.90 × 109/L). The white blood cell differential count displayed 56.6% neutrophils, 32.1% lymphocytes, and 10.2% monocytes. Several additional laboratory tests were abnormal, including C-reactive protein (158.95 mg/L; normal range, 0–10 mg/L), erythrocyte sedimentation rate (38 mm/h; normal range, <20 mm/h), serum amyloid A protein (607.1 mg/L; normal range, <10 mg/L), aspartate aminotransferase (53 U/L; normal range, 8–40 U/L), and alanine aminotransferase (60 U/L; normal range, 5–40 U/L). Real-time ñuorescence polymerase chain reaction of the patient's sputum was positive for the 2019-nCoV nucleic acid. The patient was treated with antiviral drugs (ganciclovir, oseltamivir) and anti-inflammatory drugs (meropenem, linezolid), with supportive care from January 1, 2020, until his discharge on January 25, 2020. Serial imaging studies in the Figure illustrate the patient's improvement after therapy.

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200269

Citation
Radiology. Feb 7 2020https://doi.org/10.1148/radiol.2020200269

Title
2019 Novel Coronavirus (2019-nCoV) Pneumonia

Author
Liu P, Tan XZ.

Abstract
A 41-year-old woman with a travel history to Wuhan, China, where the 2019 novel coronavirus (2019-nCoV) was spreading (1), presented with a 4-day history of fever. Laboratory examinations and chest radiographs were negative. Chest CT (Figure) showed multifocal ground-glass opacities in the perihilar and subpleural regions of both lungs, a common finding of 2019-nCoV–infected pneumonia (2–5). A throat swab was positive for 2019-nCoV on the real-time reverse transcription polymerase chain reaction assay. The patient was immediately isolated for clinical monitoring.

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200257

Citation
Radiology. Feb 4 2020https://doi.org/10.1148/radiol.2020200257

Title
Novel Coronavirus Pneumonia (COVID-19) Progression Course in 17 Discharged Patients: Comparison of Clinical and Thin-Section CT Features During Recovery

Author
Han X, Cao Y, Jiang N, Chen Y, Alwalid O, Zhang X, Gu J, Dai M, Liu J, Zhu W, Zheng C, Shi H.

Abstract
Background: To retrospectively analyze the evolution of clinical features and thin-section CT imaging of novel coronavirus pneumonia (COVID-19) in 17 discharged patients.
Methods: Serial thin-section CT scans of 17 discharged patients with COVID-19 were obtained during recovery. Longitudinal changes of clinical parameters and CT pattern were documented in all patients during 4 weeks since admission. CT score was used to evaluate the extent of the disease.
Results: There was a marked improvement of fever, lymphocytes count, C-reactive protein and erythrocyte sedimentation rate within the first two weeks since admission. However, the mean CT score rapidly increased from the 1st to 3rd week, with a top score of 8.2 obtained in the 2nd week. During the 1st week, the main CT pattern was ground-glass opacities (GGO,76.5%). The frequency of GGO (52.9%) decreased in the 2nd week. Consolidation and mixed patterns (47.0%) were noted in the 2nd week. Thereafter, consolidations generally dissipated into GGO and the frequency of GGO increased in the 3rd week (76.5%) and 4th week (71.4%). Opacities were mainly located in the peripheral (76.5%), subpleural (47.1%) zones of the lungs, and presented as focal (35.3%) or multifocal (29.4%) in the 1st week and became more diffuse in the 2nd (47.1%) and 3rd week (58.8%), then showed reduced extent in 4th week (50%).
Conclusions: The progression course of CT pattern was later than the clinical parameters within the first two weeks since admission; however, there was a synchronized improvement in both clinical and radiologic features in the 4th week.

Link
https://pubmed.ncbi.nlm.nih.gov/32227091/

Citation
Clin Infect Dis. 2020 Mar 30;ciaa271. doi: 10.1093/cid/ciaa271.

Title
Computed Tomographic Imaging of 3 Patients With Coronavirus Disease 2019 Pneumonia With Negative Virus Real-time Reverse-Transcription Polymerase Chain Reaction Test

Author
Xu J, Wu R, Huang H, Zheng W, Ren X, Wu N, Ji B, Lv Y, Liu Y, Mi R.

Abstract
We reported computed tomographic (CT) imaging findings of 3 patients with coronavirus disease 2019 (COVID-19) pneumonia with initially negative results before CT examination and finally confirmed positive for the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by real-time reverse-transcription polymerase chain reaction assay.

Link
https://pubmed.ncbi.nlm.nih.gov/32232429/

Citation
Clin Infect Dis. 2020 Mar 31;ciaa207. doi: 10.1093/cid/ciaa207.

Title
Pulmonary High-Resolution Computed Tomography (HRCT) Findings of Patients with Early-Stage Coronavirus Disease 2019 (COVID-19) in Hangzhou, China

Author
Gao L, Zhang J.

Abstract
BACKGROUND The aim of this study was to investigate the imaging manifestations of early-stage coronavirus disease 2019 (COVID-19) and to provide imaging basis for early detection of suspected cases and stratified intervention. MATERIAL AND METHODS From 20 January 2020 to 2 February 2020, 6 patients diagnosed with COVID-19, including 1 male and 5 females, were retrospectively reviewed in Zhejiang Hospital. These cases were clinically assessed and classified as common COVID-19. All patients underwent thoracic high-resolution computed tomography (HRCT) within 2 days after the onset of symptoms, and their images were viewed by 2 radiologists who were blind to their clinical records. RESULTS CT images of 6 confirmed patients were collected. Two of the 6 patients (33.3%) had bilateral lung involvements and 4 (66.7%) had single-lung involvement. Two cases (33.3%) had a single lesion, 2 cases (33.3%) had 2 lesions, and 2 cases (33.3%) had multiple lesions. There were 2 cases (33.3%) with focal subpleural distribution and 1 case (16.7%) along the bronchial vascular bundle. Five cases (83.3%) had ground-glass opacities, 4 cases (66.7%) had ground-glass nodules, 1 case (16.7%) had thickened lobular septum, 2 cases (33.3%) had thickened bronchial wall, 2 cases (33.3%) had halo sign,1 case (16.7%) had crazy-paving sign, and 1 case (16.7%) had tree-in-bud sign. CONCLUSIONS The imaging manifestations of early-stage COVID-19 are relatively mild, and the imaging findings of some patients are not typical, which can easily lead to missed diagnoses. Thus, suspected cases need to be closely monitored, and epidemiological history and clinical laboratory examination should also be considered during diagnosis.

Link
https://pubmed.ncbi.nlm.nih.gov/32246819/

Citation
Med Sci Monit. 2020 Apr 4;26:e923885. doi: 10.12659/MSM.923885.

Title
Necessitating repeated chest CT in COVID-19 pneumonia

Author
Li M, Zhang LJ, Tian GH, Hao XZ.

Abstract
An outbreak of novel coronavirus, severe acute respiratory syndrome corona-virus 2 (SARS-CoV-2) began in Wuhan, China, has spread rapidly.1 The disease caused by SARSCoV-2 was named as coronavirus disease 2019 (COVID-19) by the World Health Organization.2 Chest computed tomography (CT) is easily available and is highly strongly recommended for screening patients for rapid confirmation of SARS-CoV-2 infected COVID-19.3 We report a case with COVID-19 pneumonia which has outlined the main patterns of evolution seen on CT imaging though real-time fluorescence polymerase chain reaction results were negative for a total of four times.

Link
https://pubmed.ncbi.nlm.nih.gov/32229062/

Citation
J Formos Med Assoc. 2020 Mar 27;S0929-6646(20)30080-2. doi: 10.1016/j.jfma.2020.03.006.

Title
Recommendation of low-dose CT in the detection and management of COVID-2019.

Author
Kang Z, Li X, Zhou S.

Abstract
CT imaging plays an important role in the diagnosis of COVID-2019, especially in the early stages of the disease or with a low viral load; swab tests may be negative [1]. Fang Y et al reported a sensitivity of 98% for chest CT diagnosis of COVID-2019, while RT-PCR serves as the gold standard; its early sensitivity was only 71% [2]. The vast majority, 98%, show bilateral lung involvement. The typical chest CT findings of non-ICU patients are bilateral ground-glass opacity and sub-segmental consolidation, while the typical chest CT findings of ICU patients are bilateral multi-lobe and sub-segmental consolidation [3]. The affected lungs are mostly located in the peripheral zone. Other imaging features include linear opacities, “crazy-paving” pattern, and the “reverse halo” sign [4]. According to the COVID-2019 pneumonia diagnosis and treatment scheme of the People’s Republic of China (trial version 5), imaging features can upgrade suspected cases of new coronavirus pneumonia to clinical diagnosis.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=Recommendation+of+low-dose+CT+in+the+detection+and+management+of+COVID-2019

Citation
Eur Radiol. 2020 Mar 19. doi: 10.1007/s00330-020-06809-6. [Epub ahead of print]

Title
Coronavirus Disease 2019 (COVID-19): Role of Chest CT in Diagnosis and Management

Author
Li Y, Xia L.

Abstract
OBJECTIVE. The objective of our study was to determine the misdiagnosis rate of radiologists for coronavirus disease 2019 (COVID-19) and evaluate the performance of chest CT in the diagnosis and management of COVID-19. The CT features of COVID-19 are reported and compared with the CT features of other viruses to familiarize radiologists with possible CT patterns. MATERIALS AND METHODS. This study included the first 51 patients with a diagnosis of COVID-19 infection confirmed by nucleic acid testing (23 women and 28 men; age range, 26-83 years) and two patients with adenovirus (one woman and one man; ages, 58 and 66 years). We reviewed the clinical information, CT images, and corresponding image reports of these 53 patients. The CT images included images from 99 chest CT examinations, including initial and follow-up CT studies. We compared the image reports of the initial CT study with the laboratory test results and identified CT patterns suggestive of viral infection

Link
https://www.ncbi.nlm.nih.gov/pubmed/32130038

Citation
AJR Am J Roentgenol. 2020 Mar 4;1-7. doi: 10.2214/AJR.20.22954.

Title
CT image visual quantitative evaluation and clinical classification of coronavirus disease (COVID-19)

Author
Li K, Fang Y, Li W, Pan C, Qin P, Zhong Y, Liu X, Huang M, Liao Y, Li S.

Abstract
OBJECTIVES: To explore the relationship between the imaging manifestations and clinical classification of COVID-19. METHODS: We conducted a retrospective single-center study on patients with COVID-19 from Jan. 18, 2020 to Feb. 7, 2020 in Zhuhai, China. Patients were divided into 3 types based on Chinese guideline: mild (patients with minimal symptoms and negative CT findings), common, and severe-critical (patients with positive CT findings and different extent of clinical manifestations). CT visual quantitative evaluation was based on summing up the acute lung inflammatory lesions involving each lobe, which was scored as 0 (0%), 1 (1-25%), 2 (26-50%), 3 (51-75%), or 4 (76-100%), respectively. The total severity score (TSS) was reached by summing the five lobe scores. The consistency of two observers was evaluated. The TSS was compared with the clinical classification. ROC was used to test the diagnosis ability of TSS for severe-critical type. RESULTS: This study included 78 patients, 38 males and 40 females. There were 24 mild (30.8%), 46 common (59.0%), and 8 severe-critical (10.2%) cases, respectively. The median TSS of severe-critical-type group was significantly higher than common type ($p < 0.001$). The ICC value of the two observers was 0.976 (95% CI 0.962-0.985). ROC analysis showed the area under the curve (AUC) of TSS for diagnosing severe-critical type was 0.918. The TSS cutoff of 7.5 had 82.6% sensitivity and 100% specificity. CONCLUSIONS: The proportion of clinical mild-type patients with COVID-19 was relatively high; CT was not suitable for independent screening tool. The CT visual quantitative analysis has high consistency and can reflect the clinical classification of COVID-19. KEY POINTS: • CT visual quantitative evaluation has high consistency (ICC value of 0.976) among the observers. The median TSS of severe-critical type group was significantly higher than common type ($p < 0.001$). • ROC analysis showed the area under the curve (AUC) of TSS for diagnosing severe-critical type was 0.918 (95% CI 0.843-0.994). The TSS cutoff of 7.5 had 82.6% sensitivity and 100% specificity. • The proportion of confirmed COVID-19 patients with normal chest CT was relatively high (30.8%); CT was not a suitable screening modality.

Link
https://link.springer.com/article/10.1007/s00330-020-06817-6

Citation
European Radiology (2020) Published: 25 March 2020

Title
Coronavirus disease 2019: initial chest CT findings

Author
Zhou Z, Guo D, Li C, Fang Z, Chen L, Yang R, Li X, Zeng W.

Abstract
OBJECTIVES: To systematically analyze CT findings during the early and progressive stages of natural course of coronavirus disease 2019 and also to explore possible changes in pulmonary parenchymal abnormalities during these two stages.
METHODS: We retrospectively reviewed the initial chest CT data of 62 confirmed coronavirus disease 2019 patients (34 men, 28 women; age range 20-91 years old) who did not receive any antiviral treatment between January 21 and February 4, 2020, in Chongqing, China. Patients were assigned to the early-stage group (onset of symptoms within 4 days) or progressive-stage group (onset of symptoms within 4-7 days) for analysis. CT characteristics and the distribution, size, and CT score of pulmonary parenchymal abnormalities were assessed.
RESULTS: In our study, the major characteristic of coronavirus disease 2019 was ground-glass opacity (61.3%), followed by ground-glass opacity with consolidation (35.5%), rounded opacities (25.8%), a crazy-paving pattern (25.8%), and an air bronchogram (22.6%). No patient presented cavitation, a reticular pattern, or bronchial wall thickening. The CT scores of the progressive-stage group were significantly greater than those of the early-stage group ($p = 0.004$).
CONCLUSIONS: Multiple ground-glass opacities with consolidations in the periphery of the lungs were the primary CT characteristic of coronavirus disease 2019. CT score can be used to evaluate the severity of the disease. If these typical alterations are found, then the differential diagnosis of coronavirus disease 2019 must be considered.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32211963

Citation
Eur Radiol. 2020 Mar 24. doi: 10.1007/s00330-020-06816-7.

Title
The Battle Against Coronavirus Disease 2019 (COVID-19): Emergency Management and Infection Control in a Radiology Department

Author
Huang Z, Zhao S, Li Z, Chen W, Zhao L, Deng L, Song B.

Abstract
Objective: To describe the strategy and the emergency management and infection control procedure of our radiology department during the coronavirus disease 2019 (COVID-19) outbreak.
Methods: We set up emergency management and sensing control teams. The team formulated various measures: reconfiguration of the radiology department, personal protection and training of staff, examination procedures for patients suspected of or confirmed with COVID-19 as well as patients without an exposure history or symptoms. Those with suspected or confirmed COVID-19 infection were scanned in the designated fever-CT unit.
Results: From January 21, 2020, to March 9, 2020, 3,083 people suspected or confirmed to be infected with COVID-19 underwent fever-CT examinations. Including initial examinations and re-examinations, the total number of fever-CT examinations numbered 3,340. As a result of our precautions, none of the staff of the radiology department were infected with COVID-19.
Conclusion: Strategic planning and adequate protections can help protect patients and staff against a highly infectious disease while maintaining function at a high-volume capacity.

Link
https://pubmed.ncbi.nlm.nih.gov/32208140/

Citation
J Am Coll Radiol. 2020 Mar 24;S1546-1440(20)30285-4. doi: 10.1016/j.jacr.2020.03.011.

Title
Coronavirus Disease (COVID-19): Spectrum of CT Findings and Temporal Progression of the Disease

Author
Li M, Lei P, Zeng B, Li Z, Yu P, Fan B, Wang C, Li Z, Zhou J, Hu S, Liu H.

Abstract
Coronavirus disease is an emerging infection caused by a novel coronavirus that is moving rapidly. High resolution computed tomography (CT) allows objective evaluation of the lung lesions, thus enabling us to better understand the pathogenesis of the disease. With serial CT examinations, the occurrence, development, and prognosis of the disease can be better understood. The imaging can be sorted into four phases: early phase, progressive phase, severe phase, and dissipative phase. The CT appearance of each phase and temporal progression of the imaging findings are demonstrated.

Link
https://pubmed.ncbi.nlm.nih.gov/32204987/

Citation
Acad Radiol. 2020 Mar 20;S1076-6332(20)30144-6. doi: 10.1016/j.acra.2020.03.003.

Title
Imaging Features of Coronavirus Disease 2019 (COVID-19): Evaluation on Thin-Section CT

Author
Guan CS, Lv ZB, Yan S, Du YN, Chen H, Wei LG, Xie RM, Chen BD.

Abstract
Rationale and objectives: To retrospectively analyze the chest imaging findings in patients with coronavirus disease 2019 (COVID-19) on thin-section CT.
Materials and methods: Fifty-three patients with confirmed COVID-19 infection underwent thin-section CT examination. Two chest radiologists independently evaluated the imaging in terms of distribution, ground-glass opacity (GGO), consolidation, air bronchogram, stripe, enlarged mediastinal lymph node, and pleural effusion.
Results: Fourty-seven cases (88.7%) had findings of COVID-19 infection, and the other six (11.3%) were normal. Among the 47 cases, 78.7% involved both lungs, and 93.6% had peripheral infiltrates distributed along the subpleural area. All cases showed GGO, 59.6% of which were round and 40.4% patchy. Other imaging features included "crazy-paving pattern" (89.4%), consolidation (63.8%), and air bronchogram (76.6%). Air bronchograms were observed within GGO (61.7%) and consolidation (70.3%). Neither enlarged mediastinal lymph nodes nor pleural effusion were present. Thirty-three patients (62.3%) were followed an average interval of 6.2 ± 2.9 days. The lesions increased in 75.8% and resorbed in 24.2% of patients.
Conclusion: COVID-19 showed the pulmonary lesions in patients infected with COVID-19 were predominantly distributed peripherally in the subpleural area.

Link
https://pubmed.ncbi.nlm.nih.gov/32204990/

Citation
Acad Radiol. 2020 Mar 20;S1076-6332(20)30143-4. doi: 10.1016/j.acra.2020.03.002.

Title
CT Morphology of COVID-19: Case Report and Review of Literature

Author
Hamer OW, Salzberger B, Gebauer J, Stroszczynski C, Pfeifer M.

Abstract
The number of patients with COVID-19 is rapidly increasing in Europe. The lethality of the disease appears to be higher than that of seasonal flu, for example, especially in older patients. RT-PCR is the gold standard for establishing a diagnosis. In many patients, chest CT seems to provide an image that is suggestive for diagnosis. The cardinal signs are ground glass opacities, consolidation and crazy paving, predominantly located in the periphery of the lower lobes. This CT morphology can support the diagnosis and differentiation from other viral pneumonia. This is particularly important because RT-PCR can initially provide a false negative result.

Link
https://pubmed.ncbi.nlm.nih.gov/32215898/

Citation
Rofo. 2020 Mar 26. doi: 10.1055/a-1142-4094.

Title
High-Resolution Computed Tomography Manifestations of 5 Pediatric Patients With 2019 Novel Coronavirus

Author
Liu M, Song Z, Xiao K.

Abstract
We present clinical and chest computed tomography (CT) features of 5 cases of pediatric patients with 2019 novel coronavirus. Two patients had fever and dry cough, whereas the rest of 3 patients were asymptomatic. Three patients had unilateral ground glass opacities with or without consolidation in the subpleural region on high-resolution chest CT, 1 patient had bilateral ground glass opacities, and 1 patient was negative for CT. We note that up to 66.7% asymptomatic patients had pulmonary lesions, so the asymptomatic children with Wuhan contact are recommended to do a 2019 novel coronavirus real-time fluorescence polymerase chain reaction screening. Unlike adult patients, only a small amount of patients had multilobes affected, so we speculate that the pediatric patients generally have milder CT findings than adults.

Link
https://pubmed.ncbi.nlm.nih.gov/32217900/

Citation
J Comput Assist Tomogr. 2020 Mar 25. doi: 10.1097/RCT.0000000000001023.

Title
Imaging manifestations and diagnostic value of chest CT of coronavirus disease 2019 (COVID-19) in the Xiaogan area

Author
Wang K, Kang S, Tian R, Zhang X, Zhang X, Wang Y.

Abstract
Aim: To report the epidemiological, clinical, and radiological characteristics of patients with COVID-19 in Xiaogan, Hubei, China.
Materials and methods: The complete clinical and imaging data of 114 confirmed COVID-19 patients treated in Xiaogan Hospital were analysed retrospectively. Data were gathered regarding the presence of chest computed tomography (CT) abnormalities; the distribution, morphology, density, location, and stage of abnormal shadows on chest CT; and observing the correlation between the severity of chest infection and lymphocyte ratio and blood oxygen saturation (SPO2) in patients.
Results: Chest CT revealed abnormal lung shadows in 110 patients. Regarding lesion distribution, multi-lobe lesions in both lungs were present in most patients (80 cases; 72.7%). Lesions most frequently involved both the peripheral zone and the central zone (62 cases; 56.4%). Regarding lesion morphology, 56 cases (50.1%) demonstrated patchy shadows that were partially fused into large areas. Thirty cases showed ground-glass opacity (27.3%), 30 cases showed the consolidation change (27.3%), and the remaining 50 cases showed both types of changes (45.4%). The progressing stage was the most common stage (54 cases; 49.1%). CT results showed a negative correlation with SPO2 and lymphocyte numbers ($p<0.05$), with r-values of -0.446 and -0.780, respectively.
Conclusion: Spiral CT is a sensitive examination method, which can be applied to make an early diagnosis and for evaluation of progression, with a diagnostic sensitivity and accuracy better than that of nucleic acid detection.

Link
https://pubmed.ncbi.nlm.nih.gov/32216961/

Citation
Clin Radiol. 2020 May;75(5):341-347. doi: 10.1016/j.crad.2020.03.004. Epub 2020 Mar 23.

Title
The characteristics and clinical value of chest CT images of novel coronavirus pneumonia

Author
Zhao X, Liu B, Yu Y, Wang X, Du Y, Gu J, Wu X.

Abstract
AIM To investigate the characteristics and clinical value of chest computed tomography (CT) images of novel coronavirus pneumonia (NCP).
MATERIALS AND METHODS
Clinical data and CT images of 80 cases of NCP were collected. The clinical manifestations and laboratory test results of the patients were analysed. The lesions in each lung segment of the patient's chest CT images were characterised. Lesions were scored according to length and diffusivity.
RESULTS The main clinical manifestations were fever, dry cough, fatigue, a little white sputum, or diarrhoea. A total of 1,702 scored lesions were found in the first chest CT images of 80 patients. The lesions were located mainly in the subpleural area of the lungs (92.4%). Most of the lesions were ground-glass opacity, and subsequent fusions could increase in range and spread mainly in the subpleural area. Pulmonary consolidation accounted for 44.1% of all of the lesions. Of the 80 cases, 76 patients (95%) had bilateral lung disease, four (5%) patients had unilateral lung disease, and eight (10%) patients had cord shadow.
CONCLUSION The chest CT of NCP patients is characterised by the onset of bilateral ground-glass lesions located in the subpleural area of the lung, and progressive lesions that result in consolidation with no migratory lesions. Pleural effusions and mediastinal lymphadenopathy are rare. As patients can have inflammatory changes in the lungs alongside a negative early nucleic acid test, chest CT, in combination with epidemiological and laboratory tests, is a useful examination to evaluate the disease and curative effect.

Link
https://www.clinicalradiologyonline.net/article/S0009-9260(20)30086-6/fulltext

Citation
Clinical Radiology, May 2020 Volume 75, Issue 5, 335 – 340

Title
Clinical and CT features of early-stage patients with COVID-19: a retrospective analysis of imported cases in Shanghai, China

Author
Yang S, Shi Y, Lu H, Xu J, Li F, Qian Z, Hua X, Ding X, Song F, Shen J, Lu Y, Shan F, Zhang Z.

Abstract
Since December 2019, some patients with novel corona virus infectious disease (COVID-19) emerged in Wuhan, Hubei, China [1]. The pathogen analysis discovered a new type of coronavirus from infected airway epithelial cells [2] and named as sever acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) [3]. At the time of Chinese people were heading home for celebrating the Spring Festival, many latent cases left Wuhan, which led to the emergence of imported COVID-19 cases across the mainland of China and some other countries [4, 5]. Shanghai is one of the major cities with imported cases [4, 5].

Link
https://pubmed.ncbi.nlm.nih.gov/32217649/

Citation
Eur Respir J. 2020 Mar 26;2000407. doi: 10.1183/13993003.00407-2020.

Title
Artificial Intelligence Distinguishes COVID-19 from Community Acquired Pneumonia on Chest CT

Author
Li L, Qin L, Xu Z, Yin Y, Wang X, Kong B, Bai J, Lu Y, Fang Z, Song Q, Cao K, Liu D, Wang G, Xu Q, Fang X, Zhang S, Xia J, Xia J.

Abstract
Background: Coronavirus disease has widely spread all over the world since the beginning of 2020. It is desirable to develop automatic and accurate detection of COVID-19 using chest CT.
Purpose To develop a fully automatic framework to detect COVID-19 using chest CT and evaluate its performances.
Materials and Methods: In this retrospective and multi-center study, a deep learning model, COVID-19 detection neural network (COVNet), was developed to extract visual features from volumetric chest CT exams for the detection of COVID-19. Community acquired pneumonia (CAP) and other non-pneumonia CT exams were included to test the robustness of the model. The datasets were collected from 6 hospitals between August 2016 and February 2020. Diagnostic performance was assessed by the area under the receiver operating characteristic curve (AUC), sensitivity and specificity.
Results: The collected dataset consisted of 4356 chest CT exams from 3,322 patients. The average age is 49±15 years and there were slightly more male patients than female (1838 vs 1484; p-value=0.29). The per-exam sensitivity and specificity for detecting COVID-19 in the independent test set was 114 of 127 (90% [95% CI: 83%, 94%]) and 294 of 307 (96% [95% CI: 93%, 98%]), respectively, with an AUC of 0.96 (p-value<0.001). The per-exam sensitivity and specificity for detecting CAP in the independent test set was 87% (152 of 175) and 92% (239 of 259), respectively, with an AUC of 0.95 (95% CI: 0.93, 0.97).
Conclusions: A deep learning model can accurately detect COVID-19 and differentiate it from community acquired pneumonia and other lung diseases.

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200905

Citation
Radiology. Mar 19 2020https://doi.org/10.1148/radiol.2020200905

Title
Temporal Changes of CT Findings in 90 Patients with COVID-19 Pneumonia: A Longitudinal Study

Author
Wang Y, Dong C, Hu Y, Li C, Ren Q, Zhang X, Shi H, Zhou M.

Abstract
Background: CT may play a central role in the diagnosis and management of COVID-19 pneumonia. Purpose: To perform a longitudinal study to analyze the serial CT findings over time in patients with
COVID-19 pneumonia. Materials and Methods: During January 16 to February 17, 2020, 90 patients (male:female, 33:57; mean age, 45 years) with COVID-19 pneumonia were prospectively enrolled and followed up until they were discharged or died, or until the end of the study. A total of 366 CT scans were acquired and reviewed by 2 groups of radiologists for the patterns and distribution of lung abnormalities, total CT scores and number of zones involved. Those features were analyzed for temporal change. Results: CT scores and number of zones involved progressed rapidly, peaked during illness days 6-11 (median: 5 and 5), and followed by persistence of high levels. The predominant pattern of abnormalities after symptom onset was ground-glass opacity (35/78 [45%] to 49/79 [62%] in different periods). The percentage of mixed pattern peaked (30/78 [38%]) on illness days 12-17, and became the second most predominant pattern thereafter. Pure ground-glass opacity was the most prevalent sub-type of ground-glass opacity after symptom onset (20/50 [40%] to 20/28 [71%]). The percentage of ground-glass opacity with irregular linear opacity peaked on illness days 6-11 (14/50 [28%])] and became the second most prevalent subtype thereafter. The distribution of lesions was predominantly bilateral and subpleural. 66/70 (94%) patients discharged had residual disease on final CT scans (median CT scores and zones involved: 4 and 4), with ground-glass opacity (42/70 [60%]) and pure ground-glass opacity (31/42 [74%]) the most common pattern and subtype. Conclusions: The extent of lung abnormalities on CT peaked during illness days 6-11. The temporal changes of the diverse CT manifestations followed a specific pattern, which might indicate the progression and recovery of the illness.

Link
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Citation
J Radiology. Mar 19 2020https://doi.org/10.1148/radiol.2020200843

Title
Radiology Department Preparedness for COVID-19: Radiology Scientific Expert Panel

Author
Mossa-Basha M, Meltzer CC, Kim DC, Tuite MJ, Kolli KP, Tan BS.

Abstract
The Coronavirus Disease 2019 (COVID-19) pandemic began in December 2019 in Wuhan, China. The outbreak is due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection (1). Approximately 81,000 patients have been infected in China (2). Although infection rates are said to be controlled in China through severe public health measures, Italy (more than 10,000 cases) and Iran (more than 8000 cases) have seen exponential increases in the number of infected individuals.
Other than China, Italy, and Iran, most countries have had approximately 2 months to prepare their responses to the COVID-19 pandemic. These responses are led by public health authorities of national governments in coordination with local governments and hospitals. Due to the nature of the emergency in China, chest CT findings (eg, peripheral ground-glass infiltrates and/or organizing pneumonia) temporarily became part of official diagnostic criteria of COVID-19 as a surrogate for viral nucleic acid testing (1). With improved disease understanding, chest CT findings are no longer part of the diagnostic criteria for COVID-19. Instead, at present, the focus of most radiology departments outside of China has shifted from diagnostic capability to preparedness. Radiology preparedness is a set of policies and procedures directly applicable to imaging departments designed (a) to achieve sufficient capacity for continued operation during a health care emergency of unprecedented proportions, (b) to support the care of patients with COVID-19, and (c) to maintain radiologic diagnostic and interventional support for the entirety of the hospital and health system. Because of varying infection control policies (both nationally and regionally), steps for radiology preparedness for COVID-19 will vary between institutions and clinics. The Radiology Editorial Board has assembled a team of radiologists who are active in coordination, development, and implementation of radiology preparedness policies for COVID-19. Their policies have been developed in conjunction with top infection control experts at their respective world-class healthcare systems. In the sections below, each panel member describes their department's top priorities for COVID-19 preparedness in their environment. The Editorial Board hopes that readers may find one or more the highlighted healthcare systems to be similar to their own, providing impetus for action or confirmation of your current preparedness activities.

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200988?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Citation
Radiology. Mar 16 2020https://doi.org/10.1148/radiol.2020200988

Title
Performance of radiologists in differentiating COVID-19 from viral pneumonia on chest CT

Author
Bai HX, Hsieh B, Xiong Z, Halsey K, Choi JW, Tran TML, Pan I, Shi LB, Wang DC, Mei J, Jiang XL, Zeng QH, Egglin TK, Hu PF, Agarwal S, Xie F, Li S, Healey T, Atalay MK, Liao WH.

Abstract
Background: Despite its high sensitivity in diagnosing COVID-19 in a screening population, chest CT appearances of COVID 19 pneumonia are thought to be non-specific. Purpose: To assess the performance of United States (U.S.) and Chinese radiologists in differentiating COVID-19 from viral pneumonia on chest CT. Methods: A total of 219 patients with both positive COVID-19 by RT-PCR and abnormal chest CT findings were retrospectively identified from 7 Chinese hospitals in Hunan Providence, China from January 6 to February 20, 2020. A total of 205 patients with positive Respiratory Pathogen Panel for viral pneumonia and CT findings consistent with or highly suspicious for pneumonia by original radiology interpretation within 7 days of each other were identified from Rhode Island Hospital in Providence, RI. Three Chinese radiologists blindly reviewed all chest CTs (n=424) to differentiate COVID-19 from viral pneumonia. A sample of 58 age-matched cases was randomly selected and evaluated by 4 U.S. radiologists in a similar fashion.
Different CT features were recorded and compared between the two groups. Results: For all chest CTs, three Chinese radiologists correctly differentiated COVID-19 from non-COVID-19 pneumonia 83% (350/424), 80% (338/424), and 60% (255/424) of the time, respectively. The seven radiologists had sensitivities of 80%, 67%, 97%, 93%, 83%, 73% and 70% and specificities of 100%, 93%, 7%, 100%, 93%, 93%, 100%. Compared to non-COVID-19 pneumonia, COVID-19 pneumonia was more likely to have a peripheral distribution (80% vs. 57%, p<0.001), ground-glass opacity (91% vs. 68%, p<0.001), fine reticular opacity (56% vs. 22%, p<0.001), and vascular thickening (59% vs. 22%, p<0.001), but less likely to have a central+peripheral distribution (14.% vs. 35%, p<0.001), pleural effusion (4.1 vs. 39%, p<0.001) and lymphadenopathy (2.7% vs. 10.2%, p<0.001).
Conclusion: Radiologists in China and the United States distinguished COVID-19 from viral pneumonia on chest CT with high specificity but moderate sensitivity.

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200823?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Citation
Radiology. Mar 10 2020https://doi.org/10.1148/radiol.2020200823

Title
Correlation of Chest CT and RT-PCR Testing in Coronavirus Disease 2019 (COVID-19) in China: A Report of 1014 Cases.

Author
Ai T, Yang Z, Hou H, Zhan C, Chen C, Lv W, Tao Q, Sun Z, Xia L.

Abstract
Background: Chest CT is used for diagnosis of 2019 novel coronavirus disease (COVID-19), as an important complement to the reverse-transcription polymerase chain reaction (RT-PCR) tests.
Purpose: To investigate the diagnostic value and consistency of chest CT as compared with comparison to RT-PCR assay in COVID-19.
Methods: From January 6 to February 6, 2020, 1014 patients in Wuhan, China who underwent both chest CT and RT-PCR tests were included. With RT-PCR as reference standard, the performance of chest CT in diagnosing COVID-19 was assessed. Besides, for patients with multiple RT-PCR assays, the dynamic conversion of RT-PCR results (negative to positive, positive to negative, respectively) was analyzed as compared with serial chest CT scans for those with time-interval of 4 days or more.
Results: Of 1014 patients, 59% (601/1014) had positive RT-PCR results, and 88% (888/1014) had positive chest CT scans. The sensitivity of chest CT in suggesting COVID-19 was 97% (95%CI, 95-98%, 580/601 patients) based on positive RT-PCR results. In patients with negative RT-PCR results, 75% (308/413) had positive chest CT findings; of 308, 48% were considered as highly likely cases, with 33% as probable cases. By analysis of serial RT-PCR assays and CT scans, the mean interval time between the initial negative to positive RT-PCR results was 5.1 ± 1.5 days; the initial positive to subsequent negative RT-PCR result was 6.9 ± 2.3 days). 60% to 93% of cases had initial positive CT consistent with COVID-19 prior (or parallel) to the initial positive RT-PCR results. 42% (24/57) cases showed improvement in follow-up chest CT scans before the RT-PCR results turning negative.
Conclusion: Chest CT has a high sensitivity for diagnosis of COVID-19. Chest CT may be considered as a primary tool for the current COVID-19 detection in epidemic areas.
Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200642?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Citation
Radiology. Feb 26 2020https://doi.org/10.1148/radiol.2020200642

Title
Chest CT Findings in Coronavirus Disease-19 (COVID-19): Relationship to Duration of Infection

Author
Bernheim A, Mei X, Huang M, Yang Y, Fayad ZA, Zhang N, Diao K, Lin B, Zhu X, Li K, Li S, Shan H, Jacobi A, Chung M.

Abstract
In this retrospective study, chest CTs of 121 symptomatic patients infected with coronavirus disease-19 (COVID-19) from four centers in China from January 18, 2020 to February 2, 2020 were reviewed for common CT findings in relationship to the time between symptom onset and the initial CT scan (i.e. early, 0-2 days (36 patients), intermediate 3-5 days (33 patients), late 6-12 days (25 patients)). The hallmarks of COVID-19 infection on imaging were bilateral and peripheral ground-glass and consolidative pulmonary opacities. Notably, 20/36 (56%) of early patients had a normal CT. With a longer time after the onset of symptoms, CT findings were more frequent, including consolidation, bilateral and peripheral disease, greater total lung involvement, linear opacities, "crazy-paving" pattern and the "reverse halo" sign. Bilateral lung involvement was observed in 10/36 early patients (28%), 25/33 intermediate patients (76%), and 22/25 late patients (88%).

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200463?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Citation
Radiology. Feb 20 2020https://doi.org/10.1148/radiol.2020200463

Title
Sensitivity of Chest CT for COVID-19: Comparison to RT-PCR

Author
Fang Y, Zhang H, Xie J, Lin M, Ying L, Pang P, Ji W.

Abstract
Summary
In a series of 51 patients with chest CT and RT-PCR assay performed within 3 days, the sensitivity of CT for COVID-19 infection was 98% compared to RT-PCR sensitivity of 71% (p<.001).

Introduction
In December 2019, an outbreak of unexplained pneumonia in Wuhan [1] was caused by a new coronavirus infection named COVID-19 (Corona Virus Disease 2019). Noncontrast chest CT may be considered for early diagnosis of viral disease, although viral nucleic acid detection using real-time polymerase chain reaction (RT-PCR) remains the standard of reference. Chung et al. reported that chest CT may be negative for viral pneumonia of COVID-19 [2] at initial presentation (3/21 patients). Recently, Xie reported 5/167 (3%) patients who had negative RT-PCR for COVID-19 at initial presentation despite chest CT findings typical of viral pneumonia [3]. The purpose of this study was to compare the sensitivity of chest CT and viral nucleic acid assay at initial patient presentation.

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Citation
Radiology. Feb 19 2020https://doi.org/10.1148/radiol.2020200432

Title
Time Course of Lung Changes On Chest CT During Recovery From 2019 Novel Coronavirus (COVID-19) Pneumonia

Author
Pan F, Ye T, Sun P, Gui S, Liang B, Li L, Zheng D, Wang J, Hesketh RL, Yang L, Zheng C.

Abstract
Background: Chest CT is used to assess the severity of lung involvement in COVID-19 pneumonia. Purpose: To determine the change in chest CT findings associated with COVID-19 pneumonia from initial diagnosis until patient recovery. Materials and Methods: This retrospective review included patients with RT-PCR confirmed COVID-19 infection presenting between 12 January 2020 to 6 February 2020. Patients with severe respiratory distress and/ or oxygen requirement at any time during the disease course were excluded. Repeat Chest CT was obtained at approximately 4 day intervals. The total CT score was the sum of lung involvement (5 lobes, score 1-5 for each lobe, range, 0 none, 25 maximum) was determined. Results: Twenty one patients (6 males and 15 females, age 25-63 years) with confirmed COVID-19 pneumonia were evaluated. These patients under went a total of 82 pulmonary CT scans with a mean interval of 4±1 days (range: 1-8 days). All patients were discharged after a mean hospitalized period of 17±4 days (range: 11-26 days). Maximum lung involved peaked at approximately 10 days (with the calculated total CT score of 6) from the onset of initial symptoms (R2=0.25), p<0.001). Based on quartiles of patients from day 0 to day 26 involvement, 4 stages of lung CT were defined: Stage 1 (0-4 days): ground glass opacities (GGO) in 18/24 (75%) patients with the total CT score of 2±2; (2)Stage-2 (5-8d days): increased crazy-paving pattern 9/17 patients (53%) with a increase in total CT score (6±4, p=0.002); (3) Stage-3 (9-13days): consolidation 19/21 (91%) patients with the peak of total CT score (7±4); (4) Stage-4 (≥14 days): gradual resolution of consolidation 15/20 (75%) patients with a decreased total CT score (6±4) without crazy-paving pattern. Conclusion: In patients recovering from COVID-19 pneumonia (without severe respiratory distress during the disease course), lung abnormalities on chest CT showed greatest severity approximately 10 days after initial onset of symptoms.

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200370?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Citation
Radiology. Feb 13 2020https://doi.org/10.1148/radiol.2020200370

Title
Early Clinical and CT Manifestations of Coronavirus Disease 2019 (COVID-19) Pneumonia

Author
Han R, Huang L, Jiang H, Dong J, Peng H, Zhang D.

Abstract
OBJECTIVE. The purpose of this study was to investigate early clinical and CT manifestations of coronavirus disease (COVID-19) pneumonia. MATERIALS AND METHODS. Patients with COVID-19 pneumonia confirmed by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) nucleic acid test (reverse transcription-polymerase chain reaction) were enrolled in this retrospective study. The clinical manifestations, laboratory results, and CT findings were evaluated. RESULTS. One hundred eight patients (38 men, 70 women; age range, 21-90 years) were included in the study. The clinical manifestations were fever in 94 of 108 (87%) patients, dry cough in 65 (60%), and fatigue in 42 (39%). The laboratory results were normal WBC count in 97 (90%) patients and normal or reduced lymphocyte count in 65 (60%). High-sensitivity C-reactive protein level was elevated in 107 (99%) patients. The distribution of involved lobes was one lobe in 38 (35%) patients, two or three lobes in 24 (22%), and four or five lobes in 46 (43%). The major involvement was peripheral (97 patients [90%]), and the common lesion shape was patchy (93 patients [86%]). Sixty-five (60%) patients had ground-glass opacity (GGO), and 44 (41%) had GGO with consolidation. The size of lesions varied from smaller than 1 cm (10 patients [9%]) to larger than 3 cm (56 patients [52%]). Vascular thickening (86 patients [80%]), crazy paving pattern (43 patients [40%]), air bronchogram sign (52 patients [48%]), and halo sign (69 [64%]) were also observed in this study. CONCLUSION. The early clinical and laboratory findings of COVID-19 pneumonia are low to midgrade fever, dry cough, and fatigue with normal WBC count, reduced lymphocyte count, and elevated high-sensitivity C-reactive protein level. The early CT findings are patchy GGO with or without consolidation involving multiple lobes, mainly in the peripheral zone, accompanied by halo sign, vascular thickening, crazy paving pattern, or air bronchogram sign.

Link
https://pubmed.ncbi.nlm.nih.gov/32181672/

Citation
AJR Am J Roentgenol. 2020 Mar 17;1-6. doi: 10.2214/AJR.20.22961.

Title
Clinical Features and Chest CT Manifestations of Coronavirus Disease 2019 (COVID-19) in a Single-Center Study in Shanghai, China

Author
Cheng Z, Lu Y, Cao Q, Qin L, Pan Z, Yan F, Yang W.

Abstract
OBJECTIVE. Confronting the new coronavirus infection known as coronavirus disease 2019 (COVID-19) is challenging and requires excluding patients with suspected COVID-19 who actually have other diseases. The purpose of this study was to assess the clinical features and CT manifestations of COVID-19 by comparing patients with COVID-19 pneumonia with patients with non-COVID-19 pneumonia who presented at a fever observation department in Shanghai, China. MATERIALS AND METHODS. Patients were retrospectively enrolled in the study from January 19 through February 6, 2020. All patients underwent real-time reverse transcription-polymerase chain reaction (RT-PCR) testing. RESULTS. Eleven patients had RT-PCR test results that were positive for severe acute respiratory syndrome coronavirus 2, whereas 22 patients had negative results. No statistical difference in clinical features was observed ($p > 0.05$), with the exception of leukocyte and platelet counts ($p < 0.05$). The mean (± SD) interval between onset of symptoms and admission to the fever observation department was 4.40 ± 2.00 and 5.52 ± 4.00 days for patients with positive and negative RT-PCR test results, respectively. The frequency of opacifications in patients with positive results and patients with negative results, respectively, was as follows: ground-glass opacities (GGOs), 100.0% versus 90.9%; mixed GGO, 63.6% versus 72.7%; and consolidation, 54.5% versus 77.3%. In patients with positive RT-PCR results, GGOs were the most commonly observed opacification (seen in 100.0% of patients) and were predominantly located in the peripheral zone (100.0% of patients), compared with patients with negative results (31.8%) ($p = 0.05$). The median number of affected lung lobes and segments was higher in patients with positive RT-PCR results than in those with negative RT-PCR results (five vs 3.5 affected lobes and 15 vs nine affected segments; $p < 0.05$). Although the air bronchogram reticular pattern was more frequently seen in patients with positive results, centrilobular nodules were less frequently seen in patients with positive results. CONCLUSION. At the point during the COVID-19 outbreak when this study was performed, imaging patterns of multifocal, peripheral, pure GGO, mixed GGO, or consolidation with slight predominance in the lower lung and findings of more extensive GGO than consolidation on chest CT scans obtained during the first week of illness were considered findings highly suspicious of COVID-19.

Link
https://pubmed.ncbi.nlm.nih.gov/32174128/

Citation
AJR Am J Roentgenol. 2020 Mar 14;1-6. doi: 10.2214/AJR.20.22959.

Title
CT Features of Coronavirus Disease 2019 (COVID-19) Pneumonia in 62 Patients in Wuhan, China

Author
Zhou S, Wang Y, Zhu T, Xia L.

Abstract
OBJECTIVE. The purpose of this study was to investigate 62 subjects in Wuhan, China, with laboratory-confirmed coronavirus disease (COVID-19) pneumonia and describe the CT features of this epidemic disease.

Link
https://pubmed.ncbi.nlm.nih.gov/32134681/

Citation
AJR Am J Roentgenol. 2020 Mar 5;1-8. doi: 10.2214/AJR.20.22975.

Title
Coronavirus Disease 2019 (COVID-19): Role of Chest CT in Diagnosis and Management

Author
Li Y, Xia L.

Abstract
OBJECTIVE. The objective of our study was to determine the misdiagnosis rate of radiologists for coronavirus disease 2019 (COVID-19) and evaluate the performance of chest CT in the diagnosis and management of COVID-19. The CT features of COVID-19 are reported and compared with the CT features of other viruses to familiarize radiologists with possible CT patterns. MATERIALS AND METHODS. This study included the first 51 patients with a diagnosis of COVID-19 infection confirmed by nucleic acid testing (23 women and 28 men; age range, 26-83 years) and two patients with adenovirus (one woman and one man; ages, 58 and 66 years). We reviewed the clinical information, CT images, and corresponding image reports of these 53 patients. The CT images included images from 99 chest CT examinations, including initial and follow-up CT studies. We compared the image reports of the initial CT study with the laboratory test results and identified CT patterns suggestive of viral infection. RESULTS. COVID-19 was misdiagnosed as a common infection at the initial CT study in two inpatients with underlying disease and COVID-19. Viral pneumonia was correctly diagnosed at the initial CT study in the remaining 49 patients with COVID-19 and two patients with adenovirus. These patients were isolated and obtained treatment. Ground-glass opacities (GGOs) and consolidation with or without vascular enlargement, interlobular septal thickening, and air bronchogram sign are common CT features of COVID-19. The The "reversed halo" sign and pulmonary nodules with a halo sign are uncommon CT features. The CT findings of COVID-19 overlap with the CT findings of adenovirus infection. There are differences as well as similarities in the CT features of COVID-19 compared with those of the severe acute respiratory syndrome. CONCLUSION. We found that chest CT had a low rate of missed diagnosis of COVID-19 (3.9%, 2/51) and may be useful as a standard method for the rapid diagnosis of COVID-19 to optimize the management of patients. However, CT is still limited for identifying specific viruses and distinguishing between viruses.

Link
https://pubmed.ncbi.nlm.nih.gov/32130038/

Citation
AJR Am J Roentgenol. 2020 Mar 4:1-7.

Title
Relation Between Chest CT Findings and Clinical Conditions of Coronavirus Disease (COVID-19) Pneumonia: A Multicenter Study

Author
Zhao W, Zhong Z, Xie X, Yu Q, Liu J.

Abstract
OBJECTIVE. The increasing number of cases of confirmed coronavirus disease (COVID-19) in China is striking. The purpose of this study was to investigate the relation between chest CT findings and the clinical conditions of COVID-19 pneumonia. MATERIALS AND METHODS. Data on 101 cases of COVID-19 pneumonia were retrospectively collected from four institutions in Hunan, China. Basic clinical characteristics and detailed imaging features were evaluated and compared between two groups on the basis of clinical status: nonemergency (mild or common disease) and emergency (severe or fatal disease). RESULTS. Patients 21-50 years old accounted for most (70.2%) of the cohort, and five (5.0%) patients had disease associated with a family outbreak. Most patients (78.2%) had fever as the onset symptom. Most patients with COVID-19 pneumonia had typical imaging features, such as ground-glass opacities (GGO) (87 [86.1%]) or mixed GGO and consolidation (65 [64.4%]), vascular enlargement in the lesion (72 [71.3%]), and traction bronchiectasis (53 [52.5%]). Lesions present on CT images were more likely to have a peripheral distribution (88 [87.1%]) and bilateral involvement (83 [82.2%]) and be lower lung predominant (55 [54.5%]) and multifocal (55 [54.5%]). Patients in the emergency group were older than those in the non-emergency group. Architectural distortion, traction bronchiectasis, and CT involvement score aided in evaluation of the severity and extent of the disease. CONCLUSION. Patients with confirmed COVID-19 pneumonia have typical imaging features that can be helpful in early screening of highly suspected cases and in evaluation of the severity and extent of disease. Most patients with COVID-19 pneumonia have GGO or mixed GGO and consolidation and vascular enlargement in the lesion. Lesions are more likely to have peripheral distribution and bilateral involvement and be lower lung predominant and multifocal. CT involvement score can help in evaluation of the severity and extent of the disease.

Link
https://pubmed.ncbi.nlm.nih.gov/32125873/

Citation
AJR Am J Roentgenol. 2020 Mar 3:1-6.a

Title
Clinical and High-Resolution CT Features of the COVID-19 Infection: Comparison of the Initial and Follow-up Changes

Author
Xiong Y, Sun D, Liu Y, Fan Y, Zhao L, Li X, Zhu W.

Abstract
OBJECTIVES: In late December, 2019, an outbreak of coronavirus disease (COVID-19) in Wuhan, China was caused by a novel coronavirus, newly named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). We aimed to quantify severity of COVID-19 infection on High-Resolution CT and to determine its relationship with clinical parameters. MATERIALS AND METHODS: From Jan 11, 2020, to Feb 5, 2020, the clinical, laboratory and HRCT features of 42 patients (26-75 years, 25 males) with COVID-19 were analyzed. The initial and follow-up CT obtained a mean of 4.5 days and 11.6 days from the illness onset were retrospectively assessed for the severity and progression of pneumonia. Correlations among clinical parameters, initial CT features and progression of opacifications were evaluated with Spearman correlation and linear regression analysis. RESULTS: Thirty-five (83%) patients exhibited a progressive process according to CT features during the early stage from onset. Follow-up CT findings showed progressive opacifications, consolidation, interstitial thickening, fibrous strips and air bronchograms, compared to initial CT (all $p<0.05$). Before regular treatments, there was a moderate correlation between the days from onset and sum score of opacifications ($R=0.68$, $p<0.01$). The C-reactive protein, erythrocyte sedimentation rate and lactate dehydrogenase showed significantly positive correlation with the severity of pneumonia assessed on initial CT (R range 0.36-0.75, $p<0.05$). The highest temperature and the severity of opacifications assessed on initial CT were significantly related to the progression of opacifications on follow-up CT ($p=0.001$-0.04). CONCLUSIONS: Patients with the COVID-19 infection usually presented with typical ground-grass opacities and other CT features, which showed significant correlations with some clinical and laboratory measurements. Follow-up CT images often demonstrated progressions during the early stage from illness onset.

Link
https://pubmed.ncbi.nlm.nih.gov/32134800/

Citation
Invest Radiol. 2020 Mar 3.

Title
Coronavirus Disease 2019 (COVID-19): A Systematic Review of Imaging Findings in 919 Patients

Author
Salehi S, Abedi A, Balakrishnan S, Gholamrezanezhad A.

Abstract
OBJECTIVE. Available information on CT features of the 2019 novel coronavirus disease (COVID-19) is scattered in different publications, and a cohesive literature review has yet to be compiled. MATERIALS AND METHODS. This article includes a systematic literature search of PubMed, Embase (Elsevier), Google Scholar, and the World Health Organization database. RESULTS. Known features of COVID-19 on initial CT include bilateral multilobar ground-glass opacification (GGO) with a peripheral or posterior distribution, mainly in the lower lobes and less frequently within the right middle lobe. Atypical initial imaging presentation of consolidative opacities superimposed on GGO may be found in a smaller number of cases, mainly in the elderly population. Septal thickening, bronchiectasis, pleural thickening, and subpleural involvement are some of the less common findings, mainly in the later stages of the disease. Pleural effusion, pericardial effusion, lymphadenopathy, cavitation, CT halo sign, and pneumothorax are uncommon but may be seen with disease progression. Follow-up CT in the intermediate stage of disease shows an increase in the number and size of GGOs and progressive transformation of GGO into multifocal consolidative opacities, septal thickening, and development of a crazy paving pattern, with the greatest severity of CT findings visible around day 10 after the symptom onset. Acute respiratory distress syndrome is the most common indication for transferring patients with COVID-19 to the ICU and the major cause of death in this patient population. Imaging patterns corresponding to clinical improvement usually occur after week 2 of the disease and include gradual resolution of consolidative opacities and decrease in the number of lesions and involved lobes. CONCLUSION. This systematic review of current literature on COVID-19 provides insight into the initial and follow-up CT characteristics of the disease.

Link
https://pubmed.ncbi.nlm.nih.gov/32174129/

Citation
AJR Am J Roentgenol. 2020 Mar 14:1-7.

Title
Clinical and CT features in pediatric patients with COVID-19 infection: Different points from adults

Author
Xia W, Shao J, Guo Y, Peng X, Li Z, Hu D.

Abstract
PURPOSE: To discuss the different characteristics of clinical, laboratory, and chest computed tomography (CT) in pediatric patients from adults with 2019 novel coronavirus (COVID-19) infection. METHODS:
The clinical, laboratory, and chest CT features of 20 pediatric inpatients with COVID-19 infection confirmed by pharyngeal swab COVID-19 nucleic acid test were retrospectively analyzed during 23 January and 8 February 2020. The clinical and laboratory information was obtained from inpatient records. All the patients were undergone chest CT in our hospital. RESULTS: Thirteen pediatric patients (13/20, 65%) had an identified history of close contact with COVID-19 diagnosed family members. Fever (12/20, 60%) and cough (13/20, 65%) were the most common symptoms. For laboratory findings, procalcitonin elevation (16/20, 80%) should be pay attention to, which is not common in adults. Coinfection (8/20, 40%) is common in pediatric patients. A total of 6 patients presented with unilateral pulmonary lesions (6/20, 30%), 10 with bilateral pulmonary lesions (10/20, 50%), and 4 cases showed no abnormality on chest CT (4/20, 20%). Consolidation with surrounding halo sign was observed in 10 patients (10/20, 50%), ground-glass opacities were observed in 12 patients (12/20, 60%), fine mesh shadow was observed in 4 patients (4/20, 20%), and tiny nodules were observed in 3 patients (3/20, 15%). CONCLUSION: Procalcitonin elevation and consolidation with surrounding halo signs were common in pediatric patients which were different from adults. It is suggested that underlying coinfection may be more common in pediatrics, and the consolidation with surrounding halo sign which is considered as a typical sign in pediatric patients.

Link
https://pubmed.ncbi.nlm.nih.gov/32134205/

Citation
Pediatr Pulmonol. 2020 Mar 5.

Title
COVID-19 pneumonia: infection control protocol inside computed tomography suites

Author
Nakajima K, Kato H, Yamashiro T, Izumi T, Takeuchi I, Nakajima H, Utsunomiya D.

Abstract
A novel coronavirus (severe acute respiratory syndrome coronavirus 2) causes a cluster of pneumonia cases in Wuhan, China. It spread rapidly and globally. CT imaging is helpful for the evaluation of the novel coronavirus disease 2019 (COVID-19) pneumonia. Infection control inside the CT suites is also important to prevent hospital-related transmission of COVID-19. We present our experience with infection control protocol for COVID-19 inside the CT suites.

Link
https://pubmed.ncbi.nlm.nih.gov/32185669/

Citation
Jpn J Radiol. 2020 Mar 17.

Title
False-Negative Results of Real-Time Reverse-Transcriptase Polymerase Chain Reaction for Severe Acute Respiratory Syndrome Coronavirus 2: Role of Deep-Learning-Based CT Diagnosis and Insights from Two Cases

Author
Li D, Wang D, Dong J, Wang N, Huang H, Xu H, Xia C.

Abstract
Department of Radiology, Beijing Haidian Section of Peking University Third Hospital (Beijing Haidian Hospital), Beijing, China.
The epidemic of 2019 novel coronavirus, later named as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is still gradually spreading worldwide. The nucleic acid test or genetic sequencing serves as the gold standard method for confirmation of infection, yet several recent studies have reported false-negative results of real-time reverse-transcriptase polymerase chain reaction (rRT-PCR). Here, we report two representative false-negative cases and discuss the supplementary role of clinical data with rRT-PCR, including laboratory examination results and computed tomography features. Coinfection with SARS-COV-2 and other viruses has been discussed as well.

Link
https://pubmed.ncbi.nlm.nih.gov/32174053/

Citation
Korean J Radiol. 2020 Mar 5.

Title
CT Imaging of the 2019 Novel Coronavirus (2019-nCoV) Pneumonia

Author
Lei J, Li J, Li X, Qi X.

Abstract
A 33-year-old woman presented to the hospital with a 5-day history of fever and cough of unknown cause. She indicated that she worked in Wuhan, China (the center of novel coronavirus outbreak) but had traveled to Lanzhou, China, 6 days before presentation to the hospital.
At admission, her body temperature was elevated to 39.0°C (102.2°F) and coarse breath sounds of both lungs were heard at auscultation. Laboratory studies showed leucopenia (white blood cell count: 2.91 × 109/L). The white blood cell differential count showed 70.0% neutrophils and 0.1% eosinophils. There were elevated blood levels for C-reactive protein (16.16 mg/L; normal range, 0–10 mg/L), erythrocyte sedimentation rate (29 mm/h; normal range, <20 mm/h), and D-dimer (580 ng/mL; normal range, 500 ng/mL).
Unenhanced chest CT showed multiple peripheral ground-glass opacities in both lungs (Figure, A) that did not spare the subpleural regions. Real-time fluorescence polymerase chain reaction of the patient's sputum was positive for the 2019 novel coronavirus (2019-nCoV) nucleic acid.
On the basis of epidemiologic characteristics, clinical manifestations, chest images, and laboratory findings, the diagnosis of 2019-nCoV pneumonia was made. After receiving 3 days of treatment, combined with interferon inhalation, the patient was clinically worse with progressive pulmonary opacities found at repeat chest CT (Figure, B).
Unenhanced CT images in a 33-year-old woman. A, Image shows multiple ground-glass opacities in bilateral lungs. Ground-glass opacities are seen in the posterior segment of right upper lobe and apical posterior segment of left superior lobe. B, Image obtained 3 days after follow-up shows progressive ground-glass opacities in the posterior segment of right upper lobe and apical posterior segment of left superior lobe. The bilateralism of the peripheral lung opacities, without subpleural sparing, are common CT findings of the 2019 novel coronavirus pneumonia.

Link
https://pubmed.ncbi.nlm.nih.gov/32003646/

Citation
Radiology. 2020 Apr;295(1):18.

Title
Pre- and Posttreatment Chest CT Findings: 2019 Novel Coronavirus (2019-nCoV) Pneumonia

Author
Duan YN, Qin J.

Abstract
A 46-year-old woman presented to the hospital with a 7-day history of fever without chills and rigor, nasal discharge, cough, and myalgia. She had stayed with a friend who had been diagnosed with 2019 novel coronavirus (2019-nCoV) pneumonia in Wuhan, China, 5 days previously.
At presentation, her body temperature was elevated to 38.3°C (100.9°F) with normal pulmonary auscultation. Laboratory studies showed a normal total white blood cell count of 4.2 × 109/L (normal range, 4.0–10.0 × 109/L), and the differential count showed 52.9% neutrophils (normal range, 40.0%–74.0%) and 28.3% lymphocytes (normal range, 18.0%–43.0%). There were elevated blood levels for C-reactive protein (6.4 mg/L; normal range, 0–6 mg/L), erythrocyte sedimentation rate (27 mm/h; normal range, 0–20 mm/h), and D-dimer (566 ng/mL; normal range, 500 ng/mL).
Unenhanced chest CT showed multiple bilateral and peripheral ground-glass opacities (Figure a) in the superior segments of both lower lobes without sparing of subpleural regions (1,2). Real-time fluorescence polymerase chain reaction of the patient's pharyngeal swab was positive for 2019-nCoV nucleic acid 2 days after hospitalization.
CT scans (slice thickness = 1 mm) in a 46-year-old woman with the 2019 novel coronavirus (2019-nCoV). (a) Transverse thin-section CT scan obtained at first day after admission shows multiple ground-glass opacities in both lungs. Ground-glass opacities are seen in the superior segment of both lower lobes. (b) Follow-up CT scan obtained on day 7 after admission shows ground-glass opacities are completely resolved in the superior segment of right lower lobe and partly resolved in the superior segment of left lower lobe. (c) Follow-up CT scan obtained at day 13 after admission shows ground-glass opacities are completely resolved in the superior segment of right lower lobe and partly resolved in the superior segment of left lower lobe.

Link
https://pubmed.ncbi.nlm.nih.gov/32049602/?from_single_result=Pre-+and+Posttreatment+Chest+CT+Findings+2019+Novel+Coronavirus+%282019-nCoV%29+Pneumonia&expanded_search_query=Pre-+and+Posttreatment+Chest+CT+Findings+2019+Novel+Coronavirus+%282019-nCoV%29+Pneumonia

Citation
Radiology. 2020 Apr;295(1):21.

Title
Use of Chest CT in Combination with Negative RT-PCR Assay for the 2019 Novel Coronavirus but High Clinical Suspicion

Author
Huang P, Liu T, Huang L, Liu H, Lei M, Xu W, Hu X, Chen J, Liu B.

Abstract
A 36-year-old man presented to the hospital with a 2-day history of fever, sore throat, and fatigue 5 days after visiting Wuhan, China. His temperature on admission was 37.8°C (100.04°F). Pulmonary auscultation was normal. Laboratory studies showed a normal white blood cell count (4.6 × 109/L) with a differential count of 53.1% neutrophils. The blood procalcitonin level was normal. Chest CT showed multiple peripheral ground-glass opacities in both lungs with more involvement of the left upper lobe, lingular segment (Figure a–c). At admission, the real-time fluorescence polymerase chain reaction (RT-PCR) assay of the sputum was negative for the 2019 novel coronavirus (2019-nCoV) nucleic acid.
Figure a:
Figure a: Images in a 36-year-old man with a 2-day history of fever, sore throat, and fatigue 5 days after visiting Wuhan, China, and a negative sputum real-time fluorescence polymerase chain reaction assay for the 2019 novel coronavirus. (a, b) Chest CT scans obtained at presentation show ground-glass opacities (red box) in the right upper lobe and the lingular segment and left lower lobe (b). (c) Volume rendering of chest CT scan obtained at admission. (d, e) CT scans obtained 3 days after admission show progression of ground-glass opacities to an atoll sign in the right upper lobe (red boxes in d) and left lower lobe consolidation (red boxes in e). (f) Volume rendering of chest CT scan obtained 3 days after admission shows the new areas of consolidation. See also Movies 1 and 2 (online)

Link
https://pubmed.ncbi.nlm.nih.gov/32049600/?from_term=Use+of+Chest+CT+in+Combination+with+Negative+RT-PCR+Assay+for+the+2019+Novel+Coronavirus+but+High+Clinical+Suspicion&from_pos=1

Citation
Radiology. 2020 Apr;295(1):22-23.

Title
Severe COVID-19 Pneumonia: Assessing Inflammation Burden with Volume-rendered Chest CT

Author
Tang L, Zhang X, Wang Y, Zeng X.

Abstract
COVID-19 (formerly known as 2019 novel coronavirus [2019-nCoV]) broke out in December 2019, and it spread from Wuhan, Hubei Province, to all over China and many other countries in the world (1–4). A 54-year-old woman with a travel history to Wuhan was admitted to the hospital with a 7-day history of fever (38.5°C [101.3°F]), cough, fatigue, and chest congestion. Laboratory examinations showed normal white blood cell count and lymphocytopenia, increased C-reactive protein level and erythrocyte sedimentation rate, and decreased CD3+, CD4+, CD8+, and CD4/CD8. Unenhanced chest CT revealed patchy peripheral ground-glass opacities with upper lobe predominance (Fig 1). A three-dimensional volume-rendering technique (PULMO 3D software, VB20; Siemens Healthineers, Forchheim, Germany) highlighted the distribution of pulmonary opacities, which was useful to determine the extension of the disease (Fig 2, Movie [supplement]). Her nasopharyngeal swab was positive for COVID-19 with real-time fluorescence polymerase chain reaction test. The patient was diagnosed with severe COVID-19 pneumonia. When treated with oxygen inhalation, moxifloxacin, lopinavir/ritonavir, umifenovir, interferon, and thymosin, her body temperature returned to normal and the symptoms slightly improved. CT reexamination on the 5th day of hospitalization indicated increased lesions and mild absorption on the 9th day.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200044

Citation
Radiology. 2020 Apr;295(1):22-23.

Title
COVID-19 Complicated by Acute Pulmonary Embolism

Author
Xie Y, Wang X, Yang P, Zhang S.

Abstract
We report two cases from Wuhan, China, presenting with fever, cough, and dyspnea secondary to COVID-19 (formerly known as 2019 novel coronavirus [2019-nCoV]) pneumonia, confirmed with real-time fluorescence polymerase chain reaction test and presenting with typical findings at CT (1, 2); these cases evolved with respiratory deterioration and elevated serum D-dimer level. Figure 1 illustrates the case of a 57-year-old man admitted to the hospital for 10 days; unenhanced chest CT on day 10 from the onset of fever showed bilateral peripheral ground-glass opacities (Fig 1, A). CT pulmonary angiography performed on day 2 of admission helped diagnose acute pulmonary embolism (Fig 1, B). Figure 2 depicts the case of a 70-year-old man admitted to the hospital for 7 days; unenhanced chest CT on admission showed bilateral ground-glass opacities and consolidation in a peripheral distribution (Fig 2, A). CT pulmonary angiography 6 days after admission confirmed acute pulmonary embolism (Fig 2, B). Acute pulmonary embolism is a cause of clinical deterioration in viral pneumonias (3, 4). As patients with COVID-19 are admitted for treatment and isolation, it is important to follow prophylactic measures for avoiding venous thromboembolism. In this scenario, respiratory deterioration with other clinical evidence of venous thrombosis should raise suspicion for pulmonary embolism.
Figure 1:
Figure 1: Images in a 57-year-old man with COVID-19 pneumonia. A, Axial unenhanced chest CT scan obtained on day 10 after the onset of symptoms shows bilateral areas of peripheral ground-glass opacities. B, Coronal thick maximum intensity projection slab of CT pulmonary angiography demonstrates multiple bilateral filling defects (white arrows) involving lobar, segmental, and subsegmental branches of the pulmonary artery.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200067

Citation
Radiology: Cardiothoracic Imaging 2020; 2(2):e200067.

Title
Spectrum of Chest CT Findings in a Familial Cluster of COVID-19 Infection

Author
Liu T, Huang P, Liu H, Huang L, Lei M, Xu W, Hu X, Chen J, Liu B.

Abstract
On January 29, 2020, a 43-year-old woman presented with a 4-day history of fever, cough, sputum production, and dyspnea. She had a recent history of travel to Wuhan (the center of the COVID-19 outbreak [formerly known as 2019 novel coronavirus]) with her 15-year-old son. Her temperature was 38°C (100.4°F) and she had coarse breath sounds on auscultation. Chest CT showed peripheral multifocal ground-glass opacities (Fig 1a). Her son also presented with prolonged fever (11 days), but without respiratory symptoms. On examination, his temperature was 39°C (102.2°F), and lungs were clear on auscultation. Chest CT showed centrilobular ground-glass nodules in the left lung (Fig 1b). The patient's 43-year-old husband, who met the definition for a contact person (1), was asymptomatic on screening, but tested positive for COVID-19 on sputum real-time polymerase chain reaction test, as did the son and the wife. His chest CT was unremarkable (Fig1c), and he eventually developed fever on the following day.
Figure 1a:
Figure 1a: (a) Unenhanced CT image in a 43-year-old woman shows multiple ill-defined ground-glass opacities in the lateral segment of right lower lobe and the posterior segment of left lower lobe. (b) Unenhanced CT image in a 15-year-old male patient shows subtle nodular ground-glass opacities in the posterior segment of left lower lobe. (c) Unenhanced CT image in a 43-year-old man shows normal lungs.

Link
https://pubs.rsna.org/doi/full/10.1148/ryct.2020200025

Citation
Radiology: Cardiothoracic Imaging 2020; 2(1):e200025.

Title
CT Imaging Features of 2019 Novel Coronavirus (2019-nCoV)

Author
Chung M, Bernheim A, Mei X, Zhang N, Huang M, Zeng X, Cui J, Xu W, Yang Y, Fayad ZA, Jacobi A, Li K, Li S, Shan H.

Abstract
In this retrospective case series, chest CT scans of 21 symptomatic patients from China infected with the 2019 novel coronavirus (2019-nCoV) were reviewed, with emphasis on identifying and characterizing the most common findings. Typical CT findings included bilateral pulmonary parenchymal ground-glass and consolidative pulmonary opacities, sometimes with a rounded morphology and a peripheral lung distribution. Notably, lung cavitation, discrete pulmonary nodules, pleural effusions, and lymphadenopathy were absent. Follow-up imaging in a subset of patients during the study time window often demonstrated mild or moderate progression of disease, as manifested by increasing extent and density of lung opacities.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32017661

Citation
Radiology. 2020 Apr;295(1):202-207. doi: 10.1148/radiol.2020200230. Epub 2020 Feb 4.

Title
Chest CT for Typical 2019-nCoV Pneumonia: Relationship to Negative RT-PCR Testing

Author
Xie X, Zhong Z, Zhao W, Zheng C, Wang F, Liu J.

Abstract
Some patients with positive chest CT findings may present with negative results of real time reverse-transcription-polymerase chain- reaction (RT-PCR) for 2019 novel coronavirus (2019-nCoV). In this report, we present chest CT findings from five patients with 2019-nCoV infection who had initial negative RT-PCR results. All five patients had typical imaging findings, including ground-glass opacity (GGO) (5 patients) and/or mixed GGO and mixed consolidation (2 patients). After isolation for presumed 2019-nCoV pneumonia, all patients were eventually confirmed with 2019-nCoV infection by repeated swab tests. A combination of repeated swab tests and CT scanning may be helpful when for individuals with high clinical suspicion of nCoV infection but negative RT-PCR screening.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=Chest+CT+for+typical+2019-nCoV+pneumonia%3A+relationship+to+negative+RT-PCR+testing

Citation
Radiology. 2020 Feb 12:200343. doi: 10.1148/radiol.2020200343.

Title
Longitudinal Assessment of COVID-19 Using a Deep Learning–based Quantitative CT Pipeline: Illustration of Two Cases

Author
Cao Y, Xu Z, Feng J, Jin C, Han X, Wu H, Shi H.

Abstract
Coronavirus disease 2019, COVID-19, has recently gained global proportions (1–3). This short report illustrates the use of voxel-level deep learning–based CT segmentation of pulmonary opacities (4) for improving quantification of the disease. A separate set of CT images from 10 cases of COVID-19 confirmed by real-time reverse transcriptase polymerase chain reaction test results was selected for training purposes. Expert manual segmentation of the lungs and pulmonary opacities was used as reference. A convolutional neural network based on U-Net architecture (5) was developed to predict the expert segmentation. We used this pipeline to analyze the contrasting evolution of two confirmed cases of COVID-19 from Wuhan, China, that were receiving similar supportive therapy. Figure 1 shows the favorable evolution of a 48-year-old woman imaged at four time points across an interval of 16 days, while Figure 2 shows the case of a 44-year-old man with disease progression over 12 days, especially between the second and third studies. These examples illustrate the potential of deep learning–based quantitative CT for providing objective assessment of pulmonary involvement and therapy response in COVID-19, but further studies are still necessary to determine the performance of such an approach in this scenario.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200082

Citation
Radiology: Cardiothoracic Imaging 2020; 2(2):e200082 • https://doi.org/10.1148/ryct.2020200082

Title
Chest CT Findings in Cases from the Cruise Ship “Diamond Princess” with Coronavirus Disease 2019 (COVID-19)

Author
Inui S , Fujikawa A, Jitsu M, Kunishima N, Watanabe S, Suzuki Y, Umeda S, Uwabe Y.

Abstract
Purpose: To evaluate the chest CT findings in an environmentally homogeneous cohort from the cruise ship “Diamond Princess” with Coronavirus Disease 2019 (COVID-19).
Materials and Methods: This retrospective study comprised 104 cases (mean age, 62 years ± 16, range 25-93) with COVID-19 confirmed with RT-PCR. CT images were reviewed and the CT severity score was calculated for each lobes and the entire lung. CT findings were compared between asymptomatic and symptomatic cases.
Results: Of 104 cases, 76 (73%) were asymptomatic, 41 (54%) of which had lung opacities on CT. Other 28 (27%) cases were symptomatic, 22 (79%) of which had abnormal CT findings. Symptomatic cases showed lung opacities and airway abnormalities on CT more frequently than asymptomatic cases [lung opacity; 22 (79%) vs 41 (54%), airway abnormalities; 14 (50%) vs 15 (20%)]. Asymptomatic cases showed more GGO over consolidation (83%), while symptomatic cases more frequently showed consolidation over GGO (41%). The CT severity score was higher in symptomatic cases than asymptomatic cases, particularly in the lower lobes [symptomatic vs asymptomatic cases; right lower lobe: 2 ± 1 (0-4) vs 1 ± 1 (0-4); left lower lobe: 2 ± 1 (0-4) vs 1 ± 1 (0-3); total score: 7 ± 5 (1-17) vs 4 ± 2 (1-11)].
Conclusion: This study documented a high incidence of subclinical CT changes in cases with COVID-19. Compared to symptomatic cases, asymptomatic cases showed more GGO over consolidation and milder extension of disease on CT.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200110

Citation
https://doi.org/10.1148/ryct.2020200110

Title
Chest CT manifestations of new coronavirus disease 2019 (COVID-19): a pictorial review

Author
Ye Z, Zhang Y, Wang Y, Huang Z, Song B.

Abstract
Coronavirus disease 2019 (COVID-19) outbreak, first reported in Wuhan, China, has rapidly swept around the world just within a month, causing global public health emergency. In diagnosis, chest computed tomography (CT) manifestations can supplement parts of limitations of real-time reverse transcription polymerase chain reaction (RT-PCR) assay. Based on a comprehensive literature review and the experience in the frontline, we aim to review the typical and relatively atypical CT manifestations with representative COVID-19 cases at our hospital, and hope to strengthen the recognition of these features with radiologists and help them make a quick and accurate diagnosis.Key Points • Ground glass opacities, consolidation, reticular pattern, and crazy paving pattern are typical CT manifestations of COVID-19. • Emerging atypical CT manifestations, including airway changes, pleural changes, fibrosis, nodules, etc., were demonstrated in COVID-19 patients. • CT manifestations may associate with the progression and prognosis of COVID-19.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32193638

Citation
Eur Radiol. 2020 Mar 19. doi: 10.1007/s00330-020-06801-0.

Title
CT manifestations of coronavirus disease-2019: A retrospective analysis of 73 cases by disease severity

Author
Liu KC, Xu P, Lv WF, Qiu XH, Yao JL, Gu JF, Wei W.

Abstract
PURPOSE: To report CT features of coronavirus disease-2019 (COVID-19) in patients with various disease severity.
METHODS: The CT manifestations and clinical data of 73 patients with COVID-19 were retrospectively collected in 6 hospitals from Jan 21 to Feb 3, 2020. We analyzed the initial and follow-up CT features of patients with disease severity, according to the Guidelines for the Diagnosis and Treatment of New Coronavirus Pneumonia.
RESULTS: Six patients (8%) were diagnosed as mild type pneumonia; these patients had no obvious abnormal CT findings or manifested mild changes of lung infection. All 43 patients (59 %) with common type presented unique or multiple ground-glass opacities (GGO) in the periphery of the lungs, with or without interlobular septal thickening. In the 21 patients (29 %) with severe type, extensive GGO and pulmonary consolidation were found in 16 cases (16/21, 76 %) and 5 cases (24 %), respectively. An extensive "white lung", with atelectasis and pleural effusion were found in critical type patients (3, 4%). On the resolutive phase of the disease, CT abnormalities showed complete resolution, or demonstrated residual linear opacities.
CONCLUSIONS: Different CT features are seen according to disease severity, which can help COVID-19 stratification.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32193037

Citation
Eur J Radiol. 2020 May;126:108941. doi: 10.1016/j.ejrad.2020.108941. Epub 2020 Mar 12..

Title
Computed Tomography Manifestations of 5 Cases of the Novel Coronavirus Disease 2019 (COVID-19) Pneumonia From Patients Outside Wuhan

Author
Lu T, Pu H.

Abstract
Clinical, laboratory, and computed tomography (CT) findings of 5 cases of the novel Coronavirus Disease 2019 (COVID-19) pneumonia from patients outside of Wuhan were reviewed. The human-to-human transmission of the virus may explain the infection of the disease outside of Wuhan. CT examination is important in the early detection and follow-up of the disease. With a history of exposure or travelling, symptoms of fever and cough, and the typical CT manifestation such as ground-glass opacity with a peripheral distribution, we should also think of the possibility of the COVID-19 pneumonia in patients outside of Wuhan.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32195887

Citation
J Thorac Imaging. 2020 Mar 17. doi: 10.1097/RTI.0000000000000508

Title
Association of radiologic findings with mortality of patients infected with 2019 novel coronavirus in Wuhan, China

Author
Yuan M, Yin W, Tao Z, Tan W, Hu Y.

Abstract
Radiologic characteristics of 2019 novel coronavirus (2019-nCoV) infected pneumonia (NCIP) which had not been fully understood are especially important for diagnosing and predicting prognosis. We retrospective studied 27 consecutive patients who were confirmed NCIP, the clinical characteristics and CT image findings were collected, and the association of radiologic findings with mortality of patients was evaluated. 27 patients included 12 men and 15 women, with median age of 60 years (IQR 47-69). 17 patients discharged in recovered condition and 10 patients died in hospital. The median age of mortality group was higher compared to survival group (68 (IQR 63-73) vs 55 (IQR 35-60), P = 0.003). The comorbidity rate in mortality group was significantly higher than in survival group (80% vs 29%, P = 0.018). The predominant CT characteristics consisted of ground glass opacity (67%), bilateral sides involved (86%), both peripheral and central distribution (74%), and lower zone involvement (96%). The median CT score of mortality group was higher compared to survival group (30 (IQR 7-13) vs 12 (IQR 11-43), P = 0.021), with more frequency of consolidation (40% vs 6%, P = 0.047) and air bronchogram (60% vs 12%, P = 0.025). An optimal cutoff value of a CT score of 24.5 had a sensitivity of 85.6% and a specificity of 84.5% for the prediction of mortality. 2019-nCoV was more likely to infect elderly people with chronic comorbidities. CT findings of NCIP were featured by predominant ground glass opacities mixed with consolidations, mainly peripheral or combined peripheral and central distributions, bilateral and lower lung zones being mostly involved. A simple CT scoring method was capable to predict mortality.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32191764

Citation
PLoS One. 2020 Mar 19;15(3):e0230548. doi: 10.1371/journal.pone.0230548. eCollection 2020.

Title
Clinical and CT imaging features of 2019 novel coronavirus disease (COVID-19)

Author
Zhu Y, Liu YL, Li ZP, Kuang JY, Li XM, Yang YY, Feng ST.

Abstract
Tang JW, et al. and colleagues have written to this Journal describing the emergence of 2019 novel coronavirus disease (COVID-19).1 We have had an opportunity to examine in detail the chest computed tomography (CT) findings in cases with microbiologically confirmed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, to familiarize radiologists and clinicians with the imaging manifestations of this new outbreak. Meanwhile, we also studied the clinical characteristics of the cases, combined with CT manifestations, to provide more clues for the correct diagnosis of the disease.

Link
https://www.journalofinfection.com/article/S0163-4453(20)30104-3/fulltext

Citation
https://doi.org/10.1016/j.jinf.2020.02.022

Title
Asymptomatic SARS-CoV-2 infected patients with persistent negative CT findings

Author
Ling Z, Xu X, Gan Q, Zhang L, Luo L, Tang X, Liu J.

Abstract
A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32199142

Citation
Eur J Radiol. 2020 May;126:108956. doi: 10.1016/j.ejrad.2020.108956. Epub 2020 Mar 12.

Title
CT image of novel coronavirus pneumonia: a case report

Author
Zhang X, Song W, Liu X, Lyu L.

Abstract
OBJECTIVE: Knowledge of CT characteristics of COVID-19 pneumonia might be helpful to the early diagnosis and treatment of patients, and to control the spread of infection.
METHODS: The chest CT images of the patient were collected to describe the CT manifestations and characteristics, and they were compared with the previous studies.
RESULTS: Multiple patchy ground-glass opacities (GGOs) were seen in bilateral lung, mostly in subpleural areas. They progressed within 3 days, and nodular GGOs were also seen together with subpleural patchy GGOs.
CONCLUSION: Our case of COVID-19 pneumonia showed multiple subpleural GGOs in bilateral lung, rapid progression, and it also accompanied nodular GGOs on chest CT. These findings were consistent with the previous reports, and they might be useful for early detection and evaluation of severity of COVID-19 pneumonia.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32189175

Citation
Jpn J Radiol. 2020 Mar 18. doi: 10.1007/s11604-020-00945-1.

Title
2019 Novel Coronavirus (COVID-19) Pneumonia with Hemoptysis as the Initial Symptom: CT and Clinical Features

Author
Shi F, Yu Q, Huang W, Tan C.

Abstract
Recently, some global cases of 2019 novel coronavirus (COVID-19) pneumonia have been caused by second- or third-generation transmission of the viral infection, resulting in no traceable epidemiological history. Owing to the complications of COVID-19 pneumonia, the first symptom and imaging features of patients can be very atypical and early diagnosis of COVID-19 infections remains a challenge. It would aid radiologists and clinicians to be aware of the early atypical symptom and imaging features of the disease and contribute to the prevention of infected patients being missed.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32174057

Citation
Korean J Radiol. 2020 Mar 13. doi: 10.3348/kjr.2020.0181

Title
CT appearance of severe, laboratory-proven coronavirus disease 2019 (COVID-19) in a Caucasian patient in Berlin, Germany

Author
Gross A, Thiemig D, Koch FW, Schwarz M, Gläser S, Albrecht T.

Abstract
Coronavirus disease 2019 (COVID-19) is a new lower respiratory tract illness caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), originating from Wuhan, Hubei Province, China, in December 2019 [1] [2]. Despite enormous efforts to limit its propagation, the virus has spread rapidly across various countries around the world. At the end of January 2020, the World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern. As of 8 March 2020, 105 586 infections and 3584 deaths have been recorded worldwide, the vast majority of cases being located in China [3]. While infection rates are slowing in China, numbers of new infections are still exponentially growing in many other countries, South Chorea and Italy being the most severely affected [3].

Link
https://www.ncbi.nlm.nih.gov/pubmed/32193883

Citation
Rofo. 2020 Mar 19. doi: 10.1055/a-1138-8783.

Title
CT imaging of two cases of one family cluster 2019 novel coronavirus (2019-nCoV) pneumonia: inconsistency between clinical symptoms amelioration and imaging sign progression

Author
Hu X, Chen J, Jiang X, Tao S, Zhen Z, Zhou C, Wang J.

Abstract
The emergence and spread of a novel coronavirus (2019-nCoV) from Wuhan City, Hubei Province of China, has become a global health concern (1). Since the detection of the coronavirus in late December 2019, sporadic imported cases among travelers returning from Wuhan and human-to-human transmission have been reported in several non-Wuhan/non-Hubei areas (2,3). We describe the CT features of one family cluster of 2019-nCoV. 47-year-old man presented to the hospital with a 2-day history of fever and cough, 6-day history of sneezing, runny and chills for unknown cause. He indicated that he worked in Wuhan, China and had not been exposed to the seafood and live animal market in Wuhan, where has been identified as the centre of the outbreak. He reported that he came to Chongqing On January 16 and lived with his wife for 10 days. The above patient's wife, a 38-year-old woman, presented to the hospital because of abdominal pain and diarrhea for 5 days; and headache, fever, and muscle soreness for 2 days, just on the same day when her husband presented to the hospital. She reported that she had not travel to Wuhan over the last year and had history of hepatitis B virus (HBV) infection for 20 years.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32190575

Citation
Quant Imaging Med Surg. 2020 Feb;10(2):508-510. doi: 10.21037/qims.2020.02.10.

Title
Well-aerated Lung on Admitting Chest CT to Predict Adverse Outcome in COVID-19 Pneumoniat

Author
Colombi D, Bodini FC, Petrini M, Maffi G, Morelli N, Milanese G, Silva M, Sverzellati N Prof, Michieletti E.

Abstract
Background Computed tomography (CT) of patients with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) disease depicts the extent of lung involvement in COVID-19 pneumonia. Purpose The aim of the study was to determine the value of quantification of the well-aerated lung obtained at baseline chest CT for determining prognosis in patients with COVID-19 pneumonia. Materials and Methods Patients who underwent chest CT suspected for COVID-19 pneumonia at the emergency department admission between February 17 to March 10, 2020 were retrospectively analyzed. Patients with negative reverse-transcription polymerase chain reaction (RT-PCR) for SARS-CoV-2 in nasal-pharyngeal swabs, negative chest CT, and incomplete clinical data were excluded. CT was analyzed for quantification of well aerated lung visually (%V-WAL) and by open-source software (%S-WAL and absolute volume, VOL-WAL). Clinical parameters included demographics, comorbidities, symptoms and symptom duration, oxygen saturation and laboratory values. Logistic regression was used to evaluate relationship between clinical parameters and CT metrics versus patient outcome (ICU admission/death vs. no ICU admission/ death). The area under the receiver operating characteristic curve (AUC) was calculated to determine model performance. Results The study included 236 patients (females 59/123, 25%; median age, 68 years). A %V-WAL<73% (OR, 5.4; 95% CI, 2.7-10.8; P<0.001), %S-WAL<71% (OR, 3.8; 95% CI, 1.9-7.5; P<0.001), and VOL-WAL<2.9 L (OR, 2.6; 95% CI, 1.2-5.8; P<0.01) were predictors of ICU admission/death. In comparison with clinical model containing only clinical parameters (AUC, 0.83), all three quantitative models showed higher diagnostic performance (AUC 0.86 for all models). The models containing %V-WAL<73% and VOL-WAL<2.9L were superior in terms of performance as compared to the models containing only clinical parameters (P=0.04 for both models). Conclusion In patients with confirmed COVID-19 pneumonia, visual or software quantification the extent of CT lung abnormality were predictors of ICU admission or death.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32301647

Citation
Radiology. 2020 Apr 17:201433. doi: 10.1148/radiol.2020201433. [Epub ahead of print]

Title
Diagnostic Performance of CT and Reverse Transcriptase-Polymerase Chain Reaction for Coronavirus Disease 2019: A Meta-Analysis

Author
Kim H, Hong H, Yoon SH.

Abstract
Background Recent studies have suggested that chest computed tomography (CT) scans could be used as a primary screening or diagnostic tool for coronavirus disease 2019 (COVID-19) in epidemic areas. Purpose To perform a meta-analysis to evaluate diagnostic performance measures, including predictive values, of chest CT and initial reverse transcriptase-polymerase chain reaction (RT-PCR). Materials and Methods MEDLINE and Embase were searched from January 1, 2020 to April 3, 2020 for studies on COVID-19 that reported the sensitivity and/or specificity of CT scans and/or RT-PCR assays. The pooled sensitivity and specificity were estimated by using random-effects models. The actual prevalence (i.e., the proportion of confirmed patients among those tested) in eight countries was obtained from web sources, and the predictive values were calculated. Meta-regression was performed to reveal the effect of potential explanatory factors on the diagnostic performance measures. Results The pooled sensitivity was 94% (95% CI: 91%, 96%; I2=95%) for chest CT and 89% (95% CI: 81%, 94%; I2=90%) for RT-PCR. The pooled specificity was 37% (95% CI: 26%, 50%; I2=83%) for chest CT. The prevalence of COVID-19 outside China ranged from 1.0% to 22.9%. For chest CT scans, the positive predictive value (PPV) ranged from 1.5% to 30.7%, and the negative predictive value (NPV) ranged from 95.4% to 99.8%. For RT-PCR,the PPV ranged from 47.3% to 96.4%, while the NPV ranged from 96.8% to 99.9%. The sensitivity of CT was affected by the distribution of disease severity, the proportion of patients with comorbidities, and the proportion of asymptomatic patients (all $p < 0.05$). The sensitivity of RT-PCR was negatively associated with the proportion of elderly patients ($p = 0.01$). Conclusion Outside of China where there is a low-prevalence of COVID-19 (1-22.9%), chest CT screening of patients with suspected disease had low positive predictive value (1.5-30.7%).

Link
https://www.ncbi.nlm.nih.gov/pubmed/32301646

Citation
Radiology. 2020 Apr 17:201343. doi: 10.1148/radiol.2020201343.

Title
Policies and Guidelines for COVID-19 Preparedness: Experiences from the University of Washington

Author
Mossa-Basha M, Medverd J, Linnau K, Lynch JB, Wener MH, Kicska G, Staiger T, Sahani D.

Abstract
The Coronavirus Disease 2019 (COVID-19) pandemic initially presented in the United States in the greater Seattle area, and has rapidly progressed across the nation in the past 2 months, with the United States having the highest number of cases in the world. Radiology departments play a critical role in policy and guideline development both for the department and for the institutions, specifically in planning diagnostic screening, triage, and management of patients. In addition, radiology workflows, volumes and access must be optimized in preparation for the expected COVID-19 patient surges. This article discusses the processes that have been implemented at the University of Washington in managing the COVID-19 pandemic as well in preparing for patient surges, which may provide important guidance for other radiology departments who are in the early stages of preparation and management.

Link
https://pubmed.ncbi.nlm.nih.gov/32267209/

Citation
Radiology. 2020 Apr 8:201326. doi: 10.1148/radiol.2020201326

Title
The Impact of the COVID-19 Pandemic on the Radiology Research Enterprise: Radiology Scientific Expert Panel

Author
Vagal A, Reeder SB, Sodickson DK, Goh V, Bhujwalla ZM, Krupinski EA.

Abstract
The current COVID-19 crisis continues to grow and has resulted in marked changes to clinical operations. In parallel with clinical preparedness, universities have shut down the majority of scientific research activities. Radiology researchers are currently grappling with these challenges that will continue to affect current and future imaging research. The purpose of this article is to describe the collective experiences of a diverse international group of academic radiology research programs in managing their response to the COVID-19 pandemic. The acute response at six distinct institutions will first be described, exploring common themes, challenges, priorities, and practices. This will be followed by reflections about the future of radiology research in the wake of the COVID-19 pandemic.

Link
https://pubmed.ncbi.nlm.nih.gov/32293224/

Citation
Radiology. 2020 Apr 15:201393. doi: 10.1148/radiol.2020201393

Title
The Economic Impact of the COVID-19 Pandemic on Radiology Practices

Author
Cavallo JJ, Forman HP.

Abstract
The COVID-19 pandemic will have a profound impact on Radiology practices across the country. Policy measures adopted to slow the transmission of disease are decreasing the demand for imaging independent of COVID-19. Hospital preparations to expand crisis capacity are further diminishing the amount of appropriate medical imaging that can be safely performed. While economic recessions generally tend to result in decreased health care expenditures, radiology groups have never experienced an economic shock that is simultaneously exacerbated by the need to restrict the availability of imaging. Outpatient heavy practices will feel the biggest impact of these changes, but all imaging volumes will decrease. Anecdotal experience suggests that radiology practices should anticipate 50%-70% decreases in imaging volume that will last a minimum of 3-4 months, depending on the location of practice and the severity of the COVID-19 pandemic in each region. The CARES Act provides multiple means of direct and indirect aid to healthcare providers and small businesses. The final allocation of this funding is not yet clear, and it is likely that additional congressional action will be necessary to stabilize health care markets. Administrators and practice leaders need to be proactive with practice modifications and financial maneuvers that can position them to emerge from this pandemic in the most viable economic position. It is possible that this crisis will have lasting effects on the structure of the radiology field.

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020201495

Citation
Radiology. 2020 Apr 15:201495. doi: 10.1148/radiol.2020201495.

Title
A diagnostic model for coronavirus disease 2019 (COVID-19) based on radiological semantic and clinical features: a multi-center study

Author
Chen X, Tang Y, Mo Y, Li S, Lin D, Yang Z, Yang Z, Sun H, Qiu J, Liao Y, Xiao J, Chen X, Wu X, Wu R, Dai Z.

Abstract
Rapid and accurate diagnosis of coronavirus disease 2019 (COVID-19) is critical during the epidemic. We aim to identify differences in CT imaging and clinical manifestations between pneumonia patients with and without COVID-19, and to develop and validate a diagnostic model for COVID-19 based on radiological semantic and clinical features alone.

Link
https://pubmed.ncbi.nlm.nih.gov/32300971/

Citation
Eur Radiol. 2020 Apr 16. doi: 10.1007/s00330-020-06829-2.

Title
The role of imaging in 2019 novel coronavirus pneumonia (COVID-19)

Author
Yang W, Sirajuddin A, Zhang X, Liu G, Teng Z, Zhao S, Lu M.

Abstract
Almost the entire world, not only China, is currently experiencing the outbreak of a novel coronavirus that causes respiratory disease, severe pneumonia, and even death. The outbreak began in Wuhan, China, in December of 2019 and is currently still ongoing. This novel coronavirus is highly contagious and has resulted in a continuously increasing number of infections and deaths that have already surpassed the SARS-CoV outbreak that occurred in China between 2002 and 2003. It is now officially a pandemic, announced by WHO on the 11th of March. Currently, the 2019 novel coronavirus (SARS-CoV-2) can be identified by virus isolation or viral nucleic acid detection; however, false negatives associated with the nucleic acid detection provide a clinical challenge and thus make the imaging examination crucial. Imaging exams have been a main clinical diagnostic criteria for the 2019 novel coronavirus disease (COVID-19) in China. Imaging features of multiple patchy areas of ground glass opacity and consolidation predominately in the periphery of the lungs are characteristic manifestations on chest CT and extremely helpful in the early detection and diagnosis of this disease, which aids prompt diagnosis and the eventual control of this emerging global health emergency. Key Points • In December 2019, China, an outbreak of pneumonia caused by a novel, highly contagious coronavirus raised grave concerns and posed a huge threat to global public health. • Among the infected patients, characteristic findings on CT imaging include multiple, patchy, ground-glass opacity, crazy-paving pattern, and consolidation shadows, mainly distributed in the peripheral and subpleural areas of both lungs, which are very helpful for the frontline clinicians. • Imaging examination has become the indispensable means not only in the early detection and diagnosis but also in monitoring the clinical course, evaluating the disease severity, and may be presented as an important warning signal preceding the negative RT-PCR test results.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32296940

Citation
Eur Radiol. 2020 Apr 15. doi: 10.1007/s00330-020-06827-4.

Title
Evolution of CT findings in patients with mild COVID-19 pneumonia

Author
Liang T, Liu Z, Wu CC, Jin C, Zhao H, Wang Y, Wang Z, Li F, Zhou J, Cai S, Liang Y, Zhou H, Wang X, Ren Z, Yang J.

Abstract
To delineate the evolution of CT findings in patients with mild COVID-19 pneumonia.
CT images and medical records of 88 patients with confirmed mild COVID-19 pneumonia, a baseline CT, and at least one follow-up CT were retrospectively reviewed. CT features including lobar distribution and presence of ground glass opacities (GGO), consolidation, and linear opacities were analyzed on per-patient basis during each of five time intervals spanning the 3 weeks after disease onset. Total severity scores were calculated.

Link
https://pubmed.ncbi.nlm.nih.gov/32291502/

Citation
Eur Radiol. 2020 Apr 15. doi: 10.1007/s00330-020-06823-8.

Title
CT features of novel coronavirus pneumonia (COVID-19) in children

Author
Duan YN, Zhu YQ, Tang LL, Qin J.

Abstract
A serious epidemic of COVID-19 broke out in Wuhan, Hubei Province, China, and spread to other Chinese cities and several countries now. As the majority of patients infected with COVID-19 had chest CT abnormality, chest CT has become an important tool for early diagnosis of COVID-19 and monitoring disease progression. There is growing evidence that children are also susceptible to COVID-19 and have atypical presentations compared with adults. This review is mainly about the differences in clinical symptom spectrum, diagnosis of COVID-19, and CT imaging findings between adults and children, while highlighting the value of radiology in prevention and control of COVID-19 in pediatric patients.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32291501

Citation
Eur Radiol. 2020 Apr 14. doi: 10.1007/s00330-020-06860-3

Title
CT features of SARS-CoV-2 pneumonia according to clinical presentation: a retrospective analysis of 120 consecutive patients from Wuhan city

Author
Zhang R, Ouyang H, Fu L, Wang S, Han J, Huang K, Jia M, Song Q, Fu Z.

Abstract
To characterize the chest computed tomography (CT) findings of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) according to clinical severity. We compared the CT features of common cases and severe cases, symptomatic patients and asymptomatic patients, and febrile and afebrile patients.

Link
https://pubmed.ncbi.nlm.nih.gov/32279115/

Citation
Eur Radiol. 2020 Apr 11. doi: 10.1007/s00330-020-06854-1

Title
The Performance of Chest CT in Evaluating the Clinical Severity of COVID-19 Pneumonia: Identifying Critical Cases Based on CT Characteristics

Author
Peijie Lyu 1, Xing Liu 1, Rui Zhang 1, Lei Shi 2, Jianbo Gao 1

Abstract
To assess the clinical severity of COVID-19 pneumonia using qualitative and/or quantitative chest CT indicators and identify the CT characteristics of critical cases.

Link
https://pubmed.ncbi.nlm.nih.gov/32304402/

Citation
Invest Radiol. 2020 Apr 17. doi: 10.1097/RLI.0000000000000689.

Title
Chest CT and Coronavirus Disease (COVID-19): A Critical Review of the Literature to Date

Author
Raptis CA, Hammer MM, Short RG, Shah A, Bhalla S, Bierhals AJ, Filev PD, Hope MD, Jeudy J, Kligerman SJ, Henry TS.

Abstract
Coronavirus disease (COVID-19) is a global pandemic. Studies in the radiology literature have suggested that CT might be sufficiently sensitive and specific in diagnosing COVID-19 when used in lieu of a reverse transcription-polymerase chain reaction test; however, this suggestion runs counter to current society guidelines. The purpose of this article is to critically review some of the most frequently cited studies on the use of CT for detecting COVID-19. CONCLUSION. To date, the radiology literature on COVID-19 has consisted of limited retrospective studies that do not substantiate the use of CT as a diagnostic test for COVID-19.

Link
https://pubmed.ncbi.nlm.nih.gov/32298149/

Citation
AJR Am J Roentgenol. 2020 Apr 16;1-4. doi: 10.2214/AJR.20.23202.

Title
Lung Base Findings of Coronavirus Disease (COVID-19) on Abdominal CT in Patients With Predominant Gastrointestinal Symptoms

Author
Siegel A, Chang PJ, Jarou ZJ, Paushter DM, Harmath CB, Arevalo JB, Dachman A.

Abstract
This series of patients presented to the emergency department (ED) with abdominal pain, without the respiratory symptoms typical of coronavirus disease (COVID-19), and the abdominal radiologist was the first to suggest COVID-19 infection because of findings in the lung bases on CT of the abdomen. CONCLUSION. COVID-19 infection can present primarily with abdominal symptoms, and the abdominal radiologist must suggest the diagnosis when evaluating the lung bases for typical findings.

Link
https://pubmed.ncbi.nlm.nih.gov/32301631/

Citation
AJR Am J Roentgenol. 2020 Apr 17;1-3. doi: 10.2214/AJR.20.23232.

Title
Pregnancy and Perinatal Outcomes of Women With Coronavirus Disease (COVID-19) Pneumonia: A Preliminary Analysis

Author
Liu D, Li L, Wu X, Zheng D, Wang J, Yang L, Zheng C.

Abstract
The purpose of this study was to describe the clinical manifestations and CT features of coronavirus disease (COVID-19) pneumonia in 15 pregnant women and to provide some initial evidence that can be used for guiding treatment of pregnant women with COVID-19 pneumonia.

Link
https://pubmed.ncbi.nlm.nih.gov/32186894/

Citation
AJR Am J Roentgenol. 2020 Mar 18;1-6. doi: 10.2214/AJR.20.23072.

Title
Coronavirus Disease 2019 (COVID-19) CT Findings: A Systematic Review and Meta-analysis

Author
Bao C, Liu X, Zhang H, Li Y, Liu J.

Abstract
To date, considerable knowledge gaps remain regarding the chest CT imaging features of COVID-19. We performed a systematic review and meta-analysis of results from published studies to date to provide a summary of evidence on detection of COVID-19 by chest CT and the expected CT imaging manifestations.

Link
https://pubmed.ncbi.nlm.nih.gov/32283052/

Citation
J Am Coll Radiol. 2020 Mar 25;S1546-1440(20)30262-3. doi: 10.1016/j.jacr.2020.03.006.

Title
Operational Strategies to Prevent Coronavirus Disease 2019 (COVID-19) Spread in Radiology: Experience From a Singapore Radiology Department After Severe Acute Respiratory Syndrome

Author
Goh Y, Chua W, Lee JKT, Leng Ang BW, Liang CR, Tan CA, Choong DAW, Hoon HX, Ong MKL, Quek ST.

Abstract
As coronavirus disease 2019 (COVID-19) infection spreads globally, the demand for chest imaging will inevitably rise with an accompanying increase in risk of disease transmission to frontline radiology staff. Radiology departments should implement strict infection control measures and robust operational plans to minimize disease transmission and mitigate potential impact of possible staff infection. In this article, the authors share several operational guidelines and strategies implemented in our practice to reduce spread of COVID-19 and maintain clinical and educational needs of a teaching hospital.

Link
https://pubmed.ncbi.nlm.nih.gov/32298643/

Citation
J Am Coll Radiol. 2020 Apr 3. doi: 10.1016/j.jacr.2020.03.027.

Title
Three unsuspected CT diagnoses of COVID-19

Author
Vu D, Ruggiero M, Choi WS, Masri D, Flyer M, Shyknevsky I, Stein EG.

Abstract
Coronavirus disease 2019 (COVID-19) is caused by a novel strain of coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that has quickly spread around the globe. Health care facilities in the USA currently do not have an adequate supply of COVID-19 tests to meet the growing demand. Imaging findings for COVID-19 are non-specific but include pulmonary parenchymal ground-glass opacities in a predominantly basal and peripheral distribution.

Link
https://pubmed.ncbi.nlm.nih.gov/32285222/

Citation
Emerg Radiol. 2020 Apr 13. doi: 10.1007/s10140-020-01775-4.

Title
Pulmonary embolism in patients with COVID-19: Time to change the paradigm of computed tomography

Author
Rotzinger DC, Beigelman-Aubry C, von Garnier C, Qanadli SD.

Abstract
To raise awareness for possible benefits of examining known COVID-19 patients presenting sudden clinical worsening with CT pulmonary angiography instead of standard non-contrast chest CT.

Link
https://pubmed.ncbi.nlm.nih.gov/32302782/

Citation
Thromb Res. 2020 Apr 11;190:58-59. doi: 10.1016/j.thromres.2020.04.011.

Title
COVID-19: A case series to support radiographer preliminary clinical evaluation

Author
Woznitza N, Nair A, Hare SS.

Abstract
The case series provides radiographers with essential information to preliminarily evaluate chest imaging and prompt the rapid diagnosis of COVID-19.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7151400/

Citation
Radiography (Lond). 2020 Apr 11;S1078-8174(20)30054-7. doi: 10.1016/j.radi.2020.04.002

Title
COVID-19 pneumonia manifestations at the admission on chest ultrasound, radiographs, and CT: single-center study and comprehensive radiologic literature review

Author
Lomoro P, Verde F, Zerboni F, Simonetti I, Borghi C, Fachinetti C, Natalizi A, Martegani A.

Abstract
To investigate the imaging features of emerging COVID-19 pneumonia on chest ultrasound (US), radiographs (CXR) and computed tomography (CT) examinations performed at admission and to provide a comprehensive radiological literature review on ongoing radiological data from recent publications.

Link
https://pubmed.ncbi.nlm.nih.gov/32289051/

Citation
Eur J Radiol Open. 2020;7:100231. doi: 10.1016/j.ejro.2020.100231. Epub 2020 Apr 4

Title
COVID-19 pneumonia: A review of typical CT findings and differential diagnosis

Author
Hani C, Trieu NH, Saab I, Dangeard S, Bennani S, Chassagnon G, Revel MP.

Abstract
The standard of reference for confirming COVID-19 relies on microbiological tests such as real-time polymerase chain reaction (RT-PCR) or sequencing. However, these tests might not be available in an emergency setting. Computed tomography (CT) can be used as an important complement for the diagnosis of COVID-19 pneumonia in the current epidemic context. In this review, we present the typical CT features of COVID-19 pneumonia and discuss the main differential diagnosis.

Link
https://pubmed.ncbi.nlm.nih.gov/32291197/

Citation
Diagn Interv Imaging. 2020 Apr 3;S2211-5684(20)30091-7. doi: 10.1016/j.diii.2020.03.014.

Title
Quantitative computed tomography analysis for stratifying the severity of Coronavirus Disease 2019

Author
Shen C, Yu N, Cai S, Zhou J, Sheng J, Liu K, Zhou H, Guo Y, Niu G.

Abstract
To examine the feasibility of using a computer tool for stratifying the severity of Coronavirus Disease 2019 (COVID-19) based on computed tomography (CT) images.

Link
https://pubmed.ncbi.nlm.nih.gov/32292624/

Citation
J Pharm Anal. 2020 Mar 6. doi: 10.1016/j.jpha.2020.03.004.

Title
Clinical and computed tomographic (CT) images characteristics in the patients with COVID-19 infection: What should radiologists need to know?

Author
Lei P, Huang Z, Liu G, Wang P, Song W, Mao J, Shen G, Zhou S, Qian W, Jiao J.

Abstract
To evaluate the clinical and computed tomographic (CT) features in the patients with COVID-19 pneumonia confirmed by the real-time reverse transcriptase polymerase chain reaction (rRT-PCR) amplification of the viral DNA from a sputum sample.

Link
https://pubmed.ncbi.nlm.nih.gov/32280076/

Citation
J Xray Sci Technol. 2020 Apr 7. doi: 10.3233/XST-200670.

Title
Progress and prospect on imaging diagnosis of COVID-19

Author
Fan L, Li D, Xue H, Zhang L, Liu Z, Zhang B, Zhang L, Yang W, Xie B, Duan X, Hu X, Cheng K, Peng L, Yu N, Song L, Chen H, Sui X, Zheng N, Liu S, Jin Z.

Abstract
COVID-19 has become a public health emergency due to its rapid transmission. The appearance of pneumonia is one of the major clues for the diagnosis, progress and therapeutic evaluation. More and more literatures about imaging manifestations and related research have been reported. In order to know about the progress and prospective on imaging of COVID-19, this review focus on interpreting the CT findings, stating the potential pathological basis, proposing the challenge of patients with underlying diseases, differentiating with other diseases and suggesting the future research and clinical directions, which would be helpful for the radiologists in the clinical practice and research.

Link
https://pubmed.ncbi.nlm.nih.gov/32292880/

Citation
Chin J Acad Radiol. 2020 Mar 18;1-10. doi: 10.1007/s42058-020-00031-5.

Title
Loopholes in Current Infection Control and Prevention Practices Against COVID-19 in Radiology Department and Improvement Suggestions

Author
Yu J, Ding N, Chen H, Liu XJ, Pu ZH, Xu HJ, Lei Y, Zhang HW.

Abstract
To improve the infection control and prevention practices against coronavirus disease 2019 (COVID-19) in radiology department through loophole identification and providing rectifying measurements.

Link
https://pubmed.ncbi.nlm.nih.gov/32281391/

Citation
Can Assoc Radiol J. 2020 Apr 13;846537120916852. doi: 10.1177/0846537120916852.

Title
CT imaging and clinical course of asymptomatic cases with COVID-19 pneumonia at admission in Wuhan, China

Author
Meng H, Xiong R, He R, Lin W, Hao B, Zhang L, Lu Z, Shen X, Fan T, Jiang W, Yang W, Li T, Chen J, Qing G.

Abstract
Aimed to characterize the CT imaging and clinical course of asymptomatic cases with COVID-19 pneumonia.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7152865/

Citation
J Infect. 2020 Apr 12;S0163-4453(20)30211-5. doi: 10.1016/j.jinf.2020.04.004.

Title
Consistency analysis of COVID-19 nucleic acid tests and the changes of lung CT

Author
Zhifeng J, Feng A, Li T.

Abstract
COVID-19, the latest outbreak of infectious disease, has caused huge medical challenges to China and the entire globe. No unified diagnostic standard has been formulated. The initial diagnosis remains based on the positive of nucleic acid tests. However, early nucleic acid tests were identified to be negative in some patients, whereas the patients exhibited characteristic CT changes of lung, and positive test results appeared after repeated nucleic acid tests, having caused the failure to diagnose these patients early. The study aimed to delve into the relationships between initial nucleic acid testing and early lung CT changes in patients with COVID-19.

Link
https://pubmed.ncbi.nlm.nih.gov/32302956/

Citation
J Clin Virol. 2020 Apr 10;127:104359. doi: 10.1016/j.jcv.2020.104359.

Title
CT Scans of Patients with 2019 Novel Coronavirus (COVID-19) Pneumonia

Author
Zhao W, Zhong Z, Xie X, Yu Q, Liu J.

Abstract
The increasing speed of confirmed 2019 novel coronavirus (COVID-19) cases is striking in China. The purpose of this study is to summarize the outcomes of patients with novel COVID-19 pneumonia (NCP) at our institution.

Link
https://pubmed.ncbi.nlm.nih.gov/32292517/

Citation
Theranostics. 2020 Mar 15;10(10):4606-4613. doi: 10.7150/thno.45016. eCollection 2020.

Title
Lung Changes on Chest CT During 2019 Novel Coronavirus (COVID-19) Pneumonia

Author
Çinkooğlu A, Bayraktaroğlu S, Savaş R.

Abstract
Coronavirus Disease 2019 (COVID-19), previously called 2019-nCoV, is a novel disease caused by SARS- CoV-2 which was first identified as outbreak of unknown respiratory illness in Wuhan, China. COVID- 19 was declared as global health emergency by WHO on March 11, 2020 and quickly elevated to global pandemic on 11 March 2020. COVID-19 symptom is highly various in each patient, with fever, fatigue, shortness of breath, and cough as the main presenting symptoms. Patient with COVID-19 may shows severe symptom with severe pneumonia and ARDS, mild symptom resembling simple upper respiration tract infection, or even completely asymptomatic. Approximately 80% of cases is mild. However the number may changes as more people are getting tested. Some experts are estimating that up to 50% of all cases may be asymptomatic carrier.

Link
https://pubmed.ncbi.nlm.nih.gov/32285028/

Citation
Acta Med Indones. 2020 Jan;52(1):80-83.

Title
Computed Tomography Imaging of an HIV-infected Patient with Coronavirus Disease 2019 (COVID-19)

Author
Chen J, Cheng X, Wang R, Zeng X.

Abstract
In December 2019, an outbreak of Coronavirus disease 2019 (COVID-19) occurred in Wuhan, China. Since then, this disease has infected more than 900,000 individuals worldwide. Here we report a case of non-severe COVID-19 pneumonia who was living with HIV. Chest computed tomography (CT) showed different abnormalities from those of conventional COVID-19, and the faster absorption of pulmonary lesions also highlights the importance of antiretroviral therapy in this patient. This report provides reference for the diagnosis and treatment of HIV-infected patients with COVID-19.

Link
https://pubmed.ncbi.nlm.nih.gov/32285949/

Citation
J Med Virol. 2020 Apr 14. doi: 10.1002/jmv.25879. Online ahead of print.

Title
International Expert Consensus Statement on Chest Imaging in Pediatric COVID-19 Patient Management: Imaging Findings, Imaging Study Reporting and Imaging Study Recommendations

Author
Foust AM, Phillips GS, Chu WC, Daltro P, Das KM, Garcia-Peña P, Kilborn T, Winant AJ, Lee EY.

Abstract
The coronavirus disease 2019 (COVID-19) has quickly spread since it was first detected in December of 2019 to a global pandemic with over 1.7 million confirmed cases in over 200 countries around the world at the time this document is being prepared. Due to the novel nature of the virus and the rapidly evolving understanding of the disease, there is a great deal of uncertainty surrounding the diagnosis and management of COVID-19 pneumonia in pediatric patients. Chest imaging plays an important role in evaluation of pediatric patients with COVID-19, however there is currently little information available describing imaging manifestations of pediatric COVID-19 and even less discussing utilization of imaging studies in pediatric patients. To specifically address these concerns, a group of international experts in pediatric thoracic imaging from 5 continents convened to create a consensus statement describing the imaging manifestations of COVID-19 in the pediatric population, discussing the potential utility of structured reporting during the coronavirus 2019 pandemic, and generating consensus recommendations for utilization of chest radiographs (CXR) and computed tomography (CT) in the evaluation of pediatric patients with COVID-19. The results were compiled into 2 structured reporting algorithms (one for CXR and one for chest CT) and 8 consensus recommendations for utilization of chest imaging in pediatric COVID-19 infection.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200130

Citation
Radiology, Apr 20 2020 https://doi.org/10.1148/ryct.2020200130

Title
Radiology Preparedness in the Ongoing Battle against COVID-19: Experience from Large to Small Singapore Public Hospitals

Author
Tan BP , Lim KC, Goh YG, Kok SSX, Teo SY, Poh ACC, Kaw GJL, Quek ST, Wong SBS, Chan LP, Tan BS.

Abstract
The coronavirus disease 2019 (COVID-19) pandemic presents an unprecedented challenge to the healthcare systems of the world. In Singapore, the Radiology community's early experience on managing this pandemic was shaped by lessons learnt from the earlier SARS outbreak in 2003. This article surveys the operational responses of radiology departments from 6 public hospitals in Singapore.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200214

Citation
Radiology. Apr 23 2020https://doi.org/10.1148/ryct.2020200214

Title
Coronavirus-HKU1 Pneumonia and Differential Diagnosis with COVID 19

Author
Pianura E, Di Stefano F , Cristofaro M, Petrone A, Fusco N, Albarello F, Lapa D, Cicalini S, Campioni P, Schininà V.

Abstract
74-year-old female, residing in Rome, was admitted on March 4, 2020 with fever and dry cough for 5 days. She had an epidemiologic link with her sister, who tested positive for SARS-Cov-2. Laboratorial studies revealed elevated C-reactive protein and normal white cell count with neutrophilia. Chest CT obtained at admission showed multiple ground-glass opacities in both upper and left lower lobes, with small pleural effusions (Figure 1a). The patient was negative for SARS-CoV-2 on three polymerase chain reaction (PCR) nasopharyngeal swab tests. Serological tests for SARS-CoV-2 were also negative. A subsequent analysis for other respiratory viruses was positive for HKU1-CoV, and follow-up CT performed after 2 weeks of therapy showed almost complete radiological resolution (Figure 1b).Although chest CT has been used for diagnosing coronavirus disease 2019 (COVID-19) (Figure 2), it relies on relatively nonspecific signs, such as multifocal and peripheral ground-glass opacities, consolidations, and crazy paving, which can be also found in other viral pneumonias (1-3). We illustrate a case of HKU1-CoV pneumonia, a novel group 2 coronavirus discovered in January 2004, which has been also associated with community-acquired pneumonia (4). Given the pandemic setting of COVID-19, the current case underscores the confirmatory role of PCR and the need for considering alternative diagnoses, especially when the full clinical, laboratorial, and radiological picture does not fit into the most common presentation. Noticeably, neutrophilia and pleural effusions have been infrequently seen at the initial presentation of COVID-19 (5).

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200162

Citation
Radiology. Apr 23 2020https://doi.org/10.1148/ryct.2020200162

Title
Unexpected Findings of Coronavirus Disease (COVID-19) at the Lung Bases on Abdominopelvic CT

Author
Dane B, Brusca-Augello G, Kim D, Katz DS.

Abstract
The purpose of this study is to report unanticipated lung base findings on abdominal CT in 23 patients concerning for coronavirus disease (COVID-19). In these patients, who were not previously suspected of having COVID-19, abdominal pain was the most common indication for CT (n = 19), and 11 patients had no extrapulmonary findings. Seventeen patients underwent polymerase chain reaction testing, which returned positive results for all 17.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32319792

Citation
AJR Am J Roentgenol. 2020 Apr 22:1-4. doi: 10.2214/AJR.20.23240. [Epub ahead of print]

Title
COVID-19 patients and the radiology department - advice from the European Society of Radiology (ESR) and the European Society of Thoracic Imaging (ESTI)

Author
Revel MP, Parkar AP, Prosch H, Silva M, Sverzellati N, Gleeson F, Brady A; European Society of Radiology (ESR) and the European Society of Thoracic Imaging (ESTI).

Abstract
This document from the European Society of Radiology (ESR) and the European Society of Thoracic Imaging (ESTI) aims to present the main imaging features, and the role of CT scan in the early diagnosis of COVID-19, describing, in particular, the typical findings which make it possible to identify the disease and distinguish it from bacterial causes of infection, and to define which category of patients may benefit from CT imaging. The precautions that must be taken when performing scans to protect radiologists and technologists from infection will be described. The organisational measures that can be taken within radiology departments in order to cope with the influx of patients, while continuing to manage other emergency and time-sensitive activity (e.g. oncology, other infectious diseases etc.), will be discussed.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=COVID-19+patients+and+the+radiology+department+%E2%80%93+advice+from+the+European+Society+of+Radiology+(ESR)+and+the+European+Society+of+Thoracic+Imaging

Citation
Eur Radiol. 2020 Apr 20. doi: 10.1007/s00330-020-06865-y. [Epub ahead of print]

Title
Radiological Society of North America Expert Consensus Statement on Reporting Chest CT Findings Related to COVID-19. Endorsed by the Society of Thoracic Radiology, the American College of Radiology, and RSNA.

Author
Simpson S, Kay FU, Abbara S, Bhalla S, Chung JH, Chung M, Henry TS, Kanne JP, Kligerman S, Ko JP, Litt H.

Abstract
Routine screening CT for the identification of COVID-19 pneumonia is currently not recommended by most radiology societies. However, the number of CTs performed in persons under investigation (PUI) for COVID-19 has increased. We also anticipate that some patients will have incidentally detected findings that could be attributable to COVID-19 pneumonia, requiring radiologists to decide whether or not to mention COVID-19 specifically as a differential diagnostic possibility. We aim to provide guidance to radiologists in reporting CT findings potentially attributable to COVID-19 pneumonia, including standardized language to reduce reporting variability when addressing the possibility of COVID-19. When typical or indeterminate features of COVID-19 pneumonia are present in endemic areas as an incidental finding, we recommend contacting the referring providers to discuss the likelihood of viral infection. These incidental findings do not necessarily need to be reported as COVID-19 pneumonia. In this setting, using the term "viral pneumonia" can be a reasonable and inclusive alternative. However, if one opts to use the term "COVID-19" in the incidental setting, consider the provided standardized reporting language. In addition, practice patterns may vary, and this document is meant to serve as a guide. Consultation with clinical colleagues at each institution is suggested to establish a consensus reporting approach. The goal of this expert consensus is to help radiologists recognize findings of COVID-19 pneumonia and aid their communication with other healthcare providers, assisting management of patients during this pandemic.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32324653

Citation
J Thorac Imaging. 2020 Apr 21. doi: 10.1097/RTI.0000000000000524. [Epub ahead of print]

Title
Society of Cardiovascular Computed Tomography guidance for use of cardiac computed tomography amidst the COVID-19 pandemic Endorsed by the American College of Cardiology

Author
Choi AD, Abbara S, Branch KR, Feuchtner GM, Ghoshhajra B, Nieman K, Pontone G, Villines TC, Williams MC, Blankstein R.

Abstract
The world is currently suffering through a pandemic outbreak of severe respiratory syndrome coronavirus 2 (SARS-CoV-2) known as Coronavirus Disease 2019 (COVID-19). The United States (US) Centers for Disease Control and Prevention (CDC) currently advises medical facilities to "reschedule non-urgent outpatient visits as necessary". The European Centre for Disease Prevention and Control, the United Kingdom National Health Service and several other international agencies covering Asia, North America and most regions of the world have recommended similar "social distancing" measures. The Society of Cardiovascular Computed Tomography (SCCT) offers guidance for cardiac CT (CCT) practitioners to help implement these international recommendations in order to decrease the risk of COVID-19 transmission in their facilities while deciding on the timing of outpatient and inpatient CCT exams. This document also emphasizes SCCT's commitment to the health and well-being of CCT technologists, imagers, trainees, and research community, as well as the patients served by CCT.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32317235

Citation
J Cardiovasc Comput Tomogr. 2020 Mar 21. pii: S1934-5925(20)30125-8. doi: 10.1016/j.jcct.2020.03.002. [Epub ahead of print]

Title
Chest CT Findings of Early and Progressive Phase COVID-19 Infection from a US Patient

Author
Adair LB 2nd, Ledermann EJ.

Abstract
The SARS-CoV-2 infection (COVID-19), originally reported in Wuhan, China, has rapidly proliferated throughout several continents and the first case in the United States was reported on January 19, 2020. According to the ACR guidelines issued shortly after this disease was declared a pandemic, radiologists are expected to familiarize themselves with the CT appearance of COVID-19 infection in order to be able to identify specific findings of this entity. This case report discusses the relevant imaging findings of one of the first cases in the midwestern US. It involves a 60-year-old man who presented with fever, dyspnea, and cough for 1 week and subsequently tested positive for COVID-19. The utility of the noncontrast CT chest in the diagnosis of COVID-19 has been controversial, but there are specific imaging findings that have been increasingly associated with this virus in the appropriate clinical context. The stages of imaging findings in COVID-19 are considered along with the implications of fibrosis throughout the stages. Future considerations include using artificial intelligence algorithms to distinguish between community acquired pneumonias and COVID-19 infection.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=Chest+CT+findings+of+early+and+progressive+phase+COVID-19+infection+from+a+US+patient

Citation
Radiol Case Rep. 2020 Apr 20. doi: 10.1016/j.radcr.2020.04.031. [Epub ahead of print]

Title
Review of Artificial Intelligence Techniques in Imaging Data Acquisition, Segmentation and Diagnosis for COVID-19

Author
Shi F, Wang J, Shi J, Wu Z, Wang Q, Tang Z, He K, Shi Y, Shen D.

Abstract
The pandemic of coronavirus disease 2019 (COVID-19) is spreading all over the world. Medical imaging such as X-ray and computed tomography (CT) plays an essential role in the global fight against COVID-19, whereas the recently emerging artificial intelligence (AI) technologies further strengthen the power of the imaging tools and help medical specialists. We hereby review the rapid responses in the community of medical imaging (empowered by AI) toward COVID-19. For example, AI-empowered image acquisition can significantly help automate the scanning procedure and also reshape the workflow with minimal contact to patients, providing the best protection to the imaging technicians. Also, AI can improve work efficiency by accurate delineation of infections in X-ray and CT images, facilitating subsequent quantification. Moreover, the computer-aided platforms help radiologists make clinical decisions, i.e., for disease diagnosis, tracking, and prognosis. In this review paper, we thus cover the entire pipeline of medical imaging and analysis techniques involved with COVID-19, including image acquisition, segmentation, diagnosis, and follow-up. We particularly focus on the integration of AI with X-ray and CT, both of which are widely used in the frontline hospitals, in order to depict the latest progress of medical imaging and radiology fighting against COVID-19.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=Review+of+Artificial+Intelligence+Techniques+in+Imaging+Data+Acquisition%2C+Segmentation+and+Diagnosis+for+COVID-19

Citation
IEEE Rev Biomed Eng. 2020 Apr 16. doi: 10.1109/RBME.2020.2987975. [Epub ahead of print]

Title
Review of Artificial Intelligence Techniques in Imaging Data Acquisition, Segmentation and Diagnosis for COVID-19

Author
Shi F, Wang J, Shi J, Wu Z, Wang Q, Tang Z, He K, Shi Y, Shen D.

Abstract
The pandemic of coronavirus disease 2019 (COVID-19) is spreading all over the world. Medical imaging such as X-ray and computed tomography (CT) plays an essential role in the global fight against COVID-19, whereas the recently emerging artificial intelligence (AI) technologies further strengthen the power of the imaging tools and help medical specialists. We hereby review the rapid responses in the community of medical imaging (empowered by AI) toward COVID-19. For example, AI-empowered image acquisition can significantly help automate the scanning procedure and also reshape the workflow with minimal contact to patients, providing the best protection to the imaging technicians. Also, AI can improve work efficiency by accurate delineation of infections in X-ray and CT images, facilitating subsequent quantification. Moreover, the computer-aided platforms help radiologists make clinical decisions, i.e., for disease diagnosis, tracking, and prognosis. In this review paper, we thus cover the entire pipeline of medical imaging and analysis techniques involved with COVID-19, including image acquisition, segmentation, diagnosis, and follow-up. We particularly focus on the integration of AI with X-ray and CT, both of which are widely used in the frontline hospitals, in order to depict the latest progress of medical imaging and radiology fighting against COVID-19.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=Review+of+Artificial+Intelligence+Techniques+in+Imaging+Data+Acquisition%2C+Segmentation+and+Diagnosis+for+COVID-19

Citation
IEEE Rev Biomed Eng. 2020 Apr 16. doi: 10.1109/RBME.2020.2987975. [Epub ahead of print]

Title
Chest CT findings of COVID-19 pneumonia by duration of symptoms

Author
Ding X, Xu J, Zhou J, Long Q.

Abstract
PURPOSE: To evaluate lung abnormalities on thin-section computed tomographic (CT) scans in patients with COVID-19 and correlate findings to duration of symptoms.
METHODS: In total, 348 CT scans in 112 patients were classified according to the time after the onset of the initial symptoms, namely stage-1 (0-4 days); stage-2 (5-9 days); stage-3 (10-14 days); stage-4 (15-21 days); stage-5 (22-28 days); and stage-6 (＞28 days). Each lung lobe was evaluated for extent affected by ground-glass opacities (GGO), crazy-paving pattern and consolidation, in five categories of percentual severity. Summation of scores from all five lung lobes provided the total CT score (maximal CT score, 25).
RESULTS: The predominant patterns of lung abnormalities were GGOs, crazy-paving pattern, consolidation and linear opacities. The frequency of crazy-paving pattern, consolidation and linear opacities peaked at stage-3 (62.7 %), stage-4 (75.0 %) and stage-5 (83.1 %), respectively, and decreased thereafter. Total CT scores increased from stage-1 to stage-2 (2.8 ± 3.1, vs. 6.5 ± 4.6, respectively, $P < 0.01$), and thereafter remained high. The lower lobes were more inclined to be involved with higher CT scores except for stage-1. At stage-6 98.1 % of CT scans still showed abnormalities (CT score 7.5 ± 4.1).
CONCLUSION: Thin-section CT could provide semi-quantitative analysis of pulmonary damage severity. This disease changed rapidly at the early stage, then tended to be stable and lasted for a long time.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32325282

Citation
Eur J Radiol. 2020 Apr 18;127:109009. doi: 10.1016/j.ejrad.2020.109009. [Epub ahead of print]

Title
Serial CT features in discharged COVID-19 patients with positive RT-PCR re-test

Author
Dou P, Zhang S, Wang C, Cai L, Liu Z, Xu Q, Li X, Meng Y, Rong Y, Li S, Hu C, Xu K.

Abstract
The Coronavirus Disease 2019 (COVID-19) appeared in Decembern 2019 in China and has infected more than 100,000 patients in Chinan since then. After MDT (multi-disciplinary team treatment), more than 60,000 patients were cured and discharged from the isolation wards of designated hospitals. All of the discharged patients were negative as assayed by real-time reverse transcriptase-polymerase chain reaction (RT-PCR) tests. Based on Chinese government guidelines, these discharge patients needed to remain in isolation in the home for 2 weeks followed by additional follow-up nucleic acid testing and chest CT examination. However, some discharged patients have retested positive using nucleicnacid tests. Reports of these scattered cases have drawn huge scrutiny. Unfortunately, there are some relevant issues needing resolution. First, the capacity for transmission between persons with these patients after positive diagnosis still needs to be determined. Second, the features of serial chest CT scans need to be analyzed to improve our awareness of these cases. Finally, the reason causing these positive retest results should be discussed. We report here the serial CT examination features of two cluster transmission cases with positive follow-up nucleic acid test results after discharge.
Link
https://www.ncbi.nlm.nih.gov/pubmed/32334369

Citation
Eur J Radiol. 2020 Apr 18;127:109010. doi: 10.1016/j.ejrad.2020.109010. [Epub ahead of print]

Title
Imaging characteristics of initial chest computed tomography and clinical manifestations of patients with COVID-19 pneumonia

Author
Fan N, Fan W, Li Z, Shi M, Liang Y.

Abstract
PURPOSE: To investigate the chest CT imaging characteristics and clinical manifestations of patients with COVID-19 pneumonia.
METHODS: This study included 150 patients with COVID-19 pneumonia diagnosed from January 10 to February 12, 2020 to analyze their clinical and CT imaging characteristics.
RESULTS: The period between symptom onset and initial CT examination ranged from 1 to 8 days. There were 83 cases (55.33%) involving both lungs, 67 cases (44.67%) involving a single lung (left 25 cases and right 42 cases). There were 49 cases (32.67%) of single intrapulmonary lesion, 33 cases (22.00%) of multiple intrapulmonary lesions, 68 cases (44.00%) of diffused intrapulmonary lesions, 67 cases (44.67%) of subpleural lesions, 24 cases (16.00%) of lesions localizing along the bronchovascular bundles, and 59 cases (39.33%) with lesions in both locations. There were 18 cases (12.00%) exhibiting ground-glass nodules of < 10 mm, 124 cases (82.67%) of patchy ground-glass opacities with or without consolidation, 8 cases (5.33%) of cord-like lesions, 6 cases (4.00%) of pleural effusion, and 2 cases (1.33%) of enlarged lymph nodes.
CONCLUSIONS: The main manifestations of initial chest CT in COVID-19 pneumonia patients was ground-glass opacities, commonly involving single site in patients < 35 years old and multiple sites and extensive area in patients > 60 years old. The common lesion sites were the subpleural region and the posterior basal segments of the lower lobes, mostly showing thickening of the interlobular septum and mixed with consolidation.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32318916

Citation
Jpn J Radiol. 2020 Apr 21. doi: 10.1007/s11604-020-00973-x. [Epub ahead of print]

Title
CT characteristics of patients infected with 2019 novel coronavirus: association with clinical type

Author
Wang J, Xu Z, Wang J, Feng R, An Y, Ao W, Gao Y, Wang X, Xie Z.

Abstract
AIM: To summarise the features of chest computed tomography (CT) of a series of patients infected with 2019 novel coronavirus (2019-nCov) to speed up recognition and have a better understanding of COVID-19 disease.
MATERIALS AND METHODS: The clinical information and chest CT images of 93 patients infected with 2019-nCov from multiple centres were reviewed.
RESULTS: Of the 93 cases, abnormalities in 91 cases were located at the subpleural level, presenting with ground-glass opacity (GGO; n=69, 74.2%) and consolidation (n=56, 60.2%) in multiple lobes. Other CT features included vascular dilatation (n=83, 89.2%), interlobular septal thickening (n=29, 31.2%), bronchodilatation (n=44, 47.3%), the crazy-paving sign (n=34, 36.6%), the sieve-hole sign (n=12, 12.9%), pleural thickening (n=21, 22.6%), and pleural effusion (n=8, 8.6%). Multiple lobe involvement, including the presence of consolidation, the crazy-paving sign, interlobular septal thickening, pleural thickening and pleural effusion, was more common in critical patients with heavy/critical infection ($p<0.05$), whereas the presence of GGO, involvement of one or two lobes, and the halo sign were more common in patients with mild/common-type infections ($p<0.05$). Moreover, older age, higher body temperature, complaints of chest tightness and breathlessness, and lymphopenia was associated with heavy/critical infections.
CONCLUSION: The CT and clinical appearances of COVID-19 are variable and reflect the severity of COVID-19 to some extent.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32327229

Citation
Clin Radiol. 2020 Apr 7. pii: S0009-9260(20)30135-5. doi: 10.1016/j.crad.2020.04.001. [Epub ahead of print]

Title
Small Solitary Ground-Glass Nodule on CT as an Initial Manifestation of Coronavirus Disease 2019 (COVID-19) Pneumonia

Author
Xia T, Li J, Gao J, Xu X.

Abstract
The 2019 novel coronavirus (2019-nCoV) outbreak in Wuhan, Hubei Province, China in 2019 led to large numbers of people being infected and developing atypical pneumonia (coronavirus disease 2019, COVID-19). Typical imaging manifestations of patients infected with 2019-nCoV has been reported, but we encountered an atypical radiological manifestation on baseline computed tomography (CT) images in three patients from Wuhan, China infected with the 2019-nCoV. Surprisingly, the only similar CT finding was a solitary sub-centimeter ground-glass nodule adjacent to bronchovascular bundles, which could be easily overlooked. In addition, the follow-up images in these patients showed how COVID-19 pneumonia evolved from these small nodules. The radiologic manifestation of the three cases will expand contemporary understanding of COVID-19.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32323499

Citation
Korean J Radiol. 2020 May;21(5):545-549. doi: 10.3348/kjr.2020.0240.

Title
Early chest computed tomography to diagnose COVID-19 from suspected patients: A multicenter retrospective study

Author
Miao C, Jin M, Miao L, Yang X, Huang P, Xiong H, Huang P, Zhao Q, Du J, Hong J.

Abstract
OBJECTIVE: The purpose of this study was to distinguish the imaging features of COVID-19 from those of other infectious pulmonary diseases and evaluate the diagnostic value of chest CT for suspected COVID-19 patients.
METHODS: Adult patients suspected of COVID-19 aged >18 years who underwent chest CT scans and reverse-transcription polymerase chain reaction (RT-PCR) tests within 14 days of symptom onset were enrolled. The enrolled patients were confirmed and grouped according to the results of the RT-PCR tests. The basic demographics, single chest CT features, and combined chest CT features were analyzed for the confirmed and nonconfirmed groups.
RESULTS: A total of 130 patients were enrolled, with 54 testing positive and 76 testing negative. The typical CT imaging features of the positive group were ground glass opacities (GGOs), the crazy-paving pattern and air bronchogram. The lesions were mostly distributed bilaterally and close to the lower lungs or the pleura. When features were combined, GGOs with bilateral pulmonary distribution and GGOs with pleural distribution were more common among the positive patients, found in 31 (57.4%) and 30 patients (55.6%), respectively. The combinations were almost all statistically significant ($P < .05$), except for the combination of GGOs with consolidation. Most combinations presented relatively low sensitivity but extremely high specificity. The average specificity of these combinations was approximately 90%.
CONCLUSIONS: The combinations with GGOs could be useful in the identification and differential diagnosis of COVID-19, alerting clinicians to isolate patients for prompt treatment and repeat RT-PCR tests until the end of incubation.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32327245

Citation
Am J Emerg Med. 2020 Apr 19. pii: S0735-6757(20)30281-3. doi: 10.1016/j.ajem.2020.04.051. [Epub ahead of print]

Title
CT imaging of the COVID-19

Author
Zhang FY, Qiao Y, Zhang H.

Abstract
COVID-19 pneumonia presented with certain characteristic chest CT imaging features, which are helpful to the radiologist in the early detection and diagnosis of this emerging global health emergency. In this report, we present chest CT findings from five patients with COVID-19. Except for one case with normal lung appearance, all the other four cases had certain characteristics, including ground-glass opacity (GGO), consolidation and atoll sign. The lesions were mainly distributed in the peripheral portion of lung.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=CT+imaging+of+the+COVID-19+AND+Zhang+FY

Citation
J Formos Med Assoc. 2020 Apr 16. pii: S0929-6646(20)30142-X. doi: 10.1016/j.jfma.2020.04.006. [Epub ahead of print]

Title
CT imaging of coronavirus disease 2019 (COVID-19): from the qualitative to quantitative

Author
Qi X, Lei J, Yu Q, Xi Y, Wang Y, Ju S.

Abstract
The coronavirus disease 2019 (COVID-19) from Wuhan, China has become a global challenge since the late December 2019 (1-3). The clinical characteristics of patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) have been defined in recent studies (4-6). In addition, CT imaging characteristics have been described as an important diagnostic tool of COVID-19 (7-9). On February 4, 2020, National Health Commission of the People's Republic of China released the 5th edition of "Diagnosis and management plan of novel coronavirus pneumonia", and highlighted the role of CT imaging in Hubei Province to promote the early detection and early isolation.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=CT+imaging+of+coronavirus+disease+2019+(COVID-19)%3A+from+the+qualitative+to+quantitative

Citation
Ann Transl Med. 2020 Mar;8(5):256. doi: 10.21037/atm.2020.02.91.

Title
Chest CT features and their role in COVID-19

Author
Li M.

Abstract
Since December 2019, the novel coronavirus disease (COVID-19) has spread rapidly throughout China. This article reviews the chest CT features of COVID-19 and analyzes the role of chest CT in this health emergency.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32309528

Citation
Radiol Infect Dis. 2020 Apr 16. doi: 10.1016/j.jrid.2020.04.001. [Epub ahead of print]

Title
The unsynchronized changes of CT image and nucleic acid detection in COVID-19: reports the two cases from Gansu, China

Author
Gao J, Liu JQ, Wen HJ, Liu H, Hu WD, Han X, Li CX, Wang XJ.

Abstract
The novel coronavirus disease (COVID-19) outbreak started in December 2019 in Wuhan, China, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The CT image is used to assess the disease progress, whereas the continued two times of negative results from SARS-CoV-2 nucleic acid detection had been considered as a criterion for ending antiviral treatment. We compared the two COVID-19 cases with similar backgrounds and CT image repeated intervals under treatment. Our report highlighted the unsynchronized expression in the changes of CT image and nucleic acid detection in COVID-19, and lasting positive nucleic acid test result in patients recovered from pneumonia. It may be contributed to recognize the disease and improve prevention.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32321530

Citation
Respir Res. 2020 Apr 22;21(1):96. doi: 10.1186/s12931-020-01363-7.

Title
Variable computed tomography appearances of COVID-19

Author
Lim ZY, Khoo HW, Hui TCH, Kok SSX, Kwan KEL, Young BE, Tan CH, Kaw GJL.

Abstract
The coronavirus disease 2019 (COVID-19) is typically diagnosed by specific assays that detect viral nucleic acid from the upper respiratory tract; however, this may miss infections involving only the lower airways. Computed tomography (CT) has been described as a diagnostic modality in the COVID-19 diagnosis and treatment plan. We present a case series with virologically confirmed COVID-19 pneumonia. Variable CT features were observed: consolidation with ground-glass opacities, ground-glass opacities with subpleural reticular bands, and an anterior-posterior gradient of lung abnormalities resembling that of acute respiratory distress syndrome. In one patient, we noted evolution of CT findings, where there was interval resolution of bilateral lung consolidation with development of bronchiolectasis and subpleural fibrotic bands. While sensitive for detecting lung parenchymal abnormalities in COVID-19 pneumonia, CT for initial diagnosis is discouraged and should be reserved for specific clinical indications. Interpretation of chest CT findings should be correlated with duration of symptoms to better determine the disease stage and aid in patient management.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32312025

Citation
Singapore Med J. 2020 Apr 21. doi: 10.11622/smedj.2020066. [Epub ahead of print]

Title
The role of imaging in the detection and management of COVID-19: a review

Author
Dong D, Tang Z, Wang S, Hui H, Gong L, Lu Y, Xue Z, Liao H, Chen F, Yang F, Jin R, Wang K, Liu Z, Wei J, Mu W, Zhang H, Jiang J, Tian J, Li H.

Abstract
Coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is spreading rapidly around the world, resulting in a massive death toll. Lung infection or pneumonia is the common complication of COVID-19, and imaging techniques, especially computed tomography (CT), have played an important role in diagnosis and treatment assessment of the disease. Herein, we review the imaging characteristics and computing models that have been applied for the management of COVID-19. CT, positron emission tomography - CT (PET/CT), lung ultrasound, and magnetic resonance imaging (MRI) have been used for detection, treatment, and follow-up. The quantitative analysis of imaging data using artificial intelligence (AI) is also explored. Our findings indicate that typical imaging characteristics and their changes can play crucial roles in the detection and management of COVID-19. In addition, AI or other quantitative image analysis methods are urgently needed to maximize the value of imaging in the management of COVID-19.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32356760

Citation
IEEE Rev Biomed Eng. 2020 Apr 27. doi: 10.1109/RBME.2020.2990959. [Epub ahead of print]

Title
AI Augmentation of Radiologist Performance in Distinguishing COVID-19 from Pneumonia of Other Etiology on Chest CT

Author
Bai HX, Wang R, Xiong Z, Hsieh B, Chang K, Halsey K, Tran TML, Choi JW, Wang DC, Shi LB, Mei J, Jiang XL, Pan I, Zeng QH, Hu PF, Li YH, Fu FX, Huang RY, Sebro R, Yu QZ, Atalay MK, Liao WH.

Abstract
Background COVID-19 and pneumonia of other etiology share similar CT characteristics, contributing to the challenges in differentiating them with high accuracy. Purpose To establish and evaluate an artificial intelligence (AI) system in differentiating COVID-19 and other pneumonia on chest CT and assess radiologist performance without and with AI assistance. Methods 521 patients with positive RT-PCR for COVID-19 and abnormal chest CT findings were retrospectively identified from ten hospitals from January 2020 to April 2020. 665 patients with non-COVID-19 pneumonia and definite evidence of pneumonia on chest CT were retrospectively selected from three hospitals between 2017 and 2019. To classify COVID-19 versus other pneumonia for each patient, abnormal CT slices were input into the EfficientNet B4 deep neural network architecture after lung segmentation, followed by two-layer fully-connected neural network to pool slices together. Our final cohort of 1,186 patients (132,583 CT slices) was divided into training, validation and test sets in a 7:2:1 and equal ratio. Independent testing was performed by evaluating model performance on separate hospitals. Studies were blindly reviewed by six radiologists without and then with AI assistance. Results Our final model achieved a test accuracy of 96% (95% CI: 90-98%), sensitivity 95% (95% CI: 83-100%) and specificity of 96% (95% CI: 88-99%) with Receiver Operating Characteristic (ROC) AUC of 0.95 and Precision-Recall (PR) AUC of 0.90. On independent testing, our model achieved an accuracy of 87% (95% CI: 82-90%), sensitivity of 89% (95% CI: 81-94%) and specificity of 86% (95% CI: 80-90%) with ROC AUC of 0.90 and PR AUC of 0.87. Assisted by the models' probabilities, the radiologists achieved a higher average test accuracy (90% vs. 85%, Δ=5, p<0.001), sensitivity (88% vs. 79%, Δ=9, p<0.001) and specificity (91% vs. 88%, Δ=3, p=0.001). Conclusion AI assistance improved radiologists' performance in distinguishing COVID-19 from non-COVID-19 pneumonia on chest CT.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32339081

Citation
Radiology. 2020 Apr 27:201491. doi: 10.1148/radiol.2020201491. [Epub ahead of print]

Title
CO-RADS - A categorical CT assessment scheme for patients with suspected COVID-19: definition and evaluation

Author
Prokop M, van Everdingen W, van Rees Vellinga T, Quarles van Ufford J, Stöger L, Beenen L, Geurts B, Gietema H, Krdzalic J, Schaefer-Prokop C, van Ginneken B, Brink M; "COVID-19 Standardized Reporting" Working Group of the Dutch Radiological Society.

Abstract
Purpose To introduce the COVID-19 Reporting and Data System (CO-RADS) for standardized assessment of pulmonary involvement of COVID-19 on non-enhanced chest CT and report its initial interobserver agreement and performance. Methods The Dutch Radiological Society (NVvR) developed CO-RADS based on other efforts for standardization, such as Lung-RADS or BI-RADS. CO-RADS assesses the suspicion for pulmonary involvement of COVID-19 on a scale from 1 (very low) to 5 (very high). The system is meant to be used in patients presenting with moderate to severe symptoms of COVID-19. The system was evaluated using 105 chest CTs of patients admitted to the hospital with clinical suspicion of COVID-19 in whom RT-PCR was performed (62 +/- 16 years, 61 men, 53 with positive RT-PCR). Eight observers assessed the scans using CO-RADS. Fleiss' kappa was calculated, and scores of individual observers were compared to the median of the remaining seven observers. The resulting area under the receiver operating characteristics curve (AUC) was compared to results from RT-PCR and clinical diagnosis of COVID-19. Results There was absolute agreement among observers in 573 (68.2%) of 840 observations. Fleiss' kappa was 0.47 (95% confidence interval (CI) 0.45-0.47), with the highest kappa for CO-RADS categories 1 (0.58, 95% CI 0.54-0.62) and 5 (0.68, 95% CI 0.65-0.72). The average AUC was 0.91 (95% CI 0.85-0.97) for predicting RT-PCR outcome and 0.95 (95% CI 0.91-0.99) for clinical diagnosis. The false negative rate for CO-RADS 1 was 9/161 (5.6%, 95% CI 1.0-10%), and the false positive rate for CO-RADS 5 was 1/286 (0.3%, 95% CI 0-1.0%). Conclusions CO-RADS is a categorical assessment scheme for pulmonary involvement of COVID-19 on non-enhanced chest CT providing very good performance for predicting COVID-19 in patients with moderate to severe symptoms and has a substantial interobserver agreement, especially for categories 1 and 5.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=CO-RADS+%E2%80%93+A+categorical+CT+assessment+scheme+for+patients+with+suspected+COVID-19%3A+definition+and+evaluation

Citation
Radiology. 2020 Apr 27:201473. doi: 10.1148/radiol.2020201473. [Epub ahead of print]

Title
Management of Lung Nodules and Lung Cancer Screening During the COVID-19 Pandemic: CHEST Expert Panel Report

Author
Mazzone PJ, Gould MK, Arenberg DA, Chen AC, Choi HK, Detterbeck FC, Farjah F, Fong KM, Iaccarino JM, Janes SM, Kanne JP, Kazerooni EA, MacMahon H, Naidich DP, Powell CA, Raoof S, Rivera MP, Tanner NT, Tanoue LK, Tremblay A, Vachani A, White CS, Wiener RS, Silvestri GA.

Abstract
BACKGROUND: The risks from potential exposure to COVID-19, and resource reallocation that has occurred to combat the pandemic, have altered the balance of benefits and harms that informed current (pre-COVID-19) guideline recommendations for lung cancer screening and lung nodule evaluation. We developed consensus statements to guide clinicians managing lung cancer screening programs and patients with lung nodules during the COVID-19 pandemic.
METHODS: An expert panel of 24 members, including pulmonologists (17), thoracic radiologists (5), and thoracic surgeons (2) was formed. The panel was provided with an overview of current evidence, summarized by recent guidelines related to lung cancer screening and lung nodule evaluation. The panel was convened by video teleconference to discuss then vote on statements related to 12 common clinical scenarios. A pre-defined threshold of 70% of panel members voting agree or strongly agree was used to determine if there was a consensus for each statement. Items that may influence decisions were listed as notes to be considered for each scenario.
RESULTS: Twelve statements related to baseline and annual lung cancer screening (2), surveillance of a previously detected lung nodule (5), evaluation of intermediate and high risk lung nodules (4), and management of clinical stage I non-small cell lung cancer (1) were developed and modified. All 12 statements were confirmed as consensus statements by voting results. The consensus statements provide guidance about situations where it was felt to be appropriate to delay screening, defer surveillance imaging of lung nodules, and minimize non-urgent interventions during the evaluation of lung nodules and stage I non-small cell lung cancer.
CONCLUSIONS:There was consensus that during the COVID-19 pandemic it is appropriate to defer enrollment in lung cancer screening and modify the evaluation of lung nodules due to the added risks from potential exposure and the need for resource reallocation. There are multiple local, regional, and patient related factors that should be considered when applying these statements to individual patient care.

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https://www.ncbi.nlm.nih.gov/pubmed/32335067

Citation
Chest. 2020 Apr 22. pii: S0012-3692(20)30758-3. doi: 10.1016/j.chest.2020.04.020. [Epub ahead of print]

Title
Coronavirus disease 2019 (COVID-19) imaging reporting and data system (COVID-RADS) and common lexicon: a proposal based on the imaging data of 37 studies

Author
Salehi S, Abedi A, Balakrishnan S, Gholamrezanezhad A.

Abstract
In the vast majority of the laboratory-confirmed coronavirus disease 2019 (COVID-19) patients, computed tomography (CT) examinations yield a typical pattern and the sensitivity of this modality has been reported to be 97% in a large-scale study. Structured reporting systems simplify the interpretation and reporting of imaging examinations, serve as a framework for consistent generation of recommendations, and improve the quality of patient care.
PURPOSE: To compose a comprehensive lexicon for description of the imaging findings and propose a grading system and structured reporting format for CT findings in COVID-19.
MATERIAL AND METHODS: We updated our published systematic review on imaging findings in COVID-19 to include 37 published studies pertaining to diagnostic features of COVID-19 in chest CT. Using the reported imaging findings of 3647 patients, we summarized the typical chest CT findings, atypical features, and temporal changes of COVID-19 in chest CT. Subsequently, we extracted a list of descriptive terms and mapped it to the terminology that is commonly used in imaging literature.
RESULTS:We composed a comprehensive lexicon that can be used for documentation and reporting of typical and atypical CT imaging findings in COVID-19 patients. Using the same data, we propose a grading system with five COVID-RADS categories. Each COVID-RADS grade corresponds to a low, moderate, or high level of suspicion for pulmonary involvement of COVID-19.
CONCLUSION:The proposed COVID-RADS and common lexicon would improve the communication of findings to other healthcare providers, thus facilitating the diagnosis and management of COVID-19 patients.

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Citation
Eur Radiol. 2020 Apr 28. doi: 10.1007/s00330-020-06863-0. [Epub ahead of print]

Title
Use of CT and artificial intelligence in suspected or COVID-19 positive patients: statement of the Italian Society of Medical and Interventional Radiology

Author
Neri E, Miele V, Coppola F, Grassi R.

Abstract
The COVID-19 pandemic started in Italy in February 2020 with an exponential growth that has exceeded the number of cases reported in China. Italian radiology departments found themselves at the forefront in the management of suspected and positive COVID cases, both in diagnosis, in estimating the severity of the disease and in follow-up. In this context SIRM recommends chest X-ray as first-line imaging tool, CT as additional tool that shows typical features of COVID pneumonia, and ultrasound of the lungs as monitoring tool. SIRM recommends, as high priority, to ensure appropriate sanitation procedures on the scan equipment after detecting any suspected or positive COVID-19 patients. In this emergency situation, several expectations have been raised by the scientific community about the role that artificial intelligence can have in improving the diagnosis and treatment of coronavirus infection, and SIRM wishes to deliver clear statements to the radiological community, on the usefulness of artificial intelligence as a radiological decision support system in COVID-19 positive patients. (1) SIRM supports the research on the use of artificial intelligence as a predictive and prognostic decision support system, especially in hospitalized patients and those admitted to intensive care, and welcomes single center of multicenter studies for a clinical validation of the test. (2) SIRM does not support the use of CT with artificial intelligence for screening or as first-line test to diagnose COVID-19. (3) Chest CT with artificial intelligence cannot replace molecular diagnosis tests with nose-pharyngeal swab (rRT-PCR) in suspected for COVID-19 patients.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32350794

Citation
Radiol Med. 2020 Apr 29. doi: 10.1007/s11547-020-01197-9. [Epub ahead of print]

Title
Classification of COVID-19 patients from chest CT images using multi-objective differential evolution-based convolutional neural networks

Author
Singh D, Kumar V, Vaishali, Kaur M.

Abstract
Early classification of 2019 novel coronavirus disease (COVID-19) is essential for disease cure and control. Compared with reverse-transcription polymerase chain reaction (RT-PCR), chest computed tomography (CT) imaging may be a significantly more trustworthy, useful, and rapid technique to classify and evaluate COVID-19, specifically in the epidemic region. Almost all hospitals have CT imaging machines; therefore, the chest CT images can be utilized for early classification of COVID-19 patients. However, the chest CT-based COVID-19 classification involves a radiology expert and considerable time, which is valuable when COVID-19 infection is growing at rapid rate. Therefore, an automated analysis of chest CT images is desirable to save the medical professionals' precious time. In this paper, a convolutional neural networks (CNN) is used to classify the COVID-19-infected patients as infected (+ve) or not (-ve). Additionally, the initial parameters of CNN are tuned using multi-objective differential evolution (MODE). Extensive experiments are performed by considering the proposed and the competitive machine learning techniques on the chest CT images. Extensive analysis shows that the proposed model can classify the chest CT images at a good accuracy rate.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32337662

Citation
Eur J Clin Microbiol Infect Dis. 2020 Apr 27. doi: 10.1007/s10096-020-03901-z. [Epub ahead of print]

Title
Infection Control for CT Equipment and Radiographers' Personal Protection During the Coronavirus Disease (COVID-19) Outbreak in China

Author
Qu J, Yang W, Yang Y, Qin L, Yan F.

Abstract
OBJECTIVE. Because CT plays an important role in diagnosis, isolation, treatment, and effective evaluation of coronavirus disease (COVID-19), infection prevention and control management of CT examination rooms is important. CONCLUSION. We describe modifications to the CT examination process, strict disinfection of examination rooms, arrangement of waiting areas, and efforts to increase radiographers' awareness of personal protection made at our institution during the COVID-19 outbreak. In addition, we discuss the potential of using artificial intelligence in imaging patients with contagious diseases.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32352309

Citation
AJR Am J Roentgenol. 2020 Apr 30:1-5. doi: 10.2214/AJR.20.23112. [Epub ahead of print]

Title
Management of patients with suspected or confirmed COVID-19, in the radiology department

Author
Zanardo M, Martini C, Monti CB, Cattaneo F, Ciaralli C, Cornacchione P, Durante S.

Abstract
OBJECTIVES: From December 2019, a novel coronavirus disease named COVID-19 was reported in China. Within 3 months, the World Health Organization defined COVID-19 as a pandemic, with more than 370,000 cases and 16,000 deaths worldwide. In consideration of the crucial role of diagnostic testing during COVID-19, the aim of this technical note was to provide a complete synthesis of approaches implemented for the management of suspected or confirmed COVID-19 patients.
KEY FINDINGS: The planning of a robust plan to prevent the transmission of the virus to patients and department staff members should be fundamental in each radiology service. Moreover, the speed of spread and the incidence of the pandemic make it necessary to optimize the use of personal protective devices and dedicated COVID-19 equipment, given the limited availability of supplies.
CONCLUSION: In the management of radiographic and CT imaging, staff should take special precautions to limit contamination between patients and other patients or professionals.
IMPLICATIONS FOR PRACTICE:An isolated imaging room should be dedicated to suspected or confirmed COVID-19 cases, including radiography and CT scanners. This paper will provide guidance concerning disposable protective gear to be utilized, as well as on the cleaning and sanitation of radiology room and equipment.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32340912

Citation
Radiography (Lond). 2020 Apr 20. pii: S1078-8174(20)30062-6. doi: 10.1016/j.radi.2020.04.010. [Epub ahead of print]

Title
Quantitative computed tomography of the coronavirus disease 2019 (COVID-19) pneumonia

Author
Cheng Z, Qin L, Cao Q, Dai J, Pan A, Yang W, Gao Y, Chen L, Yan F.

Abstract
OBJECTIVE: To quantify coronavirus diseases 2019 (COVID-19) pneumonia and to explore whether quantitative computer tomography (CT) could be used to assess severity on admission.
MATERIALS AND METHODS: From January 17 to February 9, 2020, 38 hospitalized patients with COVID-19 pneumonia were consecutively enrolled in our hospitals. All clinical data and the chest CT on admission were retrospectively reviewed and analyzed. Firstly, a quantitative method based on multi-scale convolutional neural networks was used to assess the infected lung segments and this was compared with the semi-quantitative method. Secondly, the quantitative method was tested with laboratory results and the pneumonia severity index (PSI) by correlation analyses. Thirdly, both quantitative and semi-quantitative parameters between patients with different PSI were compared.
RESULTS: Thirty cases were finally enrolled: 16 (53.33%) of them were male, and the mean age was 48 years old. The interval from onset symptoms to first chest CT scan was 8 days. The proportion of ground glass opacity (GGO), consolidation and the total lesion based on the quantitative method was positively correlated with the semi-quantitative CT score ($P < 0.001$ for all; rs = 0.88, 0.87, 0.90), CRP ($P = 0.0278$, 0.0168, 0.0078; rs = 0.40, 0.43, 0.48) and ESR ($P = 0.0296$, 0.0408, 0.0048; rs = 0.46, 0.44, 0.58), respectively, and was negatively correlated with the lymphocyte count ($P = 0.0222$, 0.0024, 0.0068; rs = -0.42, -0.53, -0.48). There was a positive correlation trend between the proportion of total infection and the pneumonia severity index ($P = 0.0994$; rs = 0.30) and a tendency that patients with severe COVID-19 pneumonia had higher percentage of consolidation and total infection ($P = 0.0903$, 0.0989).
CONCLUSIONS:Quantitative CT may have potential in assessing the severity of COVID-19 pneumonia on admission.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32346594

Citation
Radiol Infect Dis. 2020 Apr 28. doi: 10.1016/j.jrid.2020.04.004. [Epub ahead of print]

Title
Clinical and imaging features of COVID-19

Author
Chen H, Ai L, Lu H, Li H.

Abstract
Since December 2019, multiple cases of 2019 coronavirus disease (COVID-19) have been reported in Wuhan in China's Hubei Province, a disease which has subsequently spread rapidly across the entire country. Highly infectious, COVID-19 has numerous transmission channels and humans are highly susceptible to infection. The main clinical symptoms of COVID-19 are fever, fatigue, and a dry cough. Laboratory examination in the early stage of the disease shows a normal or decreased white blood cell count, and a decreased lymphocyte count. While CT examination serves as the screening and diagnostic basis for COVID-19, its accuracy is limited. The nucleic acid testing is the gold standard for the diagnosis of COVID-19, but has a low sensitivity is low. There is clearly a divide between the two means of examination. This paper reviews the published literature, guidelines and consensus, and summarizes the clinical and imaging characteristics of COVID-19, in order to provide a reliable basis for early diagnosis and treatment.

Link
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Citation
Radiol Infect Dis. 2020 Apr 27. doi: 10.1016/j.jrid.2020.04.003. [Epub ahead of print]

Title
Use of Radiographic Features in COVID-19 Diagnosis: Challenges and Perspectives

Author
Chen SG, Chen JY, Yang YP, Chien CS, Wang ML, Lin LT.

Abstract
The rapid surge and wide-spread of the coronavirus disease-2019 (COVID-19) overshadows the entire medical industries worldwide. The stringent medical resources hinder the diagnostic capacity globally, while 84 thousands of new cases confirmed within a single day of 14 April 2020. Real-time reverse-transcriptase polymerase chain reaction (RT-PCR) with is the current first-line diagnosis, but the false-negative rate remains concerned. Radiographic technologies and tools, including Computed tomography (CT) and Chest X-ray (CXR), were applied for initial screening and follow-up, from which provides detail diagnosis with specific pathologic features for staging and treatment arrangement. Although the radiographic imaging is found less sensitive, numerous CT-positive patients were not screened out by RT-PCR initially and later confirmed as COVID-19 positive. Besides, the shortage of sampling kits and the longer turn-over time of PCR examinations in some areas were noticed due to logistic issues and healthcare burden. In this review, we will discuss the challenges and the future perspectives of using radiographic modalities for COVID-19 diagnosis in view of securing human lives amid the crisis.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32349032

Citation
J Chin Med Assoc. 2020 Apr 27. doi: 10.1097/JCMA.0000000000000336. [Epub ahead of print]

Title
Radiology department strategies to protect radiologic technologists against COVID19: Experience from Wuhan

Author
Zhao Y, Xiang C, Wang S, Peng C, Zou Q, Hu J.

Abstract
The outbreak of Coronavirus Disease 2019 (COVID-19) is a huge threat to global public health security. In the absence of specific antiviral medicines to prevent or treat COVID-19, it is essential to detect the infected patients at an early stage and immediately isolate them from the healthy population. In view of the advantages of sensitivity and high spatial resolution, CT imaging has played an important role in screening and diagnosing of COVID-19 in China. The radiologic technologists performing CT scans for the infected patients become high-risk medical care personnel. It is critical for the radiology department to ensure the personal safety of radiologic technologists and avoid cross-infection. In this review article, we describe the systematic strategies to combat COVID-19 from the radiology department in Tongji hospital in Wuhan, P.R. China, including personnel arrangements, environmental modification, protection levels and configurations, radiological imaging (CT and radiography), and disinfection methods. It can provide guidance to other radiology departments faced with COVID-19 to reduce infection risk for radiologic technologists.

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https://www.ncbi.nlm.nih.gov/pubmed/32344294

Citation
Eur J Radiol. 2020 Apr 20;127:108996. doi: 10.1016/j.ejrad.2020.108996. [Epub ahead of print]

Title
Radiological approach to COVID-19 pneumonia with an emphasis on chest CT

Author
Güneyli S, Atçeken Z, Doğan H, Altınmakas E, Atasoy KÇ.

Abstract
Coronavirus disease 2019 (COVID-19) has recently become a worldwide outbreak with several millions of people infected and more than 160.000 deaths. A fast and accurate diagnosis in this outbreak is critical to isolate and treat patients. Radiology plays an important role in the diagnosis and management of the patients. Among various imaging modalities, chest CT has received attention with its higher sensitivity and specificity rates. Shortcomings of the real-time reverse transcriptase-polymerase chain reaction test, including inappropriate sample collection and analysis methods, initial false negative results, and limited availability has led to widespread use of chest CT in the diagnostic algorithm. This review summarizes the role of radiology in COVID-19 pneumonia, diagnostic accuracy of imaging, and chest CT findings of the disease.

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https://www.ncbi.nlm.nih.gov/pubmed/32352917

Citation
Diagn Interv Radiol. 2020 Apr 30. doi: 10.5152/dir.2020.20260. [Epub ahead of print]

Title
COVID-19 with cystic features on computed tomography: A case report

Author
Liu K, Zeng Y, Xie P, Ye X, Xu G, Liu J, Wang H, Qian J.

Abstract
RATIONALE: The cystic features of the novel coronavirus disease 2019 (COVID-19) found on computed tomography (CT) have not yet been reported in the published literature. We report the cystic chest CT findings of 2 patients confirmed to have COVID-19-related pneumonia.
PATIENT CONCERNS: A 38-year-old man and a 35-year-old man diagnosed with severe COVID-19 pneumonia were admitted to the intensive care unit.
DIAGNOSES: Chest CT findings showed multiple cysts in ground-glass opacities (bilaterally) with/without pneumothorax. The cysts had a smooth inner wall.
INTERVENTIONS: The patients continued to be given oxygen by mask and received antitussive, phlegm-dispelling treatment.
OUTCOMES: At follow up, there was a reduction in the number of multiple cystic lesions on CT. To date, 1 patient was discharged from hospital, while the other had been transferred to the rehabilitation department.
LESSONS: COVID-19 may independently result in pulmonary cyst formation and pneumothorax; the application of a ventilator may be another causative factor.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32358406

Citation
Medicine (Baltimore). 2020 May;99(18):e20175. doi: 10.1097/MD.0000000000020175.

Title
The usual course of Thorax CT findings of Covid-19 infection and When should control Thorax CT scan?

Author
Gündüz Y, Öztürk MH, Tomak Y

Abstract
COVID-19 infection, a highly contagious disease caused by the SARS-CoV virus, and the World Health Organization declared this increasingly spreading disease as a global public health emergency (pandemic). In the diagnosis of COVID-19, the polymerase chain reaction (RT-PCR) is considered as the reference standard test. In the early stages, thorax CT findings could be present even before the onset of symptoms, thorax CT has quite high sensitivity in COVID-19 patients with false negative RT-PCR results, and it has a great importance not only in diagnosis but also in follow up (6,7). We think that it might be beneficial for our radiologist colleagues in the early diagnosis of the imaging features of this disease, by sharing the experiences we have gained by evaluating the typical and relatively atypical CT findings regarding the natural course of the tomographic findings of COVID-19 and when to control CT.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32351103

Citation
Turk J Med Sci. 2020 Apr 30. doi: 10.3906/sag-2004-293. [Epub ahead of print]

Title
Common CT Findings of Novel Coronavirus Disease 2019 (COVID-19): A Case Series

Author
Torkian P, Ramezani N, Kiani P, Bax MR, Akhlaghpoor S.

Abstract
Given the highly infectious nature of the coronavirus disease 2019 (COVID-19) virus and the lack of proven specific therapeutic drugs and licensed vaccines effective against it, early diagnosis of the disease is of paramount importance. The common chest CT imaging of confirmed COVID-19 cases is discussed here, which shows ground-glass opacity, crazy paving, and consolidation.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32351814

Citation
Cureus. 2020 Mar 27;12(3):e7434. doi: 10.7759/cureus.7434.

Title
How Might AI and Chest Imaging Help Unravel COVID-19's Mysteries?

Author
Kundu S , Elhalawani H, Gichoya JW, Kahn CE Jr.

Abstract
Artificial intelligence (AI) has the potential to expand the role of chest imaging in COVID-19 beyond diagnosis to enable risk stratification, treatment monitoring, and discovery of novel therapeutic targets. AI's power to generate models from large volumes of information – fusing molecular, clinical, epidemiological, and imaging data – may accelerate solutions to detect, contain, and treat COVID-19.

Link
https://pubs.rsna.org/doi/10.1148/ryai.2020200053

Citation
https://doi.org/10.1148/ryai.2020200053

Title
Preparedness and Best Practice in Radiology Department for COVID-19 and Other Future Pandemics of Severe Acute Respiratory Infection

Author
Wan YL, Schoepf UJ, Wu CC, Giovagnoli DP, Wu MT, Hsu HH, Chang YC, Yang CT, Cherng WJ.

Abstract
The COVID-19 global pandemic has emerged as an unprecedented health care crisis. To reduce risks of severe acute respiratory syndrome coronavirus 2 transmission in the Radiology Department, this article describes measures to increase the preparedness of Radiology Department, such as careful screening of staff and patients, thorough disinfection of equipments and rooms, appropriate use of personal protection equipment, and early isolation of patients with incidentally detected computed tomography findings suspicious for COVID-19. The familiarity of radiologists with clinical and imaging manifestations of COVID-19 pneumonia and their prognostic implications is essential to provide optimal care to patients.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32384412

Citation
J Thorac Imaging. 2020 May 6. doi: 10.1097/RTI.0000000000000529. [Epub ahead of print]

Title
Lung disease severity, Coronary Artery Calcium, Coronary inflammation and Mortality in Coronavirus Disease 2019

Author
Gaibazzi N, Martini C, Mattioli M, Tuttolomondo D, Guidorossi A, Suma S, Dey D, Palumbo A, De Filippo M.

Abstract
IMPORTANCE The in-hospital mortality rate of the coronavirus disease 2019 (COVID-19) is higher in case of myocardial injury, but the underlying mechanism is not known and might depend on pre-existing coronary artery disease (CAD), coronary inflammation or others. OBJECTIVE To determine the association of the extent of lung disease or coronary artery chest computed tomography (HRCT) variables, the Agatston coronary calcium score (CCS) and peri-coronary adipose tissue attenuation (PCAT), representing CAD and coronary inflammation, with mortality in patients with COVID-19. DESIGN Retrospective case series. SETTING Single academic institution, Parma University Hospital, Italy, between March 5, 2020 and March 15, 2020. Final follow-up: March 30, 2020. PARTICIPANTS 500 consecutive patients with suspected COVID-19 who underwent HRCT as a gatekeeper were initially selected and the subgroup with laboratory-confirmed SARS-CoV-2 infection formed the final study group. EXPOSURES SARS-CoV-2 infection by real-time reverse transcriptase polymerase chain reaction (RT-PCR) assay of nasopharyngeal swabs. MAIN OUTCOMES AND MEASURES In-hospital mortality was the end point. Demographic, clinical, laboratory and HRCT data were collected from hospital electronic records, and HRCT features (CCS and PCAT) were measured post-hoc from HRCT images. RESULTS Among 500 patients with suspected COVID-19, 279 had laboratory-confirmed COVID-19 and formed the study group. Among them, 170 patients (61%) were discharged alive and 109 (39%) died. Comparing patients discharged alive with patients who died, the median age was 65 vs 77 ($p<0.001$), with males 56% vs 68% ($p=0.061$), prior cardiovascular disease 9% vs 24% ($p=0.001$), median D-dimer 723 vs 1083 ng/ml ($p<0.001$), median C-reactive protein 78 vs 148 mg/L ($p<0.001$), the mean CCS 17 vs 189 ($p<0.001$) and the median PCAT -76.4 HU vs -68.6 HU ($p<0.001$). In multivariable analysis, only age ($p<0.001$), D-dimer ($p=0.041$), C-reactive protein ($p=0.002$), extent of lung disease ($p=0.002$), and PCAT ($p<0.001$), remained associated with in-hospital death. CONCLUSIONS AND RELEVANCE Increased age, D-dimer, C-reactive protein and the HRCT image features of extent of lung disease and coronary inflammation by PCAT (but not the CCS) were independently associated with mortality in hospitalized COVID-19 patients. Our study suggests that higher mortality in COVID-19 may be at least partly mediated by coronary artery inflammation.

Link
https://www.medrxiv.org/content/10.1101/2020.05.01.20087114v1

Citation
doi: https://doi.org/10.1101/2020.05.01.20087114

Title
Artificial intelligence to codify lung CT in Covid-19 patients

Author
Belfiore MP, Urraro F, Grassi R, Giacobbe G, Patelli G, Cappabianca S, Reginelli A.

Abstract
The spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has already assumed pandemic proportions, affecting over 100 countries in few weeks. A global response is needed to prepare health systems worldwide. Covid-19 can be diagnosed both on chest X-ray and on computed tomography (CT). Asymptomatic patients may also have lung lesions on imaging. CT investigation in patients with suspicion Covid-19 pneumonia involves the use of the high-resolution technique (HRCT). Artificial intelligence (AI) software has been employed to facilitate CT diagnosis. AI software must be useful categorizing the disease into different severities, integrating the structured report, prepared according to subjective considerations, with quantitative, objective assessments of the extent of the lesions. In this communication, we present an example of a good tool for the radiologist (Thoracic VCAR software, GE Healthcare, Italy) in Covid-19 diagnosis (Pan et al. in Radiology, 2020. https://doi.org/10.1148/radiol.2020200370). Thoracic VCAR offers quantitative measurements of the lung involvement. Thoracic VCAR can generate a clear, fast and concise report that communicates vital medical information to referring physicians. In the post-processing phase, software, thanks to the help of a colorimetric map, recognizes the ground glass and differentiates it from consolidation and quantifies them as a percentage with respect to the healthy parenchyma. AI software therefore allows to accurately calculate the volume of each of these areas. Therefore, keeping in mind that CT has high diagnostic sensitivity in identifying lesions, but not specific for Covid-19 and similar to other infectious viral diseases, it is mandatory to have an AI software that expresses objective evaluations of the percentage of ventilated lung parenchyma compared to the affected one.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32367319

Citation
Radiol Med. 2020 May 4. doi: 10.1007/s11547-020-01195-x. [Epub ahead of print]

Title
Diagnosis of Coronavirus Disease 2019 (COVID-1

Author
Kang H, Xia L, Yan F, Wan Z, Shi F, Yuan H, Jiang H, Wu D,

Abstract
Recently, the outbreak of Coronavirus Disease 2019 (COVID-19) has spread rapidly across the world. Due to the large number of infected patients and heavy labor for doctors, computer-aided diagnosis with machine learning algorithm is urgently needed, and could largely reduce the efforts of clinicians and accelerate the diagnosis process. Chest computed tomography (CT) has been recognized as an informative tool for diagnosis of the disease. In this study, we propose to conduct the diagnosis of COVID-19 with a series of features extracted from CT images. To fully explore multiple features describing CT images from different views, a unified latent representation is learned which can completely encode information from different aspects of features and is endowed with promising class structure for separability. Specifically, the completeness is guaranteed with a group of backward neural networks (each for one type of features), while by using class labels the representation is enforced to be compact within COVID-19/community-acquired pneumonia (CAP) and also a large margin is guaranteed between different types of pneumonia. In this way, our model can well avoid overfitting compared to the case of directly projecting highdimensional features into classes. Extensive experimental results show that the proposed method outperforms all comparison methods, and rather stable performances are observed when varying the number of training data.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32386147

Citation
IEEE Trans Med Imaging. 2020 May 5. doi: 10.1109/TMI.2020.2992546. [Epub ahead of print]

Title
Can Chest CT Features Distinguish Patients With Negative From Those With Positive Initial RT-PCR Results for Coronavirus Disease (COVID-19)?

Author
Chen D, Jiang X, Hong Y, Wen Z, Wei S, Peng G, Wei X.

Abstract
OBJECTIVE. The purpose of this study was to explore the value of CT in the diagnosis of coronavirus disease (COVID-19) pneumonia, especially for patients who have negative initial results of reverse transcription-polymerase chain reaction (RT-PCR) testing. MATERIALS AND METHODS. Patients with COVID-19 pneumonia from January 19, 2020, to February 20, 2020, were included. All patients underwent chest CT and swab RT-PCR tests within 3 days. Patients were divided into groups with negative (seven patients) and positive (14 patients) initial RT-PCR results. The imaging findings in both groups were recorded and compared. RESULTS. Twenty-one patients with symptoms (nine men, 12 women; age range, 26-90 years) were evaluated. Most of the COVID-19 lesions were located in multiple lobes (67%) in both lungs (72%) in our study. The main CT features were ground-glass opacity (95%) and consolidation (72%) with a subpleural distribution (100%). Otherwise, 33% of patients had other lesions around the bronchovascular bundle. The other CT features included air bronchogram (57%), vascular enlargement (67%), interlobular septal thickening (62%), and pleural effusions (19%). Compared with that in the group with positive initial RT-PCR results, CT of the group with negative initial RT-PCR results was less likely to show pulmonary consolidation ($p < 0.05$). CONCLUSION. The less pulmonary consolidation found at CT, the greater is the possibility of negative initial RT-PCR results. Chest CT is important in the screening of patients in whom disease is clinically suspected, especially those who have negative initial RT-PCR results.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32368928

Citation
AJR Am J Roentgenol. 2020 May 5:1-5. doi: 10.2214/AJR.20.23012. [Epub ahead of print]

Title
Interpretation of CT signs of 2019 novel coronavirus (COVID-19) pneumonia

Author
Wu J, Pan J, Teng D, Xu X, Feng J, Chen YC.

Abstract
OBJECTIVES: To characterize and interpret the CT imaging signs of the 2019 novel coronavirus (COVID-19) pneumonia in China.
MATERIALS AND METHODS:
The CT images of 130 patients diagnosed as COVID-19 pneumonia from several hospitals in China were collected and their imaging features were analyzed and interpreted in detail.
RESULTS: Among the 130 patients, we can see (1) distribution: 14 cases with unilateral lung disease and 116 cases with bilateral disease, the distribution was mainly lobular core (99 cases) and subpleural (102 cases); (2) number: 9 cases with single lesion, 113 cases with multiple lesions, and 8 cases with diffuse distribution; (3) density: 70 cases of pure ground glass opacity (GGO), and 60 cases of GGO with consolidation; (4) accompanying signs: vascular thickening (100 cases), "parallel pleura sign" (98 cases), "paving stone sign" (100 cases), "halo sign" (18 cases), "reversed halo sign" (6 cases), pleural effusion (2 cases), and pneumonocele (2 cases). After follow-up CT examination on 35 patients, 21 cases turned better and 14 became worse. There were signs of consolidation with marginal contraction, bronchiectasis, subpleural line, or fibrous streak.
CONCLUSION: GGO and consolidation are the most common CT signs of COVID-19 pneumonia, mainly with lobular distribution and subpleural distribution. The main manifestations were tissue organization and fibrosis at late stage. The most valuable features are the parallel pleura sign and the paving stone sign.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32367422

Citation
Eur Radiol. 2020 May 4. doi: 10.1007/s00330-020-06915-5. [Epub ahead of print]

Title
Imaging features and evolution on CT in 100 COVID-19 pneumonia patients in Wuhan, China

Author
Zhou S, Zhu T, Wang Y, Xia L.

Abstract
OBJECTIVES: To investigate CT images of 100 confirmed COVID-19 pneumonia patients to describe the lesion distribution, CT signs, and evolution during different courses.
METHODS: retrospective study of 100 COVID-19 pneumonia patients without ARDS was performed, and CT scans were reviewed. A COVID-19 pneumonia course diagram was drawn. Mann-Whitney U test was used to compare the lesion distribution and CT scores, χ2 test was used to compare the CT findings between different stages.
RESULTS: A total of 272 CT scans from 100 patients (mean age, 52.3 years ± 13.1) were investigated. Four patients with lung abnormalities on CT first showed negative RT-PCR result and turned positive afterwards. One hundred sixty-nine (62.1%) showed predominantly peripheral distribution. The CT scores of the upper zone (3.4 ± 3.6) were significantly lower than those of the middle (5.0 ± 3.9) and lower (4.8 ± 3.6) zones ($p < 0.001$). The CT scores of the anterior zones (4.9 ± 4.7) were significantly lower than those of the posterior zones (8.4 ± 6.2) ($p < 0.001$). In the early rapid progressive stage (1~7 days), ground glass opacity (GGO) plus reticular pattern (58.1%), GGO plus consolidation (43.0%), and GGO (41.9%) were all common. In the advanced stage (8~14 days), GGO plus consolidation (79.8%) and repairing CT signs (subpleural line, bronchus distortion, and fibrotic strips) showed a significant increase ($p < 0.05$). In the absorption stage, GGO plus consolidation (9.1%) sharply decreased ($p < 0.05$).
CONCLUSION: CT imaging of COVID-19 pneumonia showed a predominantly peripheral, middle and lower, and posterior distribution. The early rapid progressive stage is 1~7 days from symptom onset, the advanced stage with peak levels of abnormalities on CT is 8~14 days, and the abnormalities started to improve after 14 days.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32367418

Citation
Eur Radiol. 2020 May 4. doi: 10.1007/s00330-020-06879-6. [Epub ahead of print]

Title
Clinical and radiological changes of hospitalised patients with COVID-19 pneumonia from disease onset to acute exacerbation: a multi-center paired cohort study

Author
Liu J, Chen T, Yang H, Cai Y, Yu Q, Chen J, Chen Z, Shang QL, Ma C, Chen X, Xiao E.

Abstract
OBJECTIVES: To analyse clinical and radiological changes from disease onset to exacerbation in coronavirus infectious disease-19 (COVID-19) patients.
METHODS: We reviewed clinical histories of 276 patients with confirmed COVID-19 pneumonia and extracted data on patients who met the diagnostic criteria for COVID-19 severe/fatal pneumonia and had an acute exacerbation starting with mild or common pneumonia.
RESULTS: Twenty-four patients were included. Of these, 8% were smokers, 54% had been to Wuhan, and 46% had comorbidities. Before acute exacerbation, elevated lactate dehydrogenase (232.9 ± 88.7) was present, and chest CT scans showed the number of involved lobes was 4 (2-5) and total CT score was 6 (2-8). Following acute exacerbation, patients were likely to have more clinical symptoms ($p < 0.01$) and abnormal laboratory changes ($p < 0.01$). The number of involved lobes and CT score after an exacerbation significantly increased to 5 (5-5) and 12 (9-14), respectively. Receiver operating characteristic (ROC) curve showed that, when the cutoff value of CT score was 5, the sensitivity and specificity for severe pneumonia were 90% and 70%, respectively. CT findings of ground glass opacity with consolidations (91.7%), bilateral distribution (100.0%), and multifocal lesion (100.0%) were features in found in patients after exacerbation.
CONCLUSIONS: There are significant changes in clinical, laboratory, and CT findings in patients from disease onset to exacerbation. An increase in the number of involved lobes or an increased CT score from the baseline may predict poor clinical outcomes. Combining an assessment of CT changes with clinical and laboratory changes could help clinical teams evaluate the prognosis.

Link
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Citation
Eur Radiol. 2020 May 8. doi: 10.1007/s00330-020-06916-4. [Epub ahead of print]

Title
Diagnostic performance between CT and initial real-time RT-PCR for clinically suspected 2019 coronavirus disease (COVID-19) patients outside Wuhan, China

Author
He JL, Luo L, Luo ZD, Lyu JX, Ng MY, Shen XP, Wen Z.

Abstract
INTRODUCTION: Chest CT is thought to be sensitive but less specific in diagnosing the 2019 coronavirus disease (COVID-19). The diagnostic value of CT is unclear. We aimed to compare the performance of CT and initial RT-PCR for clinically suspected COVID-19 patients outside the epicentre-Wuhan, China.
MATERIALS AND METHODS: Patients clinically suspected of COVID-19 infection who underwent initial RT-PCR and chest CT at the same time were retrospectively enrolled. Two radiologists with specific training reviewed the CT images independently and final diagnoses of the presence or absence of COVID-19 was reached by consensus. With serial RT-PCR as reference standard, the performance of initial RT-PCR and chest CT was analysed. A strategy of combining initial RT-PCR and chest CT was analysed to study the additional benefit.
RESULTS: 82 patients admitted to hospital between Jan 10, 2020 to Feb 28, 2020 were enrolled. 34 COVID-19 and 48 non-COVID-19 patients were identified by serial RT-PCR. The sensitivity, specificity was 79% (27/34) and 100% (48/48) for initial RT-PCR and 77% (26/34) and 96% (46/48) for chest CT. The image readers had a good interobserver agreement with Cohen's kappa of 0.69. No statistical difference was found in the diagnostic performance between initial RT-PCR and chest CT. The comprehensive strategy had a higher sensitivity of 94% (32/34).
CONCLUSIONS: Initial RT-PCR and chest CT had comparable diagnostic performance in identification of suspected COVID-19 patients outside the epidemic center. To compensate potential risk of false-negative PCR, chest CT should be applied for clinically suspected patients with negative initial RT-PCR.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32364959

Citation
Respir Med. 2020 Apr 21;168:105980. doi: 10.1016/j.rmed.2020.105980. [Epub ahead of print]

Title
Initial CT imaging characters of an imported family cluster of COVID-19.

Author
Huang L, Jiang J, Li X, Zhou Y, Xu M, Zhou J.

Abstract
The objective of this report is to better understand the initial CT imaging spectrum and the relationship between clinical characteristics and initial CT imaging features of an imported family cluster cases involving 7 laboratory-confirmed COVID-19 patients. We find that initial CT findings of 4 patients were positive within one week after the onset of symptoms and 1 patient was negative before the onset of symptoms. Two asymptomatic patients had typical CT abnormalities. The initial CT imaging manifestations are mainly peripheral or subpleural ground-glass opacities and ground-glass with consolidation. Our report is of potential guiding value for the initial CT screening of imported familial cluster cases since the imported cases have an identified time of infection.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32361413

Citation
Clin Imaging. 2020 Apr 22;65:78-81. doi: 10.1016/j.clinimag.2020.04.010. [Epub ahead of print]

Title
Canadian Association of Thoracic Radiology/Canadian Association of Radiologists Consensus Statement Regarding Chest Imaging in Suspected and Confirmed COVID-19

Author
Dennie C, Hague C, Lim RS, Manos D, Memauri BF, Nguyen ET, Taylor J.

Abstract
On March 11, 2020, the World Health Organization declared infection related to a novel coronavirus (SARS-CoV-2) a pandemic. The role and impact of imaging predates this declaration and continues to change rapidly. This article is a consensus statement provided by the Canadian Society of Thoracic Radiology and the Canadian Association of Radiologists outlining the role of imaging in COVID-19 patients. The objectives are to answer key questions related to COVID-19 imaging of the chest and provide guidance for radiologists who are interpreting such studies during this pandemic. The role of chest radiography (CXR), computed tomography (CT), and lung ultrasound is discussed. This document attempts to answer key questions for the imager when dealing with this crisis, such as "When is CXR appropriate in patients with suspected or confirmed COVID-19 infection?" or "How should a radiologist deal with incidental findings of COVID-19 on CT of the chest done for other indications?" This article also provides recommended reporting structure for CXR and CT, breaking diagnostic possibilities for both CXR and CT into 3 categories: typical, nonspecific, and negative based on imaging findings with representative images provided. Proposed reporting language is also outlined based on this structure. As our understanding of this pandemic evolves, our appreciation for how imaging fits into the workup of patients during this unprecedented time evolves as well. Although this consensus statement was written using the most recent literature, it is important to maintain an open mind as new information continues to surface.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32380844

Citation
Can Assoc Radiol J. 2020 May 8:846537120924606. doi: 10.1177/0846537120924606. [Epub ahead of print]

Title
CT quantification of pneumonia lesions in early days predicts progression to severe illness in a cohort of COVID-19 patients

Author
Liu F, Zhang Q, Huang C, Shi C, Wang L, Shi N, Fang C, Shan F, Mei X, Shi J, Song F, Yang Z, Ding Z, Su X, Lu H, Zhu T, Zhang Z, Shi L, Shi Y.

Abstract
Rationale: Some patients with coronavirus disease 2019 (COVID-19) rapidly develop respiratory failure or even die, underscoring the need for early identification of patients at elevated risk of severe illness. This study aims to quantify pneumonia lesions by computed tomography (CT) in the early days to predict progression to severe illness in a cohort of COVID-19 patients. Methods: This retrospective cohort study included confirmed COVID-19 patients. Three quantitative CT features of pneumonia lesions were automatically calculated using artificial intelligence algorithms, representing the percentages of ground-glass opacity volume (PGV), semi-consolidation volume (PSV), and consolidation volume (PCV) in both lungs. CT features, acute physiology and chronic health evaluation II (APACHE-II) score, neutrophil-to-lymphocyte ratio (NLR), and d-dimer, on day 0 (hospital admission) and day 4, were collected to predict the occurrence of severe illness within a 28-day follow-up using both logistic regression and Cox proportional hazard models. Results: We included 134 patients, of whom 19 (14.2%) developed any severe illness. CT features on day 0 and day 4, as well as their changes from day 0 to day 4, showed predictive capability. Changes in CT features from day 0 to day 4 performed the best in the prediction (area under the receiver operating characteristic curve = 0.93, 95% confidence interval [CI] 0.87~0.99; C-index=0.88, 95% CI 0.81~0.95). The hazard ratios of PGV and PCV were 1.39 (95% CI 1.05~1.84, P=0.023) and 1.67 (95% CI 1.17~2.38, P=0.005), respectively. CT features, adjusted for age and gender, on day 4 and in terms of changes from day 0 to day 4 outperformed APACHE-II, NLR, and d-dimer. Conclusions: CT quantification of pneumonia lesions can early and non-invasively predict the progression to severe illness, providing a promising prognostic indicator for clinical management of COVID-19.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32373235

Citation
Theranostics. 2020 Apr 27;10(12):5613-5622. doi: 10.7150/thno.45985. eCollection 2020.

Title
Multicenter cohort study demonstrates more consolidation in upper lungs on initial CT increases the risk of adverse clinical outcome in COVID-19 patients

Author
Yu Q, Wang Y, Huang S, Liu S, Zhou Z, Zhang S, Zhao Z, Yu Y, Yang Y, Ju S.

Abstract
Rationale: Chest computed tomography (CT) has been used for the coronavirus disease 2019 (COVID-19) monitoring. However, the imaging risk factors for poor clinical outcomes remain unclear. In this study, we aimed to assess the imaging characteristics and risk factors associated with adverse composite endpoints in patients with COVID-19 pneumonia. Methods: This retrospective cohort study enrolled patients with laboratory-confirmed COVID-19 from 24 designated hospitals in Jiangsu province, China, between 10 January and 18 February 2020. Clinical and initial CT findings at admission were extracted from medical records. Patients aged < 18 years or without available clinical or CT records were excluded. The composite endpoints were admission to ICU, acute respiratory failure occurrence, or shock during hospitalization. The volume, density, and location of lesions, including ground-glass opacity (GGO) and consolidation, were quantitatively analyzed in each patient. Multivariable logistic regression models were used to identify the risk factors among age and CT parameters associated with the composite endpoints. Results: In this study, 625 laboratory-confirmed COVID-19 patients were enrolled; among them, 179 patients without an initial CT at admission and 25 patients aged < 18 years old were excluded and 421 patients were included in analysis. The median age was 48.0 years and the male proportion was 53% (224/421). During the follow-up period, 64 (15%) patients had a composite endpoint. There was an association of older age (odds ratio [OR], 1.04; 95% confidence interval [CI]: 1.01-1.06; P = 0.003), larger consolidation lesions in the upper lung (Right: OR, 1.13; 95%CI: 1.03-1.25, P =0.01; Left: OR,1.15; 95%CI: 1.01-1.32; P = 0.04) with increased odds of adverse endpoints. Conclusion: There was an association of older age and larger consolidation in upper lungs on admission with higher odds of poor outcomes in patients with COVID-19.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32373237

Citation
Theranostics. 2020 Apr 27;10(12):5641-5648. doi: 10.7150/thno.46465. eCollection 2020.

Title
COVID-19 Dynamic Computed Tomography (CT) Performance and Observation of Some Laboratory Indicators

Author
Jiang X, Yin Z, Wang T, Zhai N, Lu F, Zhan C, Han Q, Feng C.

Abstract
BACKGROUND Chest CT has an essential role in the detection and evaluation of novel coronary pneumonia (COVID-19) and has be regarded as a critical supplement for RT-PCR. This study explored the dynamic CT manifestations of COVID-19 at different times and the value of some laboratory indicators for clinical guidance. MATERIAL AND METHODS This retrospective review included 44 patients who were infected with COVID-19. The dynamic chest CT and laboratory findings were obtained from electronic medical records. The intervals between onset and CT scans and the dynamic changes of the lesions were recorded. The above data were reviewed, sorted, and analyzed by using SPSS 21.0 software. RESULTS From the time of onset, the dynamic image of the lungs became more complete. Fibrous cord shadow absorption in the lungs were observed. Experimental indicators, biochemical indicators of lymphocytes, and protein series were decreased to varying degrees, while erythrocyte sedimentation, fibrinogen, and D-dimer were increased to varying degrees. CONCLUSIONS The dynamic changes of CT images of lungs of COVID-19 patients, combined with the clinical manifestations and laboratory indicators of patients, can help guide clinical diagnosis and treatment.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32367888

Citation
Med Sci Monit. 2020 May 5;26:e924403. doi: 10.12659/MSM.924403

Title
Diagnostic role of chest computed tomography in coronavirus disease 2019

Author
Jędrusik P, Gaciong Z, Sklinda K, Sierpiński R, Walecki J, Gujski M.

Abstract
Coronavirus disease 2019 (COVID-19) is an infectious disease caused by a novel strain of coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), that appeared in China in December 2019 and spread globally, evolving into the currently observed pandemic. The laboratory diagnosis of SARS-CoV-2 infection is currently based on real-time reverse transcriptase-polymerase chain reaction (RT-PCR) testing, and imaging cannot replace genetic testing in patients suspected of COVID-19. However, with predominant respiratory manifestations of COVID-19, particularly in more severe cases, chest imaging using computed tomography (CT) plays a major role in detecting viral lung infection, evaluating the nature and extent of pulmonary lesions, and monitoring the disease activity. The role of chest CT as a diagnostic tool may be increased when the laboratory testing capacities using RT-PCR prove inaccurate or insufficient during a major outbreak of the disease. In these settings, a rapid presumptive diagnosis of COVID-19 potentially offered by CT might be an advantage, in addition to obvious benefits of delineating the nature and extent of pulmonary changes. In the present paper, we reviewed the diagnostic role of chest CT in COVID-19 patients.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32385976

Citation
Pol Arch Intern Med. 2020 May 9. doi: 10.20452/pamw.15348. [Epub ahead of print]

Title
Radiological role in the detection, diagnosis and monitoring for the coronavirus disease 2019 (COVID-19)

Author
Hu L, Wang C.

Abstract
Coronavirus disease 2019 (COVID-19) has officially been declared a pandemic by the World Health Organization (WHO). Radiological examinations, especially computed tomography (CT), play an important role in the fight against COVID-19. A comprehensive and timely review of radiological role in the fight against COVID-19 remains urgent and mandatory. Hence, the aim of this review is to summarize the radiological role in the fight against COVID-19. This review of current studies on COVID-19 provides insight into the radiological role in the detection, diagnosis, and monitoring for COVID-19. The typical radiological features of COVID-19 include bilateral, multifocal, and multilobar ground glass opacification with patchy consolidation, a peripheral/subpleural or posterior distribution (or both), mainly in the lower lobes. A combination of chest CT and repeat Reverse Transcription-Polymerase Chain Reaction (RT-PCR) testing may be beneficial for the diagnosis of COVID-19 in the setting of strongly clinical suspicion. Chest CT may improve the sensitivity for COVID-19 diagnosis, but patients' exposure to radiation should be kept as low as possible especially for children and pregnant women patients.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32373990

Citation
Eur Rev Med Pharmacol Sci. 2020 Apr;24(8):4523-4528. doi: 10.26355/eurrev_202004_21035.

Title
CT differential diagnosis of COVID-19 and non-COVID-19 in symptomatic suspects: a practical scoring method

Author
Luo L, Luo Z, Jia Y, Zhou C, He J, Lyu J, Shen X.

Abstract
BACKGROUND: Although typical and atypical CT image findings of COVID-19 are reported in current studies, the CT image features of COVID-19 overlap with those of viral pneumonia and other respiratory diseases. Hence, it is difficult to make an exclusive diagnosis.
METHODS: Thirty confirmed cases of COVID-19 and forty-three cases of other aetiology or clinically confirmed non-COVID-19 in a general hospital were included. The clinical data including age, sex, exposure history, laboratory parameters and aetiological diagnosis of all patients were collected. Seven positive signs (posterior part/lower lobe predilection, bilateral involvement, rounded GGO, subpleural bandlike GGO, crazy-paving pattern, peripheral distribution, and GGO +/- consolidation) from significant COVID-19 CT image features and four negative signs (only one lobe involvement, only central distribution, tree-in-bud sign, and bronchial wall thickening) from other non-COVID-19 pneumonia were used. The scoring analysis of CT features was compared between the two groups (COVID-19 and non-COVID-19).
RESULTS: Older age, symptoms of diarrhoea, exposure history related to Wuhan, and a lower white blood cell and lymphocyte count were significantly suggestive of COVID-19 rather than non-COVID-19 ($p < 0.05$). The receiver operating characteristic (ROC) curve of the combined CT image features analysis revealed that the area under the curve (AUC) of the scoring system was 0.854. These cut-off values yielded a sensitivity of 56.67% and a specificity of 95.35% for a score > 4, a sensitivity of 100% and a specificity of 23.26% for a score > 0, and a sensitivity of 86.67% and a specificity of 67.44% for a score > 2.
CONCLUSIONS: With a simple and practical scoring system based on CT imaging features, we can make a hierarchical diagnosis of COVID-19 and non-COVID-19 with different management suggestions.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32381057

Citation
BMC Pulm Med. 2020 May 7;20(1):129. doi: 10.1186/s12890-020-1170-6.

Title
Abdominal Imaging Findings in COVID-19: Preliminary Observations

Author
Bhayana R, Som A, Li MD, Carey DE, Anderson MA, Blake MA, Catalano O, Gee MS, Hahn PF, Harisinghani M, Kilcoyne A, Lee SI, Mojtahed A, Pandharipande PV, Pierce TT, Rosman DA, Saini S, Samir AE, Simeone JF, Gervais DA, Velmahos G, Misdraji J, Kambadakone A.

Abstract
Background Angiotensin converting enzyme 2 (ACE2), a target of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), demonstrates its highest surface expression in the lung, small bowel, and vasculature, suggesting abdominal viscera may be susceptible to injury. Purpose To report abdominal imaging findings in patients with coronavirus disease 2019 (COVID-19). Materials and Methods In this retrospective cross-sectional study, patients consecutively admitted to a single quaternary care center from 3/27/2020 to 4/10/2020 who tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) were included. Abdominal imaging studies performed in these patients were reviewed and salient findings recorded. Medical records were reviewed for clinical data. Univariable analysis and logistic regression were performed. Results 412 patients (average age 57 years; range 18->90 years; 241 men, 171 women) were evaluated. 224 abdominal imaging studies were performed (radiographs, n=137; ultrasound, n=44; CT, n=42; MRI, n=1) in 134 patients (33%). Abdominal imaging was associated with age (odds ratio [OR] 1.03 per year increase, p=0.001) and ICU admission (OR 17.3, p<0.001). Bowel wall abnormalities were seen on 31% of CT scans (13 of 42) and were associated with ICU admission (OR 15.5, p=0.01). Bowel findings included pneumatosis or portal venous gas, seen on 20% of CT scans in ICU patients (4 of 20). Surgical correlation (n=4) revealed unusual yellow discoloration of bowel (n=3) and bowel infarction (n=2). Pathology demonstrated ischemic enteritis with patchy necrosis and fibrin thrombi in arterioles (n=2). Of right upper quadrant ultrasounds, 87% (32 of 37) were performed for liver laboratory findings, and 54% (20 of 37) demonstrated a dilated sludge-filled gallbladder suggestive of cholestasis. Patients with a cholecystostomy tube placed (n=4) had negative bacterial cultures. Conclusion Bowel abnormalities and cholestasis were common findings on abdominal imaging of inpatients with COVID-19. Patients who went to laparotomy often had ischemia, possibly due to small vessel thrombosis.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32391742

Citation
Radiology. 2020 May 11:201908. doi: 10.1148/radiol.2020201908. [Epub ahead of print]

Title
CT Scans Obtained for Nonpulmonary Indications: Associated Respiratory Findings of COVID-19

Author
Hossain R, Lazarus MS, Roudenko A, Dako F, Mehta V, Alis J, Zalta B, Lei B, Haramati LB, White CS.

Abstract
Background Atypical manifestations of COVID-19 are being encountered as the pandemic unfolds, leading to non-chest CT scans that may uncover unsuspected pulmonary disease. Purpose To investigate patients with primary non-respiratory symptoms who underwent abdomen/pelvis or cervical spine/neck CT with unsuspected findings highly suspicious for pulmonary COVID-19. Materials and Methods This retrospective study from March 10, 2020 to April 6, 2020 involved three institutions, two in a region considered a hotspot (area of high prevalence) for COVID-19. Patients without known COVID-19 were included who presented to the emergency room (ER) with primary non-respiratory [gastrointestinal (GI) or neurological] symptoms, had lung parenchymal findings suspicious for COVID-19 on a non-chest CT but no concurrent chest CT and had COVID-19 testing in the ER. Group 1 patients had RT PCR obtained pre-CT read (COVID-19 suspected on presentation); Group 2 had RT PCR obtained post-CT read (COVID-19 not suspected). Presentation and imaging findings were compared and outcomes were evaluated. Descriptive statistics and Fisher exact tests were used for analysis. Results Group 1 comprised 62 patients [31 men, 31 women, mean age 67(SD ±17) years] and group 2 comprised 57 patients [28 men, 29 women, mean age 63(SD ± 16) years). Cough and fever were more common in group 1 (37/62, 60%, 29/62, 47%) than group 2 (9/57, 16%, 12/57, 21%) respectively, with no significant difference in the remaining symptoms. There were 101 abdomen/pelvis and 18 cervical spine/neck CTs. In Group 1, non-chest CT findings provided the initial evidence of COVID-19 related pneumonia in 32/62 (52%); for Group 2, it was 44/57 (77%). Overall, the most common CT findings were ground glass opacity (114/119, 96%) and consolidation (47/119,40%). 29/119 (24%) patients required major interventions (vasopressor medication or intubation) and 27/119 (23%) died. Patients who underwent cervical spine/neck CT had worse outcomes than those with abdominal/pelvic CT (p =0.01). Conclusion In a substantial percentage of patients with primary non-respiratory symptoms who underwent non-chest CT, the CT provided the first evidence of COVID-19 related pneumonia.

Link
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Citation
Radiology. 2020 May 11:201743. doi: 10.1148/radiol.2020201743. [Epub ahead of print]

Title
COVID-19-Associated Leukoencephalopathy

Author
Sachs JR, Gibbs KW, Swor DE, Sweeney AP, Williams DW, Burdette JH, West TG, Geer CP.

Abstract
As the COVID-19 pandemic has progressed, there has been increasing recognition of neurologic sequelae. We report a case of COVID-19-associated leukoencephalopathy with microhemorrhage.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=COVID-19-Associated+Leukoencephalopathy

Citation
Radiology. 2020 May 14:201753. doi: 10.1148/radiol.2020201753. [Epub ahead of print]

Title
A collaborative online AI engine for CT-based COVID-19 diagnosis

Author
Xu Y, Ma L, Yang F, Chen Y, Ma K, Yang J, Yang X, Chen Y, Shu C, Fan Z, Gan J, Zou X, Huang R, Zhang C, Liu X, Tu D, Xu C, Zhang W, Yang D, Wang MW, Wang X, Xie X, Leng H, Holalkere N, Halin NJ, Kamel IR, Wu J, Peng X, Wang X, Shao J, Mongkolwat P, Zhang J, Rubin DL, Wang G, Zheng C, Li Z, Bai X, Xia T.

Abstract
Artificial intelligence can potentially provide a substantial role in streamlining chest computed tomography (CT) diagnosis of COVID-19 patients. However, several critical hurdles have impeded the development of robust AI model, which include deficiency, isolation, and heterogeneity of CT data generated from diverse institutions. These bring about lack of generalization of AI model and therefore prevent it from applications in clinical practices. To overcome this, we proposed a federated learning-based Unified CT-COVID AI Diagnostic Initiative (UCADI), a decentralized architecture where the AI model is distributed to and executed at each host institution with the data sources or client ends for training and inferencing without sharing individual patient data. Specifically, we firstly developed an initial AI CT model based on data collected from three Tongji hospitals in Wuhan. After model evaluation, we found that the initial model can identify COVID from Tongji CT test data at near radiologist-level (97.5% sensitivity) but performed worse when it was tested on COVID cases from Wuhan Union Hospital (72% sensitivity), indicating a lack of model generalization. Next, we used the publicly available UCADI framework to build a federated model which integrated COVID CT cases from the Tongji hospitals and Wuhan Union hospital (WU) without transferring the WU data. The federated model not only performed similarly on Tongji test data but improved the detection sensitivity (98%) on WU test cases. The UCADI framework will allow participants worldwide to use and contribute to the model, to deliver a real-world, globally built and validated clinic CT-COVID AI tool. This effort directly supports the United Nations Sustainable Development Goals' number 3, Good Health and Well-Being, and allows sharing and transferring of knowledge to fight this devastating disease around the world.

Link
https://www.medrxiv.org/content/10.1101/2020.05.10.20096073v1

Citation
https://doi.org/10.1101/2020.05.10.20096073

Title
Chest Computed Tomography Manifestation of Coronavirus Disease 2019 (COVID-19) in Patients With Cardiothoracic Conditions

Author
Salehi S, Abedi A, Radmard AR, Sorouri M, Gholamrezanezhad A.

Abstract
The coronavirus disease 2019 (COVID-19) pandemic is a serious public health concern, with an exponentially growing number of patients worldwide. Computed tomography (CT) has been suggested as a highly sensitive modality for the diagnosis of pulmonary involvement in the early stages of COVID-19. The typical features of COVID-19 in chest CT include bilateral, peripheral, and multifocal ground-glass opacities with or without superimposed consolidations. Patients with underlying medical conditions are at higher risks of complications and mortality. The diagnosis of COVID-19 on the basis of the imaging features may be more challenging in patients with preexisting cardiothoracic conditions, such as chronic obstructive pulmonary disease, interstitial lung disease, cardiovascular disease, and malignancies with cardiothoracic involvement. The extensive pulmonary involvement in some of these pathologies may obscure the typical manifestation of COVID-19, whereas other preexisting pathologies may resemble the atypical or rare CT manifestations of this viral pneumonia. Thus, understanding the specific CT manifestations in these special subgroups is essential for a prompt diagnosis.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32404799

Citation
J Thorac Imaging. 2020 May 12. doi: 10.1097/RTI.0000000000000531. [Epub ahead of print]

Title
Diagnostic Tools for Coronavirus Disease (COVID-19): Comparing CT and RT-PCR Viral Nucleic Acid Testing

Author
Waller JV, Kaur P, Tucker A, Lin KK, Diaz MJ, Henry TS, Hope M.

Abstract
OBJECTIVE. Multiple studies suggest CT should be a primary diagnostic tool for coronavirus disease (COVID-19) because they reported sensitivities with CT far superior to that of reverse transcriptase polymerase chain reaction (RT-PCR) testing. This review aimed to assess these reports and found chest CT to have a clinical utility that is limited, particularly for patients who show no symptoms and patients who are screened early in disease progression. CONCLUSION. CT has limited sensitivity for COVID-19 and a lower specificity than RT-PCR testing, and it carries a risk of exposing providers to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Chest CT should be considered a supplemental diagnostic tool, particularly for patients who show symptoms.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32412790

Citation
AJR Am J Roentgenol. 2020 May 15:1-5. doi: 10.2214/AJR.20.23418. [Epub ahead of print]

Title
The role of cardiovascular imaging for myocardial injury in hospitalized COVID-19 patients

Author
Cosyns B, Lochy S, Luchian ML, Gimelli A, Pontone G, Allard SD, de Mey J, Rosseel P, Dweck M, Petersen SE, Edvardsen T.

Abstract
Recent EACVI recommendations described the importance of limiting cardiovascular imaging during the COVID-19 pandemic in order to reduce virus transmission, protect healthcare professionals from contamination, and reduce consumption of personal protective equipment. However, an elevated troponin remains a frequent request for cardiac imaging in COVID-19 patients, partly because it signifies cardiac injury due to a variety of causes and partly because it is known to convey a worse prognosis. The present paper aims to provide guidance to clinicians regarding the appropriateness of cardiac imaging in the context of troponin elevation and myocardial injury, how best to decipher the mechanism of myocardial injury, and how to guide patient management.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32391912

Citation
Eur Heart J Cardiovasc Imaging. 2020 May 11. pii: jeaa136. doi: 10.1093/ehjci/jeaa136. [Epub ahead of print]

Title
Cerebrovascular Disease in COVID-19

Author
Goldberg MF, Goldberg MF, Cerejo R, Tayal AH.

Abstract
Coronavirus disease 19 (COVID-19) is a pandemic originating in Wuhan, China, in December 2019. Early reports suggest that there are neurologic manifestations of COVID-19, including acute cerebrovascular disease. We report a case of COVID-19 with acute ischemic stroke. To our knowledge, this is the first reported case of COVID-19-related cerebral infarcts that includes brain imaging at multiple time points and CT angiography. There is a growing body of published evidence that complications of COVID-19 are not limited to the pulmonary system. Neuroradiologists should be aware of a wide range of neurologic manifestations, including cerebrovascular disease.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32409316

Citation
AJNR Am J Neuroradiol. 2020 May 14. doi: 10.3174/ajnr.A6588. [Epub ahead of print]

Title
Asymptomatic COVID-19: What the Neuroradiologist Needs to Know about Pulmonary Manifestations

Author
Barajas RF Jr, Rufener G, Starkey J, Duncan T, Fuss C

Abstract
Coronavirus disease 2019 (COVID-19) is an infectious disease with a high asymptomatic incidence. Asymptomatic infections within a population will inevitably lead to diagnosis via unrelated medical imaging. We report the case of an asymptomatic patient undergoing a spine CT examination for trauma who was incidentally found to have lung abnormalities later confirmed to be COVID-19. We aim to familiarize

Link
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Citation
AJNR Am J Neuroradiol. 2020 May 14. doi: 10.3174/ajnr.A6561. [Epub ahead of prin

Title
Comparison of chest CT findings between COVID-19 pneumonia and other types of viral pneumonia: a two-center retrospective study

Author
Li X, Fang X, Bian Y, Lu J.

Abstract
OBJECTIVES: To compare the pulmonary chest CT findings of patients with COVID-19 pneumonia with those with other types of viral pneumonia. METHODS: This retrospective review includes 154 patients with RT-PCR-confirmed COVID-19 pneumonia diagnosed between February 11 and 20, 2020, and 100 patients with other types of viral pneumonia diagnosed between April 2011 and December 2020 from two hospitals. High-resolution CT (HRCT) of the chest was performed. Data on location, distribution, attenuation, maximum lesion range, lobe involvement, number of lesions, air bronchogram signs, Hilar and mediastinal lymph node enlargement, and pleural effusion were collected. Associations between imaging characteristics and COVID-19 pneumonia were analyzed with univariate and multivariate logistic regression models. RESULTS: A peripheral distribution was associated with a 13.04-fold risk of COVID-19 pneumonia, compared with a diffuse distribution. A maximum lesion range > 10 cm was associated with a 9.75-fold risk of COVID-19 pneumonia, compared with a maximum lesion range ≤ 5 cm, and the involvement of 5 lobes was associated with an 8.45-fold risk of COVID-19 pneumonia, compared with a maximum lesion range ≤ 2. No pleural effusion was associated with a 3.58-fold risk of COVID-19 pneumonia compared with the presence of pleural effusion. Hilar and mediastinal lymph node enlargement was associated with a 2.79-fold risk of COVID-19 pneumonia. CONCLUSION: A peripheral distribution, a lesion range > 10 cm, involvement of 5 lobes, presence of hilar and mediastinal lymph node enlargement, and no pleural effusion were significantly associated with 2019-novel coronavirus pneumonia. KEY POINTS: • A peripheral distribution, a lesion range > 10 cm, involvement of 5 lobes, presence of hilar and mediastinal lymph node enlargement, and no pleural effusion were significantly associated with COVID-19 compared with other types of viral pneumonia.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32394279

Citation
Eur Radiol. 2020 May 12. doi: 10.1007/s00330-020-06925-3. [Epub ahead of print]

Title
COVID-19 pneumonia: CT findings of 122 patients and differentiation from influenza pneumonia

Author
Liu M, Zeng W, Wen Y, Zheng Y, Lv F, Xiao K.

Abstract
OBJECTIVES: To investigate the clinical and chest CT characteristics of COVID-19 pneumonia and explore the radiological differences between COVID-19 and influenza. MATERIALS AND METHODS: A total of 122 patients (61 men and 61 women, 48 ± 15 years) confirmed with COVID-19 and 48 patients (23 men and 25 women, 47 ± 19 years) confirmed with influenza were enrolled in the study. Thin-section CT was performed. The clinical data and the chest CT findings were recorded. RESULTS: The most common symptoms of COVID-19 were fever (74%) and cough (63%), and 102 patients (83%) had Wuhan contact. Pneumonia in 50 patients with COVID-19 (45%) distributed in the peripheral regions of the lung, while it showed mixed distribution in 26 patients (74%) with influenza ($p = 0.022$). The most common CT features of the COVID-19 group were pure ground-glass opacities (GGO, 36%), GGO with consolidation (51%), rounded opacities (35%), linear opacities (64%), bronchiolar wall thickening (49%), and interlobular septal thickening (66%). Compared with the influenza group, the COVID-19 group was more likely to have rounded opacities (35% vs. 17%, $p = 0.048$) and interlobular septal thickening (66% vs. 43%, $p = 0.014$), but less likely to have nodules (28% vs. 71%, $p < 0.001$), tree-in-bud sign (9% vs. 40%, $p < 0.001$), and pleural effusion (6% vs. 31%, $p < 0.001$). CONCLUSIONS: There are significant differences in the CT manifestations of patients with COVID-19 and influenza. Presence of rounded opacities and interlobular septal thickening, with the absence of nodules and tree-in-bud sign, and with the typical peripheral distribution, may help us differentiate COVID-19 from influenza. KEY POINTS: • Typical CT features of COVID-19 include pure ground-glass opacities (GGO), GGO with consolidation, rounded opacities, bronchiolar wall thickening, interlobular septal thickening, and a peripheral distribution. • Presence of rounded opacities and interlobular septal thickening, with the absence of nodules and tree-in-bud sign, and with the typical peripheral distribution, may help us differentiate COVID-19 from influenza.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32399710

Citation
Eur Radiol. 2020 May 12. doi: 10.1007/s00330-020-06928-0. [Epub ahead of print]

Title
Early CT features and temporal lung changes in COVID-19 pneumonia in Wuhan, China

Author
Hu Q, Guan H, Sun Z, Huang L, Chen C, Ai T, Pan Y, Xia L.

Abstract
PURPOSE: To analyse the high-resolution computed tomography (HRCT) early imaging features and the changing trend of coronavirus disease 2019 (COVID-19) pneumonia. MATERIALS AND METHODS: Forty-six patients with COVID-19 pneumonia who had an isolated lesion on the first positive CT were enrolled in this study. The following parameters were recorded for each lesion: sites, sizes, location (peripheral or central), attenuation (ground-glass opacity or consolidation), and other abnormalities (supply pulmonary artery dilation, air bronchogram, interstitial thickening, etc.). The follow-up CT images were compared with the previous CT scans, and the development of the lesions was evaluated. RESULTS: The lesions tended to be peripheral and subpleural. All the lesions exhibited ground-glass opacity with or without consolidation. A higher proportion of supply pulmonary artery dilation (89.13 % [41/46]) and air bronchogram (69.57 % [32/46]) were found. Other findings included thickening of the intralobular interstitium and a halo sign of ground glass around a solid nodule. Cavitation, calcification or lymphadelopathy were not observed. The reticular patterns were noted from the 14 days after symptoms onset in 7 of 20 patients (45 %). At 22-31 days, the lesions were completely absorbed only in 2 of 7 patients (28.57 %). CONCLUSION: The typical early CT features of COVID-19 pneumonia are ground-glass opacity, and located peripheral or subpleural location, and with supply pulmonary artery dilation. Reticulation was evident after the 2nd week and persisted in half of patients evaluated in 4 weeks after the onset. Long-term follow-up is required to determine whether the reticulation represents irreversible fibrosis.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32387924

Citation
Eur J Radiol. 2020 Apr 19;128:109017. doi: 10.1016/j.ejrad.2020.109017. [Epub ahead of print]

Title
Deep learning-based multi-view fusion model for screening 2019 novel coronavirus pneumonia: A multicentre study

Author
Wu X, Hui H, Niu M, Li L, Wang L, He B, Yang X, Li L, Li H, Tian J, Zha Y.

Abstract
PURPOSE: To develop a deep learning-based method to assist radiologists to fast and accurately identify patients with COVID-19 by CT images. METHODS: We retrospectively collected chest CT images of 495 patients from three hospitals in China. 495 datasets were randomly divided into 395 cases (80%, 294 of COVID-19, 101 of other pneumonia) of the training set, 50 cases (10%, 37 of COVID-19, 13 of other pneumonia) of the validation set and 50 cases (10%, 37 of COVID-19, 13 of other pneumonia) of the testing set. We trained a multi-view fusion model using deep learning network to screen patients with COVID-19 using CT images with the maximum lung regions in axial, coronal and sagittal views. The performance of the proposed model was evaluated by both the validation and testing sets. RESULTS: The multi-view deep learning fusion model achieved the area under the receiver-operating characteristics curve (AUC) of 0.732, accuracy of 0.700, sensitivity of 0.730 and specificity of 0.615 in validation set. In the testing set, we can achieve AUC, accuracy, sensitivity and specificity of 0.819, 0.760, 0.811 and 0.615 respectively. CONCLUSIONS: Based on deep learning method, the proposed diagnosis model trained on multi-view images of chest CT images showed great potential to improve the efficacy of diagnosis and mitigate the heavy workload of radiologists for the initial screening of COVID-19 pneumonia.

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https://www.ncbi.nlm.nih.gov/pubmed/32408222

Citation
Eur J Radiol. 2020 May 5;128:109041. doi: 10.1016/j.ejrad.2020.109041. [Epub ahead of print]

Title
Lung involvement in patients with coronavirus disease-19 (COVID-19): a retrospective study based on quantitative CT findings

Author
Yu N, Shen C, Yu Y, Dang M, Cai S, Guo Y.

Abstract
PURPOSE: To explore lung involvement in patients with coronavirus disease-19 (COVID-19) using quantitative computed tomography (QCT). METHODS: A total of 52 patients with COVID-19 who were admitted to three hospitals in China from January 23, 2020 to February 1, 2020 were retrospectively analyzed using QCT. The accuracy of QCT segmentation was assessed. The relationship between the time from symptom onset to initial CT and QCT parameters acquired on the initial CT were explored. RESULTS: First, the ability of QCT to detect and segment lesions was investigated and it was unveiled that results of segmentation of the majority of cases (42/52) were satisfactory and for 8 out of 52 patients, the images depicted lesions with miss-segmentation; besides, 2 out of 52 cases had negative finding on chest CT achieved by both radiologists and QCT. QCT-related parameters showed to have a relationship with the time from symptom onset to initial CT. In the early-stage (0-3 days), the percentage of lung involvement was 4%, with a mean density of -462 ± 99 HU. The peak density of lesions appeared at the range of - 500 to - 700 HU on density histogram. In the intermediate-stage (4-6 days), the mean percentage of lung involvement noticeably increased compared with that in early stage (7%, $p < 0.05$). In late stage (7-14 days), the percentage of lung involvement decreased to 5%. The mean density of lesions was the highest (- 430 ± 80), and heterogeneity density distribution showed a dual-peak on density histogram. CONCLUSION: COVID-19 can be promptly detected by QCT. In addition, the QCT-related parameters can highly facilitate assessment of pulmonary involvement.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32395696

Citation
Chin J Acad Radiol. 2020 May 11:1-6. doi: 10.1007/s42058-020-00034-2. [Epub ahead of print]

Title
Imaging in corona virus disease 2019 (COVID-19)-A scoping review.

Author
Jajodia A, Ebner L, Heidinger B, K CA, Prosch H.

Abstract
Coronavirus Disease-2019 (COVID-19) originated in the Wuhan, Hubei Province, China in November 2019 and has since been declared a pandemic by the WHO. COVID-19 is an acute infectious disease, primarily affecting the respiratory system. Currently, real-time reverse transcription polymerase chain reaction (RT-PCR) performed on respiratory specimens is considered the reference by which to diagnose COVID-19. However, the limitations of RT-PCR, specifically, the fact that it is time-consuming and inadequate for the assessment of disease severity, have affected the process of epidemiological disease containment and has taken a toll on the healthcare management chain. As the risk of infection for other patients and personnel must be kept to a minimum, the indications for imaging have to be carefully considered. Imaging is primarily performed in patients with a negative RT-PCR, but a high clinical suspicion of COVID-19, or, in patients with diagnosed COVID-19 who are suffering from moderate to severe symptoms. In this article, we review the typical imaging findings in COVID-19, the differential diagnoses, and common complications.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32395567

Citation
Eur J Radiol Open. 2020 May 11:100237. doi: 10.1016/j.ejro.2020.100237. [Epub ahead of print]

Title
Novel coronavirus disease 2019 (COVID-19): relationship between chest CT scores and laboratory parameters

Author
Zhang B, Zhang J, Chen H, Chen L, Chen Q, Li M, Chen Z, You J, Yang K, Zhang S.

Abstract
PURPOSE: To quantify the severity of 2019 novel coronavirus disease (COVID-19) on chest CT and to determine its relationship with laboratory parameters. METHODS: Patients with real-time fluorescence polymerase chain reaction (RT-PCR)-confirmed COVID-19 between January 01 and February 18, 2020, were included in this study. Laboratory parameters were retrospectively collected from medical records. Severity of lung changes on chest CT of early, progressive, peak, and absorption stages was scored according to the percentage of lung involvement (5 lobes, scores 1-5 for each lobe, range 0-20). Relationship between CT scores and laboratory parameters was evaluated by the Spearman rank correlation. The Bonferroni correction adjusted significance level was at 0.05/4 = 0.0125. RESULTS: A total of 84 patients (mean age, 47.8 ± 12.0 years [standard deviation]; age range, 24-80 years) were evaluated. The patients underwent a total of 339 chest CT scans with a median interval of 4 days (interquartile range, 3-5 days). Median chest CT scores peaked at 4 days after the beginning of treatment and then declined. CT score of the early stage was correlated with neutrophil count ($r = 0.531$, $P = 0.011$). CT score of the progressive stage was correlated with neutrophil count ($r = 0.502$, $P < 0.001$), white blood cell count ($r = 0.414$, $P = 0.001$), C-reactive protein ($r = 0.511$, $P < 0.001$), procalcitonin ($r = 0.423$, $P = 0.004$), and lactose dehydrogenase ($r = 0.369$, $P = 0.010$). However, CT scores of the peak and absorption stages were not correlated with any parameter ($P > 0.0125$). No sex difference occurred regarding CT score ($P > 0.05$). CONCLUSION: Severity of lung abnormalities quantified on chest CT might correlate with laboratory parameters in the early and progressive stages. However, larger cohort studies are necessary.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32399620

Citation
Eur J Nucl Med Mol Imaging. 2020 May 12. doi: 10.1007/s00259-020-04854-3. [Epub ahead of print]

Title
Computed tomography findings in a case of coronavirus disease 2019

Author
Yang B, Wang L, Xu G, Duan W, Zhang F, Cui C, Wang Z, Du W, Wu XH

Abstract
Coronavirus disease 2019 (COVID-19), which is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is mainly characterized by pulmonary inflammation. The preferred imaging modality is chest computed tomography (CT) which plays an important role in early diagnosis, quarantine, and treatment as well as in the evaluation of therapeutic efficacy. We report the imaging data from a confirmed case of COVID-19 admitted to our hospital. Our aims are to improve understanding of this disease and to facilitate early diagnosis and evaluation of therapeutic efficacy. A 70-year-old woman living in the epidemic area presented with a 2-day history of intermittent fever. Chest CT revealed multiple ground glass opacities in both lungs, mainly distributed subpleurally and in the middle and lateral lung fields, particularly in the right lung, where they had partially fused into patches. Local interlobular septal thickening was also observed. Throat swabs were positive for the SARS-CoV-2 nucleic acid, which confirmed the diagnosis of COVID-19. Chest CT plays a key role in the diagnosis of COVID-19, providing an accurate diagnosis and is a sensitive technique for evaluation of therapeutic efficacy. It has the advantages of promptness, convenience, and high efficiency.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32399481

Citation
Radiol Infect Dis. 2020 May 12. doi: 10.1016/j.jrid.2020.05.002. [Epub ahead of print]

Title
High-resolution CT features of the COVID-19 infection in Nanchong City: Initial and follow-up changes among different clinical types

Author
Jiang Y, Guo D, Li C, Chen T, Li R.

Abstract
OBJECTIVE: To discuss the high resolution computed tomography (HRCT) manifestations of coronavirus disease 2019 (COVID-19) patients among different clinical types on initial and follow-up CT. METHODS: Seven COVID-19 patients admitted to the Affiliated Hospital of North Sichuan Medical Collage were enrolled. All patients underwent initial and follow-up chest HRCT. The main CT features and semi-quantitative score which represent disease severity among different clinical types were evaluated. RESULT: On initial CT, the main abnormalities observed in common and severe cases respectively were pure ground glass opacities (GGOs) and patchy consolidation surrounded by GGOs. Critical cases had multiple consolidation surrounded by wide range of GGOs distributed in the whole lung fields. The scope and density score in common (4.5 and 5), severe (9.5 and 9.5) and critical (19 and 12) cases were increased by gradient. On follow-up CT, common and severe types manifested as decreasing density of lesion, absorbed consolidation and GGOs. Critical cases showed progression of the disease. The extent and progression scores in common and severe patients were significantly decreased, while the range score of patients with critical disease reached the highest points, accompanied with an increase in the density score. CONCLUSION: CT scanning can accurately assess the severity of COVID-19, and help to monitor disease transformation during follow-up among different clinical conditions.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32406420

Citation
Radiol Infect Dis. 2020 May 13. doi: 10.1016/j.jrid.2020.05.001. [Epub ahead of print]

Title
Prediction of the Development of Pulmonary Fibrosis Using Serial Thin-Section CT and Clinical Features in Patients Discharged after Treatment for COVID-19 Pneumonia

Author
Yu M, Liu Y, Xu D, Zhang R, Lan L, Xu H.

Abstract
OBJECTIVE: To identify predictors of pulmonary fibrosis development by combining follow-up thin-section CT findings and clinical features in patients discharged after treatment for COVID-19. MATERIALS AND METHODS: This retrospective study involved 32 confirmed COVID-19 patients who were divided into two groups according to the evidence of fibrosis on their latest follow-up CT imaging. Clinical data and CT imaging features of all the patients in different stages were collected and analyzed for comparison. RESULTS: The latest follow-up CT imaging showed fibrosis in 14 patients (male, 12; female, 2) and no fibrosis in 18 patients (male, 10; female, 8). Compared with the non-fibrosis group, the fibrosis group was older (median age: 54.0 years vs. 37.0 years, $p = 0.008$), and the median levels of C-reactive protein (53.4 mg/L vs. 10.0 mg/L, $p = 0.002$) and interleukin-6 (79.7 pg/L vs. 11.2 pg/L, $p = 0.04$) were also higher. The fibrosis group had a longer-term of hospitalization (19.5 days vs. 10.0 days, $p = 0.001$), pulsed steroid therapy (11.0 days vs. 5.0 days, $p < 0.001$), and antiviral therapy (12.0 days vs. 6.5 days, $p = 0.012$). More patients on the worst-state CT scan had an irregular interface (59.4% vs. 34.4%, $p = 0.045$) and a parenchymal band (71.9% vs. 28.1%, $p < 0.001$). On initial CT imaging, the irregular interface (57.1%) and parenchymal band (50.0%) were more common in the fibrosis group. On the worst-state CT imaging, interstitial thickening (78.6%), air bronchogram (57.1%), irregular interface (85.7%), coarse reticular pattern (28.6%), parenchymal band (92.9%), and pleural effusion (42.9%) were more common in the fibrosis group. CONCLUSION: Fibrosis was more likely to develop in patients with severe clinical conditions, especially in patients with high inflammatory indicators. Interstitial thickening, irregular interface, coarse reticular pattern, and parenchymal band manifested in the process of the disease may be predictors of pulmonary fibrosis. Irregular interface and parenchymal band could predict the formation of pulmonary fibrosis early.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32410413

Citation
Korean J Radiol. 2020 Jun;21(6):746-755. doi: 10.3348/kjr.2020.0215.

Title
Association between Initial Chest CT or Clinical Features and Clinical Course in Patients with Coronavirus Disease 2019 Pneumonia

Author
Liu Z, Jin C, Wu CC, Liang T, Zhao H, Wang Y, Wang Z, Li F, Zhou J, Cai S, Zeng L, Yang J.

Abstract
METHODS: Baseline CT scans and clinical and laboratory data of 72 patients admitted with COVID-19 pneumonia (39 men, 46.2 ± 15.9 years) were retrospectively analyzed. Baseline CT findings including lobar distribution, presence of ground glass opacities, consolidation, linear opacities, and lung severity score were evaluated. The outcome event was recovery with hospital discharge. The time from symptom onset to discharge or the end of follow-up (for those remained hospitalized) was recorded. Data were censored in events such as death or discharge without recovery. Multivariable Cox proportional hazard regression was used to explore the association between initial CT, clinical or laboratory findings, and discharge with recovery, whereby hazard ratio (HR) values < 1 indicated a lower rate of discharge at four weeks and longer time until discharge. RESULTS: Thirty-two patients recovered and were discharged during the study period with a median length of admission of 16 days (range, 9 to 25 days), while the rest remained hospitalized at the end of this study (median, 17.5 days; range, 4 to 27 days). None died during the study period. After controlling for age, onset time, lesion characteristics, number of lung lobes affected, and bilateral involvement, the lung severity score on baseline CT (> 4 vs. ≤ 4 [reference]: adjusted HR = 0.41 [95% confidence interval, CI = 0.18-0.92], p = 0.031) and initial lymphocyte count (reduced vs. normal or elevated [reference]: adjusted HR = 0.14 [95% CI = 0.03-0.60], p = 0.008) were two significant independent factors that influenced recovery and discharge. CONCLUSION: Lung severity score > 4 and reduced lymphocyte count at initial evaluation were independently associated with a significantly lower rate of recovery and discharge and extended hospitalization in patients admitted for COVID-19 pneumonia.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32410412

Citation
Korean J Radiol. 2020 Jun;21(6):736-745. doi: 10.3348/kjr.2020.0171.

Title
Radiological Findings in Patients with COVID-19

Author
Fatima S, Ratnani I, Husain M, Surani S.

Abstract
After its origin in Wuhan, China, coronavirus related respiratory illness spread across the globe, being declared as a pandemic by WHO on March 13, 2020. Because it is acquired via respiratory droplets, community spread is responsible for the recent global crisis. The current diagnostic options include real-time polymerase chain reaction (RT-PCR) and a few serology tests, including but not limited to the recently approved five minutes serology tests. The disease presents as a lower respiratory tract illness. Anecdotal experiences have shown that imaging characteristics are crucial to diagnosis as radiological evidence of disease appears prior to clinical manifestations and tends to evolve over time, which can be useful in predicting the stage of the disease. CT scan is more sensitive than a chest X-ray in highlighting these changes.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32411552

Citatio
Cureus. 2020 Apr 12;12(4):e7651. doi: 10.7759/cureus.7651.

Title
Observer agreement and clinical significance of chest CT reporting in patients suspected of COVID-19

Author
Debray MP, Tarabay H, Males L, Chalhoub N, Mahdjoub E, Pavlovsky T, Visseaux B, Bouzid D, Borie R, Wackenheim C, Crestani B, Rioux C, Saker L, Choquet C, Mullaert J, Khalil A.

Abstract
Objectives: To assess inter-observer agreement and clinical significance of chest CT reporting in patients suspected of COVID-19. Methods: From 16th to 24th March 2020, 241 consecutive patients addressed to hospital for COVID-19 suspicion had both chest CT and SARS-CoV-2 RT-PCR. Eight observers (2 thoracic and 2 general senior radiologists, 2 junior radiologists and 2 emergency physicians) retrospectively categorized each CT into one out of 3 categories (evocative, compatible for COVID-19 pneumonia, and not evocative or normal). Observer agreement for categorization between all readers and pairs of readers with similar experience was evaluated with the Kappa coefficient. The results of a consensus categorization were correlated to RT-PCR. Results: Observer agreement across the 3 categories was good between all readers (κ value 0.68 95%CI 0.67-0.70) and good to very good between pairs of readers (0.64-0.85). It
was very good (κ 0.81 95%CI 0.79-0.83), fair (κ 0.32 95%CI 0.29-0.34) and good (κ 0.74 95%CI 0.71-0.76) for the categories evocative, compatible and not evocative or normal, respectively. RT-PCR was positive in 97%, 50% and 27% of cases classified in the respective categories. Observer agreement was lower (p=0.045) and RT-PCR positive cases were less frequently categorized evocative in presence of an underlying pulmonary disease(p<0.001). Conclusion: Inter-observer agreement for chest CT reporting using categorization offindings is good in patients suspected of COVID-19. Among patients considered for hospitalization in an epidemic context, CT categorized evocative is highly predictive of COVID-19, whereas the predictive value of CT decreases between the categories compatible and not evocative.

Link
https://www.medrxiv.org/content/10.1101/2020.05.07.20094102v1

Citation
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Title
Chest Computed Tomography Findings in Asymptomatic Patients with COVID-19

Author
Chang MC, Lee W, Hur J, Park D.

Abstract
Background: Little is known about the damage to the respiratory system in asymptomatic patients with coronavirus disease (COVID-19). Objective: Herein, we evaluated the findings of chest computed tomography (CT) and radiography in patients with COVID-19 who were asymptomatic. Methods: We retrospectively investigated patients with a confirmed diagnosis of COVID-19
but who did not show any symptoms. Among the 139 patients with COVID-19 who were hospitalized, 10 (7.2%) were asymptomatic. Their chest CT and radiographic findings were analyzed. Results: In the results, all patients (100%) had ground glass opacity (GGO) on chest CT. Further, the GGO lesions were predominantly distributed peripherally and posteriorly in all
patients. In 9 (90%) patients, the GGO lesions were combined with reticular opacity. Airbronchogram due to bronchiolectasis surrounded by GGO was observed in 8 patients (80%).
Additionally, the lung lesions were dominant on the right side in all patients. Conclusions: In conclusion, considering our results that the lung is affected in asymptomatic patients, it will be necessary to extend the indications of COVID-19 testing for effective management of COVID-19 during the pandemic.

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Citation
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Title
Artificial Intelligence-Enabled Rapid Diagnosis of Patients With COVID-19

Author
Xueyan Mei, Hao-Chih Lee, Kai-Yue Diao, Mingqian Huang, Bin Lin, Chenyu Liu, Zongyu Xie, Yixuan Ma, Philip M Robson, Michael Chung, Adam Bernheim, Venkatesh Mani, Claudia Calcagno, Kunwei Li, Shaolin Li, Hong Shan, Jian Lv, Tongtong Zhao, Junli Xia, Qihua Long, Sharon Steinberger, Adam Jacobi, Timothy Deyer, Marta Luksza, Fang Liu, Brent P Little, Zahi A Fayad, Yang Yang

Abstract
For diagnosis of coronavirus disease 2019 (COVID-19), a SARS-CoV-2 virus-specific reverse transcriptase polymerase chain reaction (RT–PCR) test is routinely used. However, this test can take up to 2 d to complete, serial testing may be required to rule out the possibility of false negative results and there is currently a shortage of RT–PCR test kits, underscoring the urgent need for alternative methods for rapid and accurate diagnosis of patients with COVID-19. Chest computed tomography (CT) is a valuable component in the evaluation of patients with suspected SARS-CoV-2 infection. Nevertheless, CT alone may have limited negative predictive value for ruling out SARS-CoV-2 infection, as some patients may have normal radiological findings at early stages of the disease. In this study, we used artificial intelligence (AI) algorithms to integrate chest CT findings with clinical symptoms, exposure history and laboratory testing to rapidly diagnose patients who are positive for COVID-19. Among a total of 905 patients tested by real-time RT–PCR assay and next-generation sequencing RT–PCR, 419 (46.3%) tested positive for SARS-CoV-2. In a test set of 279 patients, the AI system achieved an area under the curve of 0.92 and had equal sensitivity as compared to a senior thoracic radiologist. The AI system also improved the detection of patients who were positive for COVID-19 via RT–PCR who presented with normal CT scans, correctly identifying 17 of 25 (68%) patients, whereas radiologists classified all of these patients as COVID-19 negative. When CT scans and associated clinical history are available, the proposed AI system can help to rapidly diagnose COVID-19 patients.

Link
https://www.nature.com/articles/s41591-020-0931-3#citeas

Citation
Mei, X., Lee, H., Diao, K. et al. Artificial intelligence–enabled rapid diagnosis of patients with COVID-19. Nat Med (2020). https://doi.org/10.1038/s41591-020-0931-3

Title
Clinically Applicable AI System for Accurate Diagnosis, Quantitative Measurements, and Prognosis of COVID-19 Pneumonia Using Computed Tomography

Author
Kang Zhang, Xiaohong Liu, Jun Shen, Zhihuan Li, Ye Sang, Xingwang Wu, Yunfei Zha, Wenhua Liang, Chengdi Wang, Ke Wang, Linsen Ye, Ming Gao, Zhongguo Zhou, Liang Li, Jin Wang, Zehong Yang, Huimin Cai, Jie Xu, Lei Yang, Wenjia Cai, Wenqin Xu, Shaoxu Wu, Wei Zhang, Shanping Jiang, Lianghong Zheng, Xuan Zhang, Li Wang, Liu Lu, Jiaming Li, Haiping Yin, Winston Wang, Oulan Li, Charlotte Zhang, Liang Liang, Tao Wu, Ruiyun Deng, Kang Wei, Yong Zhou, Ting Chen, Johnson Yiu-Nam Lau, Manson Fok, Jianxing He, Tianxin Lin, Weimin Li, Guangyu Wang

Abstract
Many COVID-19 patients infected by SARS-CoV-2 virus develop pneumonia (called novel coronavirus pneumonia, NCP) and rapidly progress to respiratory failure. However, rapid diagnosis and identification of high-risk patients for early intervention are challenging. Using a large computed tomography (CT) database from 3,777 patients, we developed an AI system that can diagnose NCP and differentiate it from other common pneumonia and normal controls. The AI system can assist radiologists and physicians in performing a quick diagnosis especially when the health system is overloaded. Significantly, our AI system identified important clinical markers that correlated with the NCP lesion properties. Together with the clinical data, our AI system was able to provide accurate clinical prognosis that can aid clinicians to consider appropriate early clinical management and allocate resources appropriately. We have made this AI system available globally to assist the clinicians to combat COVID-19.

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https://www.sciencedirect.com/science/article/pii/S0092867420305511

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https://doi.org/10.1016/j.cell.2020.04.045

Title
Interpretable Artificial Intelligence for COVID-19 Diagnosis from Chest CT Reveals Specificity of Ground-Glass Opacities

Author
Anmol Warman, Pranav I. Warman, Ayushman Sharma, Puja Parikh, Roshan Warman, Narayan Viswanadhan, Lu Chen, Subhra Mohapatra, Shyam S Mohapatra, Guillermo Sapiro.

Abstract
Background The use of CT imaging enhanced by artificial intelligence to effectively diagnose COVID-19, instead of or in addition to reverse transcription-polymerase chain reaction (RT-PCR), can improve widespread COVID-19 detection and resource allocation. Methods 904 axial lung window CT slices from 338 patients in 17 countries were collected and labeled. The data included 606 images from COVID-19 positive patients (confirmed via RT-PCR), 224 images of a variety of other pulmonary diseases including viral pneumonias, and 74 images of normal patients. We developed, trained, validated, and tested an object detection model which detects features in three categories: ground-glass opacities (GGOs) for COVID-19, GGOs for non-COVID-19 diseases, and features that are inconsistent with a COVID-19 diagnosis. These collected features are passed into an interpretable decision tree model to make a suggested diagnosis. Results On an independent test of 219 images from COVID-19 positive, a variety of pneumonia, and healthy patients, the model predicted COVID-19 diagnoses with an accuracy of 96.80 % (95% confidence interval [CI], 96.75 to 96.86) , AUC-ROC of 0.9664 (95% CI, 0.9659 to 0.9671) , sensitivity of 98.33% (95% CI, 98.29 to 98.40) , precision of 95.93% (95% CI, 95.83 to 95.99), and specificity of 94.95% (95% CI, 94.84 to 95.05). On an independent test of 34 images from asymptomatic COVID-19 positive patients, our model achieved an accuracy of 97.06% (95% CI, 96.81 to 97.06) and a sensitivity of 96.97% (95% CI, 96.71 to 96.97). Similarly high performance was also obtained for out-of-sample countries, and no significant performance difference was obtained between genders. Conclusion We present an interpretable artificial intelligence CT analysis tool to diagnose COVID-19 in both symptomatic and asymptomatic patients. Further, our model is able to differentiate COVID-19 GGOs from similar pathologies suggesting that GGOs can be disease-specific.

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Title
Development and validation of chest CT-based imaging biomarkers for early stage COVID-19 screening

Author
Xuanyu Mao, Xiao-Ping Liu, Xu Yang, Jian-Hua Mao, Miao Xiong, Shuang Zhou, Hang Chang.

Abstract
Coronavirus Disease 2019 (COVID-19) is currently a global pandemic, and the early screening of COVID-19 is one of the key factors for COVID-19 control and treatment. Here, we developed and validated chest CT-based imaging biomarkers for COVID-19 patient screening. We identified the vasculature-like signals from CT images and found that, compared to healthy and community acquired pneumonia (CAP) patients, the COVID-19 patients revealed significantly higher abundance of these signals. Furthermore, unsupervised feature learning leads to the discovery of clinical-relevant imaging biomarkers from the vasculature-like signals for accurate and sensitive COVID-19 screening that has been double-blindly validated in an independent hospital (sensitivity: 0.941, specificity: 0.904, AUC: 0.952). Our findings could open a new avenue to assist screening of COVID-19 patients.

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Citation
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Title
AI-based multi-modal integration of clinical characteristics, lab tests and chest CTs improves COVID-19 outcome prediction of hospitalized patients

Author
Nathalie Lassau, Samy Ammari, Emilie Chouzenoux, Hugo Gortais, Paul Herent, Matthieu Devilder, Samer Soliman, Olivier Meyrignac, Marie-Pauline Talabard, Jean-Philippe Lamarque, Remy Dubois, Nicolas Loiseau, Paul Trichelair, Etienne Bendjebbar, Gabriel Garcia, Corinne Balleyguier, Mansouria Merad, Annabelle Stoclin, Simon Jegou, Franck Griscelli, Nicolas Tetelboum, Yingping Li, Sagar Verma, Matthieu Terris, Tasnim Dardouri, Kavya Gupta, Ana Neacsu, Frank Chemouni, Meriem Sefta, Paul Jehanno, Imad Bousaid, Yannick Boursin, Emmanuel Planchet, Mikael Azoulay, Jocelyn Dachary, Fabien Brulport, Adrian Gonzalez, Olivier Dehaene, Jean-Baptiste Schiratti, Kathryn Schutte, Jean-Christophe Pesquet, Hugues Talbot, Elodie Pronier, Gilles
Wainrib, Thomas Clozel, Fabrice Barlesi, Marie-France Bellin, Michael G. B. Blum.

Abstract
With 15% of severe cases among hospitalized patients1, the SARS-COV-2 pandemic has put tremendous pressure on Intensive Care Units, and made the identification of early predictors of severity a public health priority. We collected clinical and biological data, as well as CT scan images and radiology reports from 1,003 coronavirus-infected patients from two French hospitals. Radiologists' manual CT annotations were also available. We first identified 11 clinical variables and 3 types of radiologist-reported features significantly associated with prognosis. Next, focusing on the CT images, we trained deep learning models to automatically segment the scans and reproduce radiologists' annotations. We also built CT image-based deep learning models that predicted severity better than models based on the radiologists' scan reports. Finally, we showed that including CT scan features alongside the clinical and biological data yielded more accurate predictions than using clinical and biological data only. These findings show that CT scans provide insightful early predictors of severity.

Link
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Citation
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Title
A Fully Automatic Deep Learning System for COVID-19 Diagnostic and Prognostic Analysis

Author
Shuo Wang, Yunfei Zha, Weimin Li, Qingxia Wu, Xiaohu Li, Meng Niu, Meiyun Wang, Xiaoming Qiu, Hongjun Li, He Yu, Wei Gong, Yan Bai, Li Li, Yongbei Zhu, Liusu Wang, Jie Tian

Abstract
Coronavirus disease 2019 (COVID-19) has spread globally, and medical resources become insufficient in many regions. Fast diagnosis of COVID-19, and finding high-risk patients with worse prognosis for early prevention and medical resources optimization is important. Here, we proposed a fully automatic deep learning system for COVID-19 diagnostic and prognostic analysis by routinely used computed tomography. We retrospectively collected 5372 patients with computed tomography images from 7 cities or provinces. Firstly, 4106 patients with computed tomography images and gene information were used to pre-train the DL system, making it learn lung features. Afterwards, 1266 patients (924 with COVID-19, and 471 had follow-up for 5+ days; 342 with other pneumonia) from 6 cities or provinces were enrolled to train and externally validate the performance of the deep learning system. In the 4 external validation sets, the deep learning system achieved good performance in identifying COVID-19 from other pneumonia (AUC=0.87 and 0.88) and viral pneumonia (AUC=0.86). Moreover, the deep learning system succeeded to stratify patients into high-risk and low-risk groups whose hospital-stay time have significant difference (p=0.013 and 0.014). Without human-assistance, the deep learning system automatically focused on abnormal areas that showed consistent characteristics with reported radiological findings. Deep learning provides a convenient tool for fast screening COVID-19 and finding potential high-risk patients, which may be helpful for medical resource optimization and early prevention before patients show severe symptoms.

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Citation
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Title
Pulmonary Fibrosis Secondary to COVID-19: A Call to Arms?

Author
Paolo Spagnolo, Elisabetta Balestro, Stefano Aliberti, Elisabetta Cocconcelli, Davide Biondini, Giovanni Della Casa, Nicola Sverzellati, Toby M Maher

Abstract
As of May 6, 2020, nearly 3·7 million people have been infected and around 260 000 people have died from coronavirus disease 2019 (COVID-19) worldwide.1 Almost all COVID-19-related serious consequences feature pneumonia.2 In the first large series of hospitalised patients (n=138) with COVID-19 in Wuhan, China, chest CT showed bilateral ground glass opacities with or without consolidation and with lower lobe predilection in all patients.3 In this series, 36 (26%) patients required intensive care, of whom 22 (61%) developed acute respiratory distress syndrome (ARDS).3 The mechanisms through which severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causes lung damage are only partly known, but plausible contributors include a cytokine release syndrome triggered by the viral antigen, drug-induced pulmonary toxicity, and high airway pressure and hyperoxia-induced acute lung injury secondary to mechanical ventilation. To date, about 1·2 million people worldwide have recovered from COVID-19, but there remains concern that some organs, including the lungs, might have long-term impairment following infection (figure). No post-discharge imaging or functional data are available for patients with COVID-19.

Link
https://www.thelancet.com/journals/lanres/article/PIIS2213-2600(20)30222-8/fulltext#articleInformation

Citation
https://doi.org/10.1016/S2213-2600(20)30222-8

Title
Diagnostic Tools for Coronavirus Disease (COVID-19): Comparing CT and RT-PCR Viral Nucleic Acid Testing

Author
Joseph V Waller, Parveer Kaur, Amy Tucker, Keldon K Lin, Michael J Diaz, Travis S Henry, Michael Hope

Abstract
OBJECTIVE. Multiple studies suggest CT should be a primary diagnostic tool for coronavirus disease (COVID-19) because they reported sensitivities with CT far superior to that of reverse transcriptase polymerase chain reaction (RT-PCR) testing. This review aimed to assess these reports and found chest CT to have a clinical utility that is limited, particularly for patients who show no symptoms and patients who are screened early in disease progression. CONCLUSION. CT has limited sensitivity for COVID-19 and a lower specificity than RT-PCR testing, and it carries a risk of exposing providers to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Chest CT should be considered a supplemental diagnostic tool, particularly for patients who show symptoms.

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https://pubmed.ncbi.nlm.nih.gov/32412790/

Citation
DOI: 10.2214/AJR.20.23418

Title
Chest CT for Detecting COVID-19: A Systematic Review and Meta-Analysis of Diagnostic Accuracy

Author
Buyun Xu, Yangbo Xing, Jiahao Peng, Zhaohai Zheng, Weiliang Tang, Yong Sun, Chao Xu, Fang Peng

Abstract
Objective: The purpose of this article was to perform a systematic review and meta-analysis regarding the diagnostic test accuracy of chest CT for detecting coronavirus disease 2019 (COVID-19).
Methods: PubMed, Embase, Web of Science, and CNKI were searched up to March 12, 2020. We included studies providing information regarding diagnostic test accuracy of chest CT for COVID-19 detection. The methodological quality was assessed using the Quality Assessment of Diagnostic Accuracy Studies-2 tool. Sensitivity and specificity were pooled.
Results: Sixteen studies (n = 3186 patients) were included. The risks of bias in all studies were moderate in general. Pooled sensitivity was 92% (95% CI = 86-96%), and two studies reported specificity (25% [95% CI = 22-30%] and 33% [95% CI = 23-44%], respectively). There was substantial heterogeneity according to Cochran's Q test ($p < 0.01$) and Higgins I2 heterogeneity index (96% for sensitivity). After dividing the studies into two groups based on the study site, we found that the sensitivity of chest CT was great in Wuhan (the most affected city by the epidemic) and the sensitivity values were very close to each other (97%, 96%, and 99%, respectively). In the regions other than Wuhan, the sensitivity varied from 61 to 98%.
Conclusion: Chest CT offers the great sensitivity for detecting COVID-19, especially in a region with severe epidemic situation. However, the specificity is low. In the context of emergency disease control, chest CT provides a fast, convenient, and effective method to early recognize suspicious cases and might contribute to confine epidemic.
Key points: • Chest CT has a high sensitivity for detecting COVID-19, especially in a region with severe epidemic, which is helpful to early recognize suspicious cases and might contribute to confine epidemic.

Link
https://pubmed.ncbi.nlm.nih.gov/32415585/

Citation
Eur Radiol
. 2020 May 15;1-8. doi: 10.1007/s00330-020-06934-2. Online ahead of print.

Title
Diagnostic power of chest CT for COVID-19: to screen or not to screen

Author
De Smet K, De Smet D, Demedts I, Bouckaert B, Ryckaert T, Laridon E, Heremans B, Vandenbulcke R, Gryspeerdt S, Martens GA.

Abstract
Background: chest CT is increasingly used for COVID-19 screening in healthcare systems with limited SARS-CoV-2 PCR capacity. Its diagnostic value was supported by studies with methodological concerns and its use is controversial. Here we investigated its potential to diagnose COVID-19 in symptomatic patients and to screen asymptomatic patients in a prospective study with minimal selection bias. Methods: From March 19, 2020 to April 20, 2020 we performed parallel SARS-CoV-2 PCR and CT with categorization of COVID-19 suspicion by CO-RADS, in 859 patients with COVID-19 symptoms and 1138 controls admitted to the hospital for COVID-19 unrelated medical urgencies. CT-CORADS was categorized on a 5-point scale from 1 (very low suspicion) to 5 (very high suspicion). AUC under ROC curve were calculated in symptomatic versus asymptomatic patients to predict positive SARS-CoV-2 positive PCR and likelihood ratios for each CO-RADS score were used for rational selection of diagnostic thresholds. Findings: CT-CORADS had significant (P<0.0001) diagnostic power in both symptomatic (AUC=0.891) and asymptomatic (AUC=0.700) patients hospitalized during SARS-CoV-2 peak prevalence. In symptomatic patients (41.7% PCR+), CO-RADS ≥ 3 detected positive PCR with high sensitivity (89.1%) and 72.5% specificity. In asymptomatic patients (5.3% PCR+), a CO-RADS score ≥ 3 detected SARS-CoV-2 infection with low sensitivity (45.0%) but high specificity (88.8%). Interpretation: CT-CORADS has meaningful diagnostic power in symptomatic patients, supporting its application for time-sensitive triage. Sensitivity in asymptomatic patients is insufficient to justify its use as screening approach. Incidental detection of CO-RADS ≥ 3 in asymptomatic patients should trigger reflex testing for respiratory pathogens.

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Title
Computed Tomography Features of Coronavirus Disease 2019 (COVID-19): A Review for Radiologists

Author
Nikhil Goyal, Michael Chung, Adam Bernheim, Graham Keir, Xueyan Mei, Mingqian Huang, Shaolin Li, Jeffrey P Kanne

Abstract
Coronavirus Disease 2019 (COVID-19) pneumonia has become a global pandemic. Although the rate of new infections in China has decreased, currently, 169 countries report confirmed cases, with many nations showing increasing numbers daily. Testing for COVID-19 infection is performed via reverse transcriptase polymerase chain reaction, but availability is limited in many parts of the world. The role of chest computed tomography is yet to be determined and may vary depending on the local prevalence of disease and availability of laboratory testing. A common but nonspecific pattern of disease with a somewhat predictable progression is seen in patients with COVID-19. Specifically, patchy ground-glass opacities in the periphery of the lower lungs may be present initially, eventually undergoing coalescence, consolidation, and organization, and ultimately showing features of fibrosis. In this article, we review the computed tomography features of COVID-19 infection. Familiarity with these findings and their evolution will help radiologists recognize potential COVID-19 and recognize the significant overlap with other causes of acute lung injury.

Link
https://journals.lww.com/thoracicimaging/Abstract/9000/Computed_Tomography_Features_of_Coronavirus.99410.aspx

Citation
Journal of Thoracic Imaging: May 15, 2020 - Volume Publish Ahead of Print - Issue -
doi: 10.1097/RTI.0000000000000527

Title
CT Features of Coronavirus Disease (COVID-19) in 30 Pediatric Patients

Author
Sharon Steinberger, Bin Lin, Adam Bernheim, Michael Chung, Yuantong Gao, Zongyu Xie, Tongtong Zhao, Junli Xia, Xueyan Mei, Brent P Little

Abstract
OBJECTIVE. The purpose of this study is to characterize the CT findings of 30 children from mainland China who had laboratory-confirmed coronavirus disease (COVID-19). Although recent American College of Radiology recommendations assert that CT should not be used as a screening or diagnostic tool for patients with suspected COVID-19, radiologists should be familiar with the imaging appearance of this disease to identify its presence in patients undergoing CT for other reasons. MATERIALS AND METHODS. We retrospectively reviewed the CT findings and clinical symptoms of 30 pediatric patients with laboratory-confirmed COVID-19 who were seen at six centers in China from January 23, 2020, to February 8, 2020. Patient age ranged from 10 months to 18 years. Patients older than 18 years of age or those without chest CT examinations were excluded. Two cardiothoracic radiologists and a cardiothoracic imaging fellow characterized and scored the extent of lung involvement. Cohen kappa coefficient was used to calculate interobserver agreement between the readers. RESULTS. Among children, CT findings were often negative (77%). Positive CT findings seen in children included ground-glass opacities with a peripheral lung distribution, a crazy paving pattern, and the halo and reverse halo signs. There was a correlation between increasing age and increasing severity of findings, consistent with reported symptomatology in children. Eleven of 30 patients (37%) underwent follow-up chest CT, with 10 of 11 examinations (91%) showing no change, raising questions about the utility of CT in the diagnosis and management of COVID-19 in children. CONCLUSION. The present study describes the chest CT findings encountered in children with COVID-19 and questions the utility of CT in the diagnosis and management of pediatric patients.

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https://www.ajronline.org/doi/full/10.2214/AJR.20.23145

Citation
American Journal of Roentgenology: 1-9. 10.2214/AJR.20.23145

Title
False Negative Chest X-Rays in Patients Affected by COVID-19 Pneumonia and Corresponding Chest CT Findings

Author
M Cellina, M Orsi, T Toluian, C Valenti Pittino, G Oliva

Abstract
Due to the wide availability, rapid execution, low cost, and possibility of being acquired at the patient's bed, chest X-Ray is a fundamental tool in the diagnosis, follow-up and evaluation of the treatment effectiveness of patients with pneumonia, also in the context of COVID-19 infection. However, false negative cases are possible. We report 4 cases of false negative chest X-Rays, in patients who were diagnosed positive for COVID-19 by real-time transverse-transcript-polymerase chain reaction (RT-PCR), and executed chest unenhanced CTs just after the X-Rays, demonstrating signs of COVID-19 pneumonia.

Link
https://www.sciencedirect.com/science/article/pii/S1078817420300699

Citation
https://doi.org/10.1016/j.radi.2020.04.017

Title
CT Scanning in Suspected Stroke or Head Trauma: Is It Worth to Go the Extra Mile and Include the Chest to Screen for COVID-19 Infection?

Author
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Abstract
Background and purpose: Chest CT may be used as a tool for rapid coronavirus disease 2019 (COVID-19) detection. Our aim was to investigate the value of additional chest CT for detection of coronavirus 19 (COVID-19) in patients who undergo head CT for suspected stroke or head trauma in a COVID-19-endemic region.
Materials and methods: Our study included 27 patients (mean age, 74 years; range, 54-90 years; 20 men) who underwent head CT for suspected stroke (n = 21) or head trauma (n = 6), additional chest CT for COVID-19 detection, and real-time reverse transcriptase polymerase chain reaction testing in a COVID-19-endemic region. Sensitivity, specificity, and negative and positive predictive values of chest CT in detecting COVID-19 were calculated.
Results: Final neurologic diagnoses were ischemic stroke (n = 11), brain contusion (n = 5), nontraumatic intracranial hemorrhage (n = 2), brain metastasis (n = 1), and no primary neurologic disorder (n = 8). Symptoms of possible COVID-19 infection (ie, fever, cough, and/or shortness of breath) were present in 20 of 27 (74%) patients. Seven of 27 patients (26%) had real-time reverse transcriptase polymerase chain reaction confirmed-COVID-19 infection. Chest CT results were 6 true-positives, 15 true-negatives, 5 false-positives, and 1 false-negative. Diagnostic performance values of chest CT were a sensitivity of 85.7%, specificity of 75.0%, negative predictive value of 93.8%, and positive predictive value of 54.6%.
Conclusions: The sensitivity of additional chest CT is fairly high. However, a negative result does not exclude COVID-19. The positive predictive value is poor. Correlation of chest CT results with epidemiologic history and clinical presentation, along with real-time reverse transcriptase polymerase chain reaction, is needed for confirmation.

Link
http://www.ajnr.org/content/early/2020/05/21/ajnr.A6607.abstract

Citation
American Journal of Neuroradiology May 2020, DOI: https://doi.org/10.3174/ajnr.A6607

Title
Neurologically Devastating Intraparenchymal Hemorrhage in COVID-19 Patients on Extracorporeal Membrane Oxygenation: A Case Series

Author
Sabrina M Heman-Ackah, YouRong Sophie Su, Michael Spadola, Dmitriy Petrov, H Isaac Chen, James Schuster, Timothy Lucas

Abstract
Background and importance: Extracorporeal membrane oxygenation (ECMO) represents a life-saving therapy in cases of refractory hypoxia and has been utilized in patients suffering from the most severe forms of coronavirus disease 2019 (COVID-19). A strikingly high mortality rate of 94% was described in early reports of patients with COVID-19 transitioned to ECMO. Later case reports and series demonstrating successful recovery from COVID-19 after ECMO have revived interest in this therapeutic modality, including the recent approval of ECMO for COVID-19 patients by the Food and Drug Administration (FDA). Here, we present the first reports of devastating intracranial hemorrhage as a complication of veno-venous (VV) ECMO in two COVID-19 patients.
Clinical presentation: We performed a retrospective analysis of 2 cases of devastating intracranial hemorrhage in patients on VV-ECMO for the treatment of COVID-19. Collected data included clinical history, laboratory results, treatment, and review of all available imaging. Both patients demonstrated activated partial thromboplastin times (aPTT) within an appropriate therapeutic range. No risk factors that clearly predicted likelihood of this complication were identified.
Conclusion: Understanding the complications of ECMO in this cohort and developing therapeutic algorithms to aid in optimal patient selection will be critical in the limited resource setting experienced as a result of global pandemic. We propose the use of head computed tomography (CT) to identify devastating neurological complications as early as possible, aiding in the resource allocation of ECMO machines to the most appropriately selected patients.

Link
https://academic.oup.com/neurosurgery/advance-article/doi/10.1093/neuros/nyaa198/5840444

Citation
Neurosurgery, nyaa198, https://doi.org/10.1093/neuros/nyaa198

Title
Computed Tomography Manifestations in Super Early Stage 2019 Novel Coronavirus Pneumonia

Author
Shan Hu, Zhen Li, Xu Chen, Chang-Hong Liang

Abstract
Background: The recent outbreak of pneumonia cases in Wuhan, PR China, was caused by a novel beta coronavirus, the 2019 novel coronavirus (COVID-19).
Purpose: To summarize chest computed tomography (CT) manifestations of the early stage of COVID-19 infection and provide a piece of reliable imaging evidence for initial screening and diagnosis.
Material and methods: From 10 January 2020 to 10 February 2020, we continuously observed chest CT imaging of 14 patients with clinically suspected new coronavirus infection in the two weeks after onset of symptoms. Ground-glass opacity (GGO), consolidation, reticular pattern, and ground-glass mimic nodules in each patient's chest CT image were recorded.
Results: We enrolled 14 patients, of which nine patients had the infection confirmed by reverse transcription polymerase chain reaction (RT-PCR). Five patients were highly suspected of infection. All cases had epidemiological evidence. GGO was a dominant imaging manifestation in the initial days of infection. GGO performance accounts for 40% in 1- 2 days, 90% in 3- 6 days, and 85% in 7- 10 days. With disease progression, consolidation appeared on follow-up CT. Consolidation performance accounts for 0% in 1- 2 days, 40% in 3- 6 days, and 71% in 7- 10 days. The lesions are mostly near the pleura. The number of lesions and the extent of the lesions increased as the disease progressed.
Conclusion: Patients with novel coronavirus pneumonia have characteristic CT features in the initial stage of infection, which can be used as an essential supplement for nucleic acid examination.

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https://journals.sagepub.com/doi/full/10.1177/0284185120924806

Citation
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Title
Extrapulmonary Manifestations of COVID-19: Radiologic and Clinical Overview

Author
Shima Behzad, Leila Aghaghazvini, Amir Reza Radmard, Ali Gholamrezanezhad

Abstract
COVID-19 is principally a respiratory illness and pulmonary manifestations constitute main presentations of the disease. According to the reported studies, SARS-CoV-2 infection is not limited to the respiratory system and other organs can be also affected. Renal dysfunction, gastrointestinal complications, liver dysfunction, cardiac manifestations, mediastinal findings, neurological abnormalities, and hematological manifestations are among the reported extrapulmonary features. Considering the broad spectrum of clinical manifestations and the increasing worldwide burden of the disease, there is an urgent need to rapidly scale up the diagnostic capacity to detect COVID-19 and its complications. This paper focuses on the most common extrapulmonary manifestations in patients with COVID-19 pneumonia. Further studies are needed to elaborate and confirm the causative relationship between SARS-CoV-2 and the reported extrapulmonary manifestations of COVID-19.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7233216/

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Clin Imaging. 2020 Oct; 66: 35–41.
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Title
CT Imaging Features of 34 Patients Infected With COVID-19

Author
Litao Zhang, Xue Kong, Xiujuan Li, Jianzhong Zhu, Shanping Liu, Weiwei Li, Chunlin Xu, Huanwang Du, Hui Jing, Jiahuan Xu, Tongtong Shi, Yuanzhong Xie

Abstract
Objective: To retrospectively analyze the CT findings in patients infected with Coronavirus disease 2019 (COVID-19).
Materials and methods: The thirty-four cases, 15 females and 19 males, with an age ranging from 7 to 88 years old, confirmed by real-time reverse-transcriptase-polymerase chain reaction (RT-PCR), were used for our study. All thin-section CT scans of the lungs were performed in all of patients. The clinical, laboratory and CT imaging were available to evaluate in all patients.
Results: The patients present with fever (85.29%, n = 29), cough (67.65%, n = 23), fatigue or myalgia (26.47%, n = 9), and pharyngalgia (8.82%, n = 3). The 4 patients (11.76%) with no symptoms were identified during screening for close contacts, who had typical CT findings. On initial CT scans, the bilateral lung involved was shown in 24 cases (70.59%), while 29 (82.35%) cases were distributed in peripheral. The pure ground glass opacity (GGO) was shown in 18 cases (52.94%), the GGO with consolidation was in 12 cases (35.29%), and full consolidation only in 3 cases. The lesion with air bronchogram was seen in 14 (41.18%) cases, with enlarged blood vessel in 17 (50.00%) cases, with crazy-paving pattern in 8 (23.53%) cases, with fine reticular pattern in 4 (11.77%) cases, and with intralesional vacuole sign in 6 (17.65%) cases. The pleural effusion was seen in one patient. Follow-up imaging in 19 patients during the study time window demonstrated mild, moderate or severe progression of disease, as manifested by increasing extent and density of lung opacities.
Conclusions: The bilateral GGO with air bronchogram, enlarged blood vessel, fine reticular pattern, and peripheral distribution are the early CT findings of COVID-19. The crazy-paving pattern and intralesional vacuole sign are the features of progressive stage.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7229931/

Citation
Clin Imaging. 2020 May 16
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Title
The Clinical Manifestations and Chest Computed Tomography Findings of Coronavirus Disease 2019 (COVID-19) Patients in China: A Proportion Meta-Analysis

Author
Joo-Hyun Park , Wook Jang, Sang-Woo Kim, Jeongjun Lee , Yun-Sung Lim , Chang-Gun Cho, Seok-Won Park , Bo Hae Kim

Abstract
Objectives: The objectives of this study were to identify the clinical features and chest computed tomography (CT) findings of coronavirus disease 2019 (COVID-19) patients and to compare the characteristics of patients diagnosed in Wuhan and in other areas of China by integrating the findings reported in previous studies.
Methods: We conducted a proportion meta-analysis to integrate the results of previous studies identified in online databases, and subsequently compared the overlapping of 95% confidence intervals (CIs) between locations of diagnosis. The heterogeneity of the results of the included studies was also demonstrated.
Results: Nine studies with level IV evidence were considered to be eligible for the meta-analysis, and a comparative analysis was only possible between patients diagnosed in Wuhan and outside of Wuhan in China. Fever (84.8%; 95% CI, 78.5% to 90.1%) was identified as the most common clinical manifestation in all COVID-19 patients, and signs of respiratory infection were also frequently present in these patients. When comparing the clinical features according to the location of diagnosis, fever and dyspnea were less frequent in patients diagnosed outside of Wuhan (fever: 78.1%; 95% CI, 73.2% to 82.7%; dyspnea: 3.80%; 95% CI, 0.13% to 12.22%) than in patients diagnosed in Wuhan (fever: 91.7%; 95% CI, 88.0% to 94.8%; dyspnea: 21.1%; 95% CI, 13.2% to 30.3%). The chest CT findings exhibited no significant differences between the groups.
Conclusion: Fever was found to be the most common symptom in COVID-19, and respiratory infection signs were also commonly present. Fever and dyspnea were less frequently observed in the patients diagnosed outside of Wuhan, which should be considered in COVID-19 screening programs. These results may be attributable to the earlier diagnosis of the disease and the younger age of patients outside of Wuhan although further analysis is needed. The role of chest CT in COVID-19 diagnosis is inconclusive based on this study.

Link
https://pubmed.ncbi.nlm.nih.gov/32434310/

Citation
Clin Exp Otorhinolaryngol. 2020 May;13(2):95-105. doi: 10.21053/ceo.2020.00570. Epub 2020 May 1.

Title
High Resolution CT Imaging Dynamic Follow-Up Study of Novel Coronavirus Pneumonia

Author
Xuefang Lu, Wei Gong, Zhoufeng Peng, Feifei Zeng, Fang Liu

Abstract
Objective: To explore the clinical characteristics and dynamic follow-up changes of high resolution CT (HRCT) in 270 patients with Coronavirus Disease 2019 (COVID-19) pneumonia. Methods: Two hundred seventy COVID-19 pneumonia patients were retrospectively analyzed, including 146 males and 124 females, with median age of 51 (9,89). The clinical features, laboratory examination indexes and HRCT evolution findings of 270 COVID-19 pneumonia patients were analyzed. Results: 264 cases (95.74%) were positive at the first time nucleic acid test, 6 cases (2.22%) were negative, after multiple inspections, 270 cases (100%) were positive. According to the number of lung segments involved in the lesion, the lesions range from <30% of the lung area (Common type), 30-50% (Severe type), and> 50% (Critical type). At the first CT exam, 136 cases (50.37%) of the common type, 89 cases (32.96%) of the severe type and 45 cases (16.67%) of the critical type. At the second CT exam, 84 cases (31.11%) of the common type, 103 cases (38.15%) of the severe type and 83 cases (30.74%) of the critical type. In the third CT exam, there were 151 cases (55.93%) of the common type, 86 cases (31.85%) of the severe type and 33 cases (12.22%) of the critical type. The differences in image typing were statistically significant ($P < 0.05$). During this study, a total of 173 patients (64.08%) were recovered after treatment. Conclusion: In some epidemiological backgrounds, CT imaging manifestations and evolutionary characteristics are of great significance for early warning of lung injury, assessment of disease severity, and assistance in clinical typing and post-treatment follow-up.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7212820/

Citation
Front Med (Lausanne). 2020; 7: 168.
Published online 2020 May 4. doi: 10.3389/fmed.2020.00168

Title
Incidental COVID-19 Related Lung Apical Findings on Stroke CTA During the COVID-19 Pandemic

Author
Shingo Kihira, Javin Schefflein, Michael Chung, Keon Mahmoudi, Brian Rigney, Bradley N Delman, J Mocco, Amish Doshi, Puneet Belani

Abstract
Background: Authors have noticed an increase in lung apex abnormalities on CT angiography (CTA) of the head and neck performed for stroke workup during the coronavirus disease 2019 (COVID-19) pandemic.
Objective: To evaluate the incidence of these CTA findings and their relation to COVID-19 infection.
Methods: In this retrospective multicenter institutional review board-approved study, assessment was made of CTA findings of code patients who had a stroke between March 16 and April 5, 2020 at six hospitals across New York City. Demographic data, comorbidities, COVID-19 status, and neurological findings were collected. Assessment of COVID-19 related lung findings on CTA was made blinded to COVID-19 status. Incidence rates of COVID-19 related apical findings were assessed in all code patients who had a stroke and in patients with a stroke confirmed by imaging.
Results: The cohort consisted of a total of 118 patients with mean±SD age of 64.9±15.7 years and 57.6% (68/118) were male. Among all code patients who had a stroke, 28% (33/118) had COVID-19 related lung findings. RT-PCR was positive for COVID-19 in 93.9% (31/33) of these patients with apical CTA findings.Among patients who had a stroke confirmed by imaging, 37.5% (18/48) had COVID-19 related apical findings. RT-PCR was positive for COVID-19 in all (18/18) of these patients with apical findings.
Conclusion: The incidence of COVID-19 related lung findings in stroke CTA scans was 28% in all code patients who had a stroke and 37.5% in patients with a stroke confirmed by imaging. Stroke teams should closely assess the lung apices during this COVID-19 pandemic as CTA findings may be the first indicator of COVID-19 infection.

Link
https://jnis.bmj.com/content/early/2020/05/19/neurintsurg-2020-016188

Citation
Journal of NeuroInterventional Surgery Published Online First: 19 May 2020. doi: 10.1136/neurintsurg-2020-016188

Title
Clinical Characteristics and Changes of Chest CT Features in 307 Patients With Common COVID-19 Pneumonia Infected SARS-CoV-2: A Multicenter Study in Jiangsu, China

Author
Yalei Shang, Chuanjun Xu, Fengli Jiang, Renjun Huang, Yonggang Li, Ying Zhou, Feng Xu, Hui Dai

Abstract
Objective: The study was aimed to describe the clinical characteristics and evaluate the dynamic changes of chest CT features in the first three weeks in the common type fo COVID-19 pneumonia patients in Jiangsu Province.
Methods: 307 patients infected SARS-CoV-2 classified as common type were enrolled in the study. 628 chest CT scans were divided into three groups based on the time interval between symptoms and chest CT scan. The clinical characteristics were descriptively analyzed.The chest CT features were quantitatively evaluated. Mann-Whitney U test was used to test the differences in three groups and between men and women. Spearman rank correlation was used to test the association between the arterial blood gas(ABG) analysis results and chest CT scores.
Results: Fever (69.1%) and cough (62.8%) were common symptoms. 111(36.2%) patients were anorexia. GGO was the most common manifestation of COVID-19 pneumonia, which could be followed by consolidation and fibrosis. Lower lobe or subpleural region was the most common distribution form of lesion. More lung lobes were involved in the third week. Total chest CT scores in the second week were higher than the first week. Fibrosis Scores increased in the second and third week. Total CT score, GGO score and fibrosis score of male patients were significantly higher than female in the second week. Male patients had higher consolidation score and fibrosis score than female in the third week. Total CT score and GGO score had weak to moderate correlation with arterial blood gas indices.
Conclusion: Changes in chest CT were difficult to assess quantitatively in the first third weeks. Male patients recovered slower than female in the second week. Although CT score had correlations with arterial blood gas indices, long-term follow-up of pulmonary function test is needed to determine the recovery of lung.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7207103/

Citation
Int J Infect Dis. 2020 May 8
doi: 10.1016/j.ijid.2020.05.006 [Epub ahead of print]

Title
Chest CT Imaging Characteristics of COVID-19 Pneumonia in Preschool Children: A Retrospective Study

Author
Yang Li, Jianghui Cao, Xiaolong Zhang, Guangzhi Liu, Xiaxia Wu, Baolin Wu

Abstract
Background: Recently, the World Health Organization has declared the coronavirus disease 2019 (COVID-19) outbreak a public health emergency of international concern. So far, however, limited data are available for children. Therefore, we aimed to investigate the clinical and chest CT imaging characteristics of COVID-19 in preschool children.
Methods: From January 26, 2020 to February 20, 2020, the clinical and initial chest CT imaging data of eight preschool children with laboratory-confirmed COVID-19 from two hospitals were retrospectively collected. The chest CT imaging characteristics, including the distribution, shape, and density of lesions, and the pleural effusion, pleural changes, and enlarged lymph nodes were evaluated.
Results: Two cases (25%) were classified as mild type, and they showed no obvious abnormal CT findings or minimal pleural thickening on the right side. Five cases (62.5%) were classified as moderate type. Among these patients, one case showed consolidation located in the subpleural region of the right upper lobe, with thickening in the adjacent pleura; one case showed multiple consolidation and ground-glass opacities with blurry margins; one case displayed bronchial pneumonia-like changes in the left upper lobe; and two cases displayed asthmatic bronchitis-like changes. One case (12.5%) was classified as critical type and showed bronchial pneumonia-like changes in the bilateral lungs, presenting blurred and messy bilateral lung markings and multiple patchy shadows scattered along the lung markings with blurry margins.
Conclusions: The chest CT findings of COVID-19 in preschool children are atypical and various. Accurate diagnosis requires a comprehensive evaluation of epidemiological, clinical, laboratory and CT imaging data.

Link
https://bmcpediatr.biomedcentral.com/articles/10.1186/s12887-020-02140-7

Citation
BMC Pediatr 20, 227 (2020). https://doi.org/10.1186/s12887-020-02140-7

Title
Diagnosis and Treatment of Coronavirus Disease 2019 (COVID-19): Laboratory, PCR, and Chest CT Imaging Findings

Author
Ebrahim Abbasi-Oshaghi, Fatemeh Mirzaei, Farhad Farahani, Iraj Khodadadi, Heidar Tayebinia

Abstract
Since December 2019, more than 3 million cases of coronavirus disease 2019 (COVID-19) and about 200,000 deaths have been reported worldwide. The outbreak of this novel disease has become a global health emergency and continues to rapidly spread around the world. Based on the clinical data, approved cases are divided into four classes including mild, moderate, severe, and critical. About 5% of cases were considered critically ill and 14% were considered to have the severe classification of the disease. In China, the fatality rate of this infection was about 4%. This review focuses on currently available information on the etiology, clinical symptoms, diagnosis, and mechanism of action of COVID-19. Furthermore, we present an overview of diagnostic approaches and treatment of this disease according to available findings. This review paper will help the physician to diagnose and successfully treat COVID-19.

Link
https://pubmed.ncbi.nlm.nih.gov/32422384/

Citation
Int J Surg
. 2020 May 15;S1743-9191(20)30401-5. doi: 10.1016/j.ijsu.2020.05.018.

Title
A Review on the Use of Artificial Intelligence for Medical Imaging of the Lungs of Patients With Coronavirus Disease 2019

Author
Rintaro Ito, Shingo Iwano, Shinji Naganawa

Abstract
The results of research on the use of artificial intelligence (AI) for medical imaging of the lungs of patients with coronavirus disease 2019 (COVID-19) has been published in various forms. In this study, we reviewed the AI for diagnostic imaging of COVID-19 pneumonia. PubMed, arXiv, medRxiv, and Google scholar were used to search for AI studies. There were 15 studies of COVID-19 that used AI for medical imaging. Of these, 11 studies used AI for computed tomography (CT) and 4 used AI for chest radiography. Eight studies presented independent test data, 5 used disclosed data, and 4 disclosed the AI source codes. The number of datasets ranged from 106 to 5941, with sensitivities ranging from 0.67-1.00 and specificities ranging from 0.81-1.00 for prediction of COVID-19 pneumonia. Four studies with independent test datasets showed a breakdown of the data ratio and reported prediction of COVID-19 pneumonia with sensitivity, specificity, and area under the curve (AUC). These 4 studies showed very high sensitivity, specificity, and AUC, in the range of 0.9-0.98, 0.91-0.96, and 0.96-0.99, respectively.

Link
https://europepmc.org/article/med/32436845

Citation
Diagnostic and Interventional Radiology (Ankara, Turkey), 21 May 2020,
DOI: 10.5152/dir.2019.20294

Title
CT Findings of COVID-19 in Follow-Up: Comparison Between Progression and Recovery

Author
Chun-Shuang Guan, Lian-Gui Wei, Ru-Ming Xie, Zhi-Bin Lv, Shuo Yan, Zi-Xin Zhang, Bu-Dong Chen

Abstract
Purpose: We aimed to retrospectively analyze the imaging changes detected in the follow-up of coronavirus disease 2019 (COVID-19) patients on thin-section computed tomography (CT).
Methods: We included 54 patients diagnosed with COVID-19. The mean interval between the initial and follow-up CT scans was 7.82±3.74 days. Patients were divided into progression and recovery groups according to their outcomes. We evaluated CT images in terms of distribution of lesions and imaging manifestations. The manifestations included ground-glass opacity (GGO), crazy-paving pattern, consolidation, irregular line, and air bronchogram sign.
Results: COVID-19 lesions showed mainly subpleural distribution, which was accompanied by bronchovascular bundle distribution in nearly 30% of the patients. The lower lobes of both lungs were the most commonly involved. In the follow-up, the progression group showed more involvement of the upper lobe of the left lung than the recovery group. GGO was the most common sign. As the disease progressed, round GGO decreased and patchy GGO increased. On follow-up CT, consolidation increased in the progression group while decreasing in the recovery group. Air bronchogram sign was more commonly observed at the initial examination (90.9%) than at follow-up (30%) in the recovery group, but there was no significant change in the progression group. Pleural effusion and lymphadenopathy were absent in the initial examination, but pleural effusion was observed in three cases after follow-up.
Conclusion: As COVID-19 progressed, round GGOs tended to evolve into patchy GGOs, consolidation increased, and pleural effusion could be occasionally observed. As COVID-19 resolved, the crazy-paving pattern and air bronchogram significantly decreased.

Link
https://www.x-mol.com/paper/1263737242056237056?adv

Citation
DOI: 10.5152/dir.2019.20176

Title
Lobar Distribution of COVID-19 Pneumonia Based on Chest Computed Tomography Findings; A Retrospective Study

Author
Sara Haseli, Nastaran Khalili, Mehrdad Bakhshayeshkaram, Morteza Sanei Taheri

Abstract
Introduction: Computed tomography (CT) imaging has quickly found its place as a beneficial tool in the detection of coronavirus disease 2019 (COVID-19). To date, only a few studies have reported the distribution of lung lesions by segment. This study aimed to evaluate the lobar and segmental distribution of COVID-19 pneumonia based on patients' chest CT scan.
Methods: This was a retrospective study performed on 63 Iranian adult patients with a final diagnosis of COVID-19. All patients had undergone chest CT scan on admission. Demographic data and imaging profile, including segmental distribution, were evaluated. Moreover, a scoring scale was designed to assess the severity of ground-glass opacification (GGO). The relationship of GGO score with age, sex, and symptoms at presentation was investigated.
Results: Among included patients, mean age of patients was 54.2 ±14.9 (range: 26 - 81) years old and 60.3% were male. Overall, the right lower lobe (87.3%) and the left lower lobe (85.7%) were more frequently involved. Specifically, predominant involvement was seen in the posterior segment of the left lower lobe (82.5%). The most common findings were peripheral GGO and consolidation, which were observed in 92.1% and 42.9% of patients, respectively. According to the self-designed GGO scoring scale, about half of the patients presented with mild GGO on admission. GGO score was found to be equally distributed among different sex and age categories; however, the presence of dyspnea on admission was significantly associated with a higher GGO score (p= 0.022). Cavitation, reticulation, calcification, bronchiectasis, tree-in-bud appearance and nodules were not identified in any of the cases.
Conclusion: COVID-19 mainly affects the lower lobes of the lungs. GGO and consolidation in the lung periphery is the imaging hallmark in patients with COVID-19 infection. Absence of bronchiectasis, solitary nodules, cavitation, calcifications, tree-in-bud appearance, and reversed halo-sign indicates that these features are not common findings, at least in the earlier stages.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7212068/

Citation
Arch Acad Emerg Med. 2020; 8(1): e55.
Published online 2020 Apr 18

Title
Imaging Evaluation of COVID-19 in the Emergency Department

Author
Amir Pakray, David Walker, Alexander Figacz, Stephen Kilanowski, Casey Rhodes, Shashin Doshi, Mary Coffey

Abstract
Purpose: The purpose of this study is to elucidate the chest imaging findings of suspected COVID-19 patients presenting to the emergency department and the relationship with their demographics and RT-PCR testing results. Methods: Patients presenting to the ED between March 12 and March 28, 2020, with symptoms suspicious for COVID-19 and subsequent CXR and/or CT exam were selected. Patients imaged for other reasons with findings suspicious for COVID-19 were also included. Demographics, laboratory test results, and history were extracted from the medical record. Descriptive statistics were used to explore the relationship between imaging and these factors. Results: A total of 227 patients from the emergency department were analyzed (224 CXRs and 25 CTs). Of the 192 patients with COVID-19 results, 173 (90.1%) had COVID-19 RT-PCR (+). Abnormal imaging (CXR, 85.7% and/or CT, 100%) was noted in 155 (89.6%) of COVID-19 RT-PCR (+) cases. The most common imaging findings were mixed airspace/interstitial opacities (39.8%) on CXR and peripheral GGOs on CT (92%). The most common demographic were African Americans (76.8%). Furthermore, 97.1% of African Americans were RT-PCR (+) compared to 65.8% of Caucasians. Conclusion: We found a similar spectrum of thoracic imaging findings in COVID-19 patients as previous studies. The most common demographic were African Americans (76.8%). Furthermore, 97.1% of African Americans were RT-PCR (+) compared to 65.8% of Caucasians. Both CT and CXR can accurately identify COVID-19 pneumonitis in 89.6% of RT-PCR (+) cases, 89.5% of false negatives, and 72.7% of cases with no RT-PCR result.

Link
https://pubmed.ncbi.nlm.nih.gov/32449099/

Citation
Emerg Radiol
. 2020 May 25;1-10. doi: 10.1007/s10140-020-01787-0. Online ahead of print.

Title
Any Unique Image Biomarkers Associated With COVID-19?

Author
Jiantao Pu, Joseph Leader, Andriy Bandos, Junli Shi, Pang Du, Juezhao Yu, Bohan Yang, Shi Ke, Youmin Guo, Jessica B Field, Carl Fuhrman, David Wilson, Frank Sciurba, Chenwang Jin

Abstract
Objective: To define the uniqueness of chest CT infiltrative features associated with COVID-19 image characteristics as potential diagnostic biomarkers. Methods: We retrospectively collected chest CT exams including n = 498 on 151 unique patients RT-PCR positive for COVID-19 and n = 497 unique patients with community-acquired pneumonia (CAP). Both COVID-19 and CAP image sets were partitioned into three groups for training, validation, and testing respectively. In an attempt to discriminate COVID-19 from CAP, we developed several classifiers based on three-dimensional (3D) convolutional neural networks (CNNs). We also asked two experienced radiologists to visually interpret the testing set and discriminate COVID-19 from CAP. The classification performance of the computer algorithms and the radiologists was assessed using the receiver operating characteristic (ROC) analysis, and the nonparametric approaches with multiplicity adjustments when necessary. Results: One of the considered models showed non-trivial, but moderate diagnostic ability overall (AUC of 0.70 with 99% CI 0.56-0.85). This model allowed for the identification of 8-50% of CAP patients with only 2% of COVID-19 patients. Conclusions: Professional or automated interpretation of CT exams has a moderately low ability to distinguish between COVID-19 and CAP cases. However, the automated image analysis is promising for targeted decision-making due to being able to accurately identify a sizable subsect of non-COVID-19 cases. Key points: • Both human experts and artificial intelligent models were used to classify the CT scans. • ROC analysis and the nonparametric approaches were used to analyze the performance of the radiologists and computer algorithms. • Unique image features or patterns may not exist for reliably distinguishing all COVID-19 from CAP; however, there may be imaging markers that can identify a sizable subset of non-COVID-19 cases.

Link
https://pubmed.ncbi.nlm.nih.gov/32462445/?from_single_result=Any+Unique+Image+Biomarkers+Associated+With+COVID-19%3F

Citation
Eur Radiol
. 2020 May 28;1-7. doi: 10.1007/s00330-020-06956-w. Online ahead of print.

Title
Brain Imaging Use and Findings in COVID-19: A Single Academic Center Experience in the Epicenter of Disease in the United States

Author
A Radmanesh, E Raz, E Zan, A Derman, M Kaminetzky

Abstract
Coronavirus disease 2019 (COVID-19) is a serious public health crisis and can have neurologic manifestations. This is a retrospective observational case series performed March 1-31, 2020, at New York University Langone Medical Center campuses. Clinical and imaging data were extracted, reviewed, and analyzed. Two hundred forty-two patients with COVID-19 underwent CT or MRI of the brain within 2 weeks after the positive result of viral testing (mean age, 68.7 ± 16.5 years; 150 men/92 women [62.0%/38.0%]). The 3 most common indications for imaging were altered mental status (42.1%), syncope/fall (32.6%), and focal neurologic deficit (12.4%). The most common imaging findings were nonspecific white matter microangiopathy (134/55.4%), chronic infarct (47/19.4%), acute or subacute ischemic infarct (13/5.4%), and acute hemorrhage (11/4.5%). No patients imaged for altered mental status demonstrated acute ischemic infarct or acute hemorrhage. White matter microangiopathy was associated with higher 2-week mortality (P < .001). Our data suggest that in the absence of a focal neurologic deficit, brain imaging in patients with early COVID-19 with altered mental status may not be revealing.

Link
https://pubmed.ncbi.nlm.nih.gov/32467191/?from_single_result=Brain+Imaging+Use+and+Findings+in+COVID-19%3A+A+Single+Academic+Center+Experience+in+the+Epicenter+of+Disease+in+the+United+States

Citation
AJNR Am J Neuroradiol
. 2020 May 28. doi: 10.3174/ajnr.A6610. Online ahead of print.

Title
Assessment of small pulmonary blood vessels in COVID-19 patients using HRCT

Author
Muriel Lins, Jan Vandevenne, Muhunthan Thillai, Ben R Lavon, Maarten Lanclus, Stijn Bonte, Rik Godon, Jan De Backer, Wilfried De Backer.

Abstract
Background: Mounting evidence supports the role of pulmonary hemodynamic alternations in the pathogenesis of COVID-19. Previous studies have demonstrated that changes in pulmonary
blood volumes measured on CT are associated with histopathological markers of pulmonary vascular pruning, suggesting that quantitative HRCT analysis may eventually be useful in the
assessment pulmonary vascular dysfunction more broadly. Methods: Building upon previous work, automated HRCT measures of small blood vessel volume and pulmonary vascular density were developed. Scans from 103 COVID-19 patients and 108 healthy volunteers were analyzed and their results compared, with comparisons made both on lobar and global levels. Results:
Compared to healthy volunteers, COVID-19 patients showed significant reduction in BV5 (pulmonary blood volume contained in blood vessels of <5 mm2) expressed as BV5/(Total pulmonary blood volume) ($p<0.0001$), and significant increases in BV5_10 and BV 10 (pulmonary blood volumes contained in vessels between 5 and 10 mm2 and above 10 mm2, respectively) ($p<0.0001$). These changes were consistent across lobes. Conclusions: COVID-19 patients display striking anomalies in the distribution of blood volume within the pulmonary vascular tree, consistent with increased pulmonary vasculature resistance in the pulmonary vessels below the resolution of HRCT.

Link
https://www.medrxiv.org/content/10.1101/2020.05.22.20108084v1

Citation
doi: https://doi.org/10.1101/2020.05.22.20108084

Title
Combining PCR and CT testing for COVID

Author
Chen Shen, Ron Mark, Nolan J Kagetsu, Anton S Becker, Yaneer Bar-Yam.

Abstract
We analyze the effect of using a screening CT-scan for evaluation of potential COVID-19 infections in order to isolate and perform contact tracing based upon a viral pneumonia diagnosis. RT-PCR is then used for continued isolation based upon a COVID diagnosis. Both the low false negative rates and rapid results of CT-scans lead to dramatically reduced transmission. The reduction in cases after 60 days with widespread use of CT-scan screening compared to PCR by itself is as high as 50×, and the reduction of effective reproduction rate R(t) is 0.20. Our results imply that much more rapid extinction of COVID is possible by combining social distancing with CT-scans and contact tracing.

Link
https://www.medrxiv.org/content/10.1101/2020.05.27.20114736v1

Citation
doi: https://doi.org/10.1101/2020.05.27.20114736

Title
Intensive Care Risk Estimation in COVID-19 Pneumonia Based on Clinical and Imaging Parameters: Experiences From the Munich Cohort

Author
Egon Burian, Friederike Jungmann, Georgios A Kaissis, Fabian K Lohöfer, Christoph D Spinner, Tobias Lahmer, Matthias Treiber, Michael Dommasch, Gerhard Schneider, Fabian Geisler, Wolfgang Huber, Ulrike Protzer, Roland M Schmid, Markus Schwaiger, Marcus R Makowski, Rickmer F Braren

Abstract
The evolving dynamics of coronavirus disease 2019 (COVID-19) and the increasing infection numbers require diagnostic tools to identify patients at high risk for a severe disease course. Here we evaluate clinical and imaging parameters for estimating the need of intensive care unit (ICU) treatment. We collected clinical, laboratory and imaging data from 65 patients with confirmed COVID-19 infection based on polymerase chain reaction (PCR) testing. Two radiologists evaluated the severity of findings in computed tomography (CT) images on a scale from 1 (no characteristic signs of COVID-19) to 5 (confluent ground glass opacities in over 50% of the lung parenchyma). The volume of affected lung was quantified using commercially available software. Machine learning modelling was performed to estimate the risk for ICU treatment. Patients with a severe course of COVID-19 had significantly increased interleukin (IL)-6, C-reactive protein (CRP), and leukocyte counts and significantly decreased lymphocyte counts. The radiological severity grading was significantly increased in ICU patients. Multivariate random forest modelling showed a mean ± standard deviation sensitivity, specificity and accuracy of 0.72 ± 0.1, 0.86 ± 0.16 and 0.80 ± 0.1 and a receiver operating characteristic-area under curve (ROC-AUC) of 0.79 ± 0.1. The need for ICU treatment is independently associated with affected lung volume, radiological severity score, CRP, and IL-6.

Link
https://pubmed.ncbi.nlm.nih.gov/32443442/?from_single_result=Intensive+Care+Risk+Estimation+in+COVID-19+Pneumonia+Based+on+Clinical+and+Imaging+Parameters%3A+Experiences+From+the+Munich+Cohort

Citation
J Clin Med
. 2020 May 18;9(5):E1514. doi: 10.3390/jcm9051514.

Title
Recommendations of the Thoracic Imaging Section of the German Radiological Society for Clinical Application of Chest Imaging and Structured CT Reporting in the COVID-19 Pandemic

Author
Jens Vogel-Claussen, Julia Ley-Zaporozhan, Prerana Agarwal, Jürgen Biederer, Hans-Ulrich Kauczor, Sebastian Ley, Hilmar Kühl, Ullrich G Mueller-Lisse, Thorsten Persigehl, Christopher L Schlett, Dag Wormanns, Gerald Antoch, Okka W Hamer

Abstract
This information provided by the Thoracic Imaging Section of the German Radiological Society is intended to give physicians recommendations on the use of thoracic imaging procedures in the context of the current COVID-19 pandemic. It represents the consensus of the authors based on the previous scientific knowledge and is intended to provide guidance for unified, structured CT reporting if COVID-19 pneumonia is suspected. The recommendations presented correspond to state of knowledge at the time of print and will be updated according to the results of ongoing and future scientific studies.

Link
https://pubmed.ncbi.nlm.nih.gov/32455442/?from_single_result=Recommendations+of+the+Thoracic+Imaging+Section+of+the+German+Radiological+Society+for+Clinical+Application+of+Chest+Imaging+and+Structured+CT+Reporting+in+the+COVID-19+Pandemic

Citation
Rofo
. 2020 May 26. doi: 10.1055/a-1174-8378. Online ahead of print.

Title
Diagnostic performance of CT and its key signs for COVID-19: A systematic review and meta-analysis

Author
Xiuting Wu, Yuhui Zhong, Wanyue Qin, Zhenxi Zhang, Kai Li.

Abstract
Purpose: To evaluate the diagnostic value of chest CT in 2019 novel coronavirus disease (COVID-19), using the reverse transcription polymerase chain reaction（RTPCR） as a reference standard. At the same time, the imaging features of CT in confirmed COVID-19 patients would be summarized. Methods: A comprehensive literature search of 5 electronic databases was performed. The pooled sensitivity, specificity, positive predictive value, and negative predictive value were calculated using the random-effects model and the summary receiver operating characteristic (SROC) curve. We also conducted a meta-analysis to estimate the pooled incidence of the chest CT imaging findings and the 95% confidence interval (95%CI). Meta-regression analysis was used to explore the source of heterogeneity. Results: Overall, 25 articles comprising 4,857 patients were included. The pooled sensitivity of CT was 93% (95% CI, 89-96%) and specificity was 44% (95% CI, 27-62%). The area under the SROC curve was 0.94 (95% CI, 0.91-0.96). For the RT-PCR assay, the pooled sensitivity of the initial test and the missed diagnosis rate after the second-round test were 76% (95% CI: 59-89%; I2=96%) and 26% (95% CI: 14-39%; I2=45%), respectively. According to the subgroup analysis, the diagnostic sensitivity of CT in Hubei was higher than that in other regions. Besides, the most common patterns on CT imaging finding was ground glass opacities (GGO) 58% (95% CI: 49-70%), followed by air bronchogram 51% (95% CI: 31-70%). Lesions were inclined to distribute in peripheral 64% (95% CI: 49-78%), and the incidence of bilateral lung involvement was 69% (95% CI: 58-79%). Conclusions: There were still several cases of missed diagnosis after multiple RT-PCR examinations. In high-prevalence areas, CT could be recommended as an auxiliary screening method for RT-PCR.
Key points: 1. Taking RT-PCR as the reference standard, the pooled sensitivity of CT was 93% (95% CI, 89-96%) and the specificity was 44% (95% CI, 27-62%). The area under the SROC curve was 0.94 (95% CI, 0.91-0.96). 2. For the RT-PCR assay, the pooled sensitivity of the initial test and the missed diagnosis rate after the second-round test were 76% (95% CI: 59-89%) and 26% (95% CI: 14-39%), respectively. 3. GGO was the key sign of the CT imaging, with an incidence of 58% (95% CI: 49-70%) in patients with SARS-CoV-2 infection. Pneumonia lesions were inclined to distribute in peripheral 64% (95% CI: 49-78%) and bilateral 69% (95% CI: 58-79%) lung lobes.

Link
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Citation
doi: https://doi.org/10.1101/2020.05.24.20111773

Title
A Comparison of Clinical and Chest CT Findings in Patients With Influenza A (H1N1) Virus Infection and Coronavirus Disease (COVID-19)

Author
Zhilan Yin, Zhen Kang, Danhui Yang, Shuizi Ding, Hong Luo, Enhua Xiao

Abstract
OBJECTIVE. The purpose of this study was to compare clinical and chest CT findings in patients with influenza A (H1N1) pneumonia and coronavirus disease (COVID-19) pneumonia. MATERIALS AND METHODS. Thirty patients with diagnosed influenza A (H1N1) virus infection (group A) and 30 patients with diagnosed COVID-19 (group B) were retrospectively enrolled in the present study. The clinical characteristics and chest CT findings of the two groups were compared. RESULTS. Fever, cough, expectoration, and dyspnea were the main symptoms in both groups with viral pneumonia, with cough and expectoration more frequently found in group A. Lymphopenia, an elevated C-reactive protein level, and an increased erythrocyte sedimentation rate were common laboratory test findings in the two groups. The median time from symptom onset to CT in group A and group B was 6 and 15 days, respectively, and the median total CT score of the pulmonary lobes involved was 6 and 13, respectively. Linear opacification, crazy-paving sign, vascular enlargement, were more common in group B. In contrast, bronchiectasis and pleural effusion were more common in group A. Other common CT features, including peripheral or peribronchovascular distribution, ground-glass opacities (GGOs), consolidation, subpleural line, air bronchogram, and bronchial distortion, did not show statistical significance. CONCLUSION. On CT, the significant differences between influenza A (H1N1) pneumonia and COVID-19 pneumonia were findings of linear opacification, crazy-paving sign, vascular enlargement, pleural thickening, and pleural effusion, which were more common in patients with COVID-19 pneumonia, and bronchiectasis and pleural effusion, which were more common in patients with influenza A (H1N1) pneumonia. Other imaging findings, including peripheral or peribronchovascular distribution, ground-glass opacities (GGO), consolidation, subpleural line, air bronchogram, and bronchial distortion, were not significantly different between the two patient groups.

Link
https://pubmed.ncbi.nlm.nih.gov/32452731/?from_single_result=A+Comparison+of+Clinical+and+Chest+CT+Findings+in+Patients+With+Influenza+A+%28H1N1%29+Virus+Infection+and+Coronavirus+Disease+%28COVID-19%29

Citation
AJR Am J Roentgenol
. 2020 May 26;1-7. doi: 10.2214/AJR.20.23214. Online ahead of print.

Title
Chest CT-based Differential Diagnosis of 28 Patients With Suspected Corona Virus Disease 2019 (COVID-19)

Author
Sidong Xie, Ziying Lei, Xiuzhen Chen, Weimin Liu, Xiaohong Wang, Yunxu Dong, Yuefei Guo, Yani Duan, Huijuan Cao, Jie Qin, Bingliang Lin

Abstract
Objectives: The chest CT findings that can distinguish patients with corona virus disease 2019 (COVID-19) from those with clinically suspected COVID-19 but subsequently found to be COVID-19 negative have not previously been described in detail. The purpose of this study was to determine the distinctions among patients with COVID-19 by comparing the imaging findings of patients with suspected confirmed COVID-19 and those of patients initially suspected to haveCOVID-19 who were ultimately negative for the disease. Methods: 28 isolated suspected in-patients with COVID-19 were enrolled in this retrospective study from January 22, 2020, to February 6, 2020. 12 patients were confirmed to have positive severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) RNA results, and 16 patients had negative results. The thin-section CT imaging findings and clinical and laboratory data of all the patients were evaluated. Results: There were no significant differences between the 12 confirmed COVID-19 (SARS-Cov-2-positive) patients and 16 SARS-CoV-2-negative patients in epidemiology and most of the clinical features or laboratory data. The CT images showed that the incidence of pure/mixed ground-glass opacities (GGOs) was not different between COVID-19 and SARS-CoV-2-negative patients [9/12 (75.0%) vs 10/16 (62.5%), p = 0.687], but pure/mixed GGOs in the peripheral were more common in patients with COVID-19 [11/12 (91.7%) vs 6/16 (37.5%), p = 0.006]. There were no significant differences in the number of lesions, bilateral lung involvement, large irregular/patchy opacities, rounded opacities, linear opacities, crazy-paving patterns, halo signs, interlobular septal thickening or air bronchograms. Conclusions: Although peripheral pure/mixed GGOs on CT may help distinguish patients with COVID-19 from clinically suspected but negative patients, CT cannot replace RT-PCR testing. Advances in knowledge: Peripheral pure/mixed GGOs on-chest CT findings can be helpful in distinguishing patients with COVID-19 from those with clinically suspected COVID-19 but subsequently found to be COVID-19 negative.

Link
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Citation
Br J Radiol
. 2020 May 26;20200243. doi: 10.1259/bjr.20200243. Online ahead of print.

Title
Preliminary CT Findings of Coronavirus Disease 2019 (COVID-19)

Author
Ning Cui, Xugong Zou, Lin Xu

Abstract
Objectives: Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This paper aims to examine the CT imaging characteristics of COVID-19. Methods: We evaluated CT images obtained between 10 January 2019 and 16 February 2020 at Taihe Hospital. Scans were conducted 2-6 times per patient and the re-testing interval was 2-7 days. Ninety-five patients with positive SARS-CoV-2 nucleic acid test results were included in this study and we retrospectively analysed their CT imaging characteristics.Results: Ninety-five patients underwent 2-3 SARS-CoV-2 nucleic acid tests and received a definitive diagnosis of COVID-19. Fifty-three were male and 42 were female, and their mean age was 42 ± 12 years (range: 10 months to 81 years). Sixty-nine patients (72.6%) experienced fever, fatigue, and dry cough, while 15 (15.8%) had poor appetite and fatigue, and 11 (11.6%) had a dry cough and no fever. On CT imaging, early stage patients (n = 53, 55.8%) showed peripheral subpleural ground-glass opacities; these were mainly local patches (22/53, 41.5%), while some lesions were accompanied by interlobular septal thickening. Thirty-four (35.8%) patients were classified in the 'progression stage' based on CT imaging; these patients typically showed lesions in multiple lung segments and lobes (21/34, 61.8%), and an uneven increase in ground-glass opacity density accompanied by consolidation and grid-like or cord-like shadows(30.5%). Two patients (2.1%) showed a severe presentation on CT. These showed diffuse bilateral lung lesions, mixed ground-glass opacities and consolidation with cord-like interstitial thickening and air bronchograms, entire lung involvement with a "white lung" presentation, and mild pleural effusion. Six patients in remission (6.3%), visible lesion absorption, fibrotic lesions. Based on clinical signs, 71 (74.7%), 22 (23.2%), and 2 (2.1%) patients had mild or moderate, severe, and critical disease, respectively. Within the follow-up period, 93 patients recovered and were discharged, including the 53 early stage patients and 34 progression stage patients. The length of hospitalisation was 7-28 days (mean: 10 ± 3.5 days). On discharge, lesions were significantly reduced in area and had in many cases completely disappeared, while slight pulmonary fibrosis was present in some patients. One severe stage patient was still hospitalised at the end of the follow-up period and the other severe stage patient died. The overall mortality rate was 1.05%. Conclusions: Understanding the CT imaging characteristics of COVID-19 is important for early lesion detection, determining the nature of lesions, and assessing disease severity.

Link
https://pubmed.ncbi.nlm.nih.gov/32464579/?from_sort=date&from_size=100&from_term=Cui+N&from_cauthor_id=32464579&from_pos=1

Citation
Clin Imaging
. 2020 May 12;65:124-132. doi: 10.1016/j.clinimag.2020.04.042. Online ahead of print

Title

Application of CareDose 4D Combined With Karl 3D Technology in the Low Dose Computed Tomography for the Follow-Up of COVID-19

Author

Jiawei Li, Xiao Wang, Xiaolu Huang, Fangxing Chen, Xuesong Zhang, Ying Liu, Guangzuo Luo, Xunhua Xu

Abstract

Background: Coronavirus disease 2019 (COVID-19) is a highly infectious disease caused by the new coronavirus. Previous studies have shown that the chest CT examination plays an important role in the diagnosis and monitoring of COVID-19. However, some patients with COVID-19 had low white blood cell counts and reduced lymphocyte ratios. Multiple CT examinations may cause radiation damages as well as increase the apoptosis of peripheral blood lymphocytes. A new low-dose CT method should be developed because the regular CT may aggravate the disease. Method: Sixty cases were randomly divided into the study group (n = 30) and control group (n = 30). The lung window was reconstructed by Karl 3D iterative technique in the study group. The image quality was subjectively evaluated by two senior chest group diagnostic physicians using a 5-point double-blind method. The value of CT measurement and its standard deviation (SD) was used as an objective evaluation criteria. The volume of CT dose index (CTDIvol), dose length product (DLP) and effective dose (ED) from the two groups were compared and analyzed statistically. Result: There was no significant difference in the occurrence rates of ground glass opacities, consolidation, crazy-paving pattern, fiber cable shadow and axial interstitial thickening between the study group and control group ($p > 0.05$). In addition, no significant difference was found for the subjective score of overall image quality and image noise level (SD) between the two groups ($p > 0.05$). However, significant differences was found in CTDIvol, DLP, and ED between the study group and the control group ($p < 0.05$). The effective dose of the study group was reduced by 76% compared to the control group. Conclusion: CareDose 4D low-dose scanning combined with Karl 3D iterative reconstruction technology can not only greatly reduce the radiation dose, but also provide images that meet the diagnostic criteria of COVID-19, which can be used as a routine method for the follow-up of COVID-19 patients.

Link

https://pubmed.ncbi.nlm.nih.gov/32448136/?from_single_result=Application+of+CareDose+4D+Combined+With+Karl+3D+Technology+in+the+Low+Dose+Computed+Tomography+for+the+Follow-Up+of+COVID-19

Citation

BMC Med Imaging
. 2020 May 24;20(1):56. doi: 10.1186/s12880-020-00456-5.

Title
Systematic Review and Meta-Analysis on the Value of Chest CT in the Diagnosis of Coronavirus Disease (COVID-19): Sol Scientiae, Illustra Nos

Author
Hugo J A Adams, Thomas C Kwee, Derya Yakar, Michael D Hope, Robert M Kwee

Abstract
OBJECTIVE. The purpose of this article is to systematically review and meta-analyze the diagnostic accuracy of chest CT in detecting coronavirus disease (COVID-19). MATERIALS AND METHODS. MEDLINE was systematically searched for publications on the diagnostic performance of chest CT in detecting COVID-19. Methodologic quality was assessed using the Quality Assessment of Diagnostic Accuracy Studies 2 (QUADAS-2) tool. Meta-analysis was performed using a bivariate random-effects model. RESULTS. Six studies were included, comprising 1431 patients. All six studies included patients at high risk of COVID-19, and five studies explicitly reported that they included only symptomatic patients. Mean prevalence of COVID-19 was 47.9% (range, 27.6-85.4%). High or potential risk of bias was present throughout all QUADAS-2 domains in all six studies. Sensitivity ranged from 92.9% to 97.0%, and specificity ranged from 25.0% to 71.9%, with pooled estimates of 94.6% (95% CI, 91.9-96.4%) and 46.0% (95% CI, 31.9-60.7%), respectively. The included studies were statistically homogeneous in their estimates of sensitivity ($p = 0.578$) and statistically heterogeneous in their estimates of specificity ($p < 0.001$). CONCLUSION. Diagnostic accuracy studies on chest CT in COVID-19 suffer from methodologic quality issues. Chest CT appears to have a relatively high sensitivity in symptomatic patients at high risk of COVID-19, but it cannot exclude COVID-19. Specificity is poor. These data, along with other local factors such as COVID-19 prevalence, available real-time reverse transcriptase-polymerase chain reaction tests, staff, hospital, and CT scanning capacity, can be useful to healthcare professionals and policy makers to decide on the utility of chest CT for COVID-19 detection in the hospital setting.

Link
https://pubmed.ncbi.nlm.nih.gov/32478562/?from_sort=date&from_size=100&from_term=Adams+HJA&from_cauthor_id=32478562&from_pos=1

Citation
AJR Am J Roentgenol. 2020 Jun 1;1-9. doi: 10.2214/AJR.20.23391. Online ahead of print.

Title
COVID-19: A Multimodality Review of Radiologic Techniques, Clinical Utility, and Imaging Features

Author
Sayan Manna, Jill Wruble, Samuel Z Maron, Danielle Toussie, Nicholas Voutsinas, Mark Finkelstein, Mario A Cedillo, Jamie Diamond, Corey Eber, Adam Jacobi, Michael Chung, Adam Bernheim.

Abstract
In this article we will review the imaging features of COVID-19 across multiple modalities, including radiography, computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography/computed tomography (PET/CT), and ultrasonography (US). Given that COVID-19 primarily affects the lung parenchyma by causing pneumonia, our directive is to focus on thoracic findings associated with COVID-19. We aim to enhance radiologists' understanding of this disease in order to help guide diagnosis and management.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200210

Citation
https://doi.org/10.1148/ryct.2020200210

Title
CT in Coronavirus Disease 2019 (COVID-19): A Systematic Review of Chest CT Findings in 4410 Adult Patients

Author
Vineeta Ojha, Avinash Mani, Niraj Nirmal Pandey, Sanjiv Sharma, Sanjeev Kumar

Abstract
Objective: The objective of this systematic review was to evaluate the key imaging manifestations of COVID-19 on chest CT in adult patients by providing a comprehensive review of the published literature. Methods: We performed a systematic literature search from the PubMed, Google Scholar, Embase, and WHO databases for studies mentioning the chest CT imaging findings of adult COVID-19 patients. Results: A total of 45 studies comprising 4410 patients were included. Ground glass opacities (GGO), in isolation (50.2%) or coexisting with consolidations (44.2%), were the most common lesions. Distribution of GGOs was most commonly bilateral, peripheral/subpleural, and posterior with predilection for lower lobes. Common ancillary findings included pulmonary vascular enlargement (64%), intralobular septal thickening (60%), adjacent pleural thickening (41.7%), air bronchograms (41.2%), subpleural lines, crazy paving, bronchus distortion, bronchiectasis, and interlobular septal thickening. CT in early follow-up period generally showed an increase in size, number, and density of GGOs, with progression into mixed areas of GGOs plus consolidations and crazy paving, peaking at 10-11 days, before gradually resolving or persisting as patchy fibrosis. While younger adults more commonly had GGOs, extensive/multilobar involvement with consolidations was prevalent in the older population and those with severe disease. Conclusion: This review describes the imaging features for diagnosis, stratification, and follow-up of COVID-19 patients. The most common CT manifestations are bilateral, peripheral/subpleural, posterior GGOs with or without consolidations with a lower lobe predominance. It is pertinent to be familiar with the various imaging findings to positively impact the management of these patients. Key points: • Ground glass opacities (GGOs), whether isolated or coexisting with consolidations, in bilateral and subpleural distribution, are the most prevalent chest CT findings in adult COVID-19 patients. • Follow-up CT shows a progression of GGOs into a mixed pattern, reaching a peak at 10-11 days, before gradually resolving or persisting as patchy fibrosis. • Younger people tend to have more GGOs. Older or sicker people tend to have more extensive involvement with consolidations.

Link
https://pubmed.ncbi.nlm.nih.gov/32474632/?from_sort=date&from_size=100&from_term=Ojha+V&from_cauthor_id=32474632&from_pos=3

Citation
Eur Radiol. 2020 May 30;1-10. doi: 10.1007/s00330-020-06975-7. Online ahead of print.

Title
Relationship Between Clinical Types and Radiological Subgroups Defined by Latent Class Analysis in 2019 Novel Coronavirus Pneumonia Caused by SARS-CoV-2

Author
Xu Fang, Xiao Li, Yun Bian, Xiang Ji, Jianping Lu

Abstract
Objectives: To investigate whether meaningful subgroups sharing the CT features of patients with COVID-19 pneumonia could be identified using latent class analysis (LCA) and explore the relationship between the LCA-derived subgroups and clinical types. Methods: This retrospective review included 499 patients with confirmed COVID-19 pneumonia between February 11 and March 8, 2020. Subgroups sharing the CT features were identified using LCA. Univariate and multivariate logistic regression models were utilized to analyze the association between clinical types and the LCA-derived subgroups. Results: Two radiological subgroups were identified using LCA. There were 228 subjects (45.69%) in class 1 and 271 subjects (54.31%) in class 2. The CT findings of class 1 were smaller pulmonary infection volume, more peripheral distribution, more GGO, more maximum lesion range ≤ 5 cm, a smaller number of lesions, less involvement of lobes, less air bronchogram, less dilatation of vessels, less hilar and mediastinal lymph node enlargement, and less pleural effusion than the CT findings of class 2. Univariate analysis demonstrated that older age, therapy, presence of fever, presence of hypertension, decreased lymphocyte count, and increased CRP levels were significant parameters associated with an increased risk for class 2. Multivariate analyses revealed that the patients with clinically severe type disease had a 1.97-fold risk of class 2 than the patients with clinically moderate-type disease. Conclusions: The demographic and clinical differences between the two radiological subgroups based on the LCA were significantly different. Two radiological subgroups were significantly associated with clinical moderate and severe types. Key points: • Two radiological subgroups were identified using LCA. • Older age, therapy, presence of fever, presence of hypertension, decreased lymphocyte count, and increased CRP levels were significant parameters with an increased risk for class 2 defined by LCA. • Patients with clinically severe type had a 1.97-fold higher risk of class 2 defined by LCA in comparison with patients showing clinically moderate-type disease

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https://pubmed.ncbi.nlm.nih.gov/32474631/?from_sort=date&from_size=100&from_term=Fang+X&from_cauthor_id=32474631&from_pos=13

Citation
Eur Radiol . 2020 May 30;1-12. doi: 10.1007/s00330-020-06973-9. Online ahead of print.

Title
Clinical Characteristics and Chest CT Imaging Features of Critically Ill COVID-19 Patients

Author
Nan Zhang, Xunhua Xu, Ling-Yan Zhou, Gang Chen, Yu Li, Huiming Yin, Zhonghua Sun

Abstract
Objectives: To compare clinical, laboratory, and chest computed tomography (CT) findings in critically ill patients diagnosed with coronavirus disease 2019 (COVID-19) who survived and who died. Methods: This retrospective study reviewed 60 critically ill patients (43 males and 17 females, mean age 64.4 ± 11.0 years) with COVID-19 pneumonia who were admitted to two different clinical centers. Their clinical and medical records were analyzed, and the chest CT images were assessed to determine the involvement of lobes and the distribution of lesions in the lungs between the patients who recovered from the illness and those who died. Results: Compared with recovered patients (50/60, 83%), deceased patients (10/60, 17%) were older (mean age, 70.6 vs. 62.6 years, p = 0.044). C-reactive protein (CRP) (110.8 ± 26.3 mg/L vs 63.0 ± 50.4 mg/L, p < 0.001) and neutrophil-to-lymphocyte ratio (NLR) (18.7 ± 16.6 vs 8.4 ± 7.5, p = 0.030) were significantly elevated in the deceased as opposed to the recovered. Medial or parahilar area involvement was observed in all the deceased patients (10/10, 100%), when compared to only 54% (27/50) in the recovered. Ground-glass opacities (97%), crazy-paving pattern (92%), and air bronchogram (93%) were the most common radiological findings. There was significant difference in diabetes (p = 0.025) and emphysema (p = 0.013), and the odds ratio on a deceased patient having diabetes and emphysema was 6 times and 21 times the odds ratio on a recovered patient having diabetes and emphysema, respectively. Conclusions: Older patients with comorbidities such as diabetes and emphysema, and higher CRP and NLRs with diffuse lung involvement were more likely to die of COVID-19. Key points: • Almost all patients critically ill with COVID-19 pneumonia had five lung lobes involved. • Medial or parahilar area involvement and degree of lung involvement were more serious in the deceased patients when compared with those who recovered from treatment. • Chronic lung disease, e.g., emphysema, diabetes, and higher serum CRP and NLR characterized patients who died of COVID-19.

Link
https://pubmed.ncbi.nlm.nih.gov/32474629/?from_sort=date&from_size=100&from_term=Zhang+N&from_cauthor_id=32474629&from_pos=30

Citation
Eur Radiol. 2020 May 30;1-10. doi: 10.1007/s00330-020-06955-x. Online ahead of print.

Title
Chest CT Features of Coronavirus Disease 2019 (COVID-19) Pneumonia: Key Points for Radiologists

Author
Marina Carotti, Fausto Salaffi, Piercarlo Sarzi-Puttini, Andrea Agostini, Alessandra Borgheresi, Davide Minorati, Massimo Galli, Daniela Marotto, Andrea Giovagnoni

Abstract
COVID-19 is an emerging infection caused by a novel coronavirus that is moving so rapidly that on 30 January 2020 the World Health Organization declared the outbreak a Public Health Emergency of International Concern and on 11 March 2020 as a pandemic. An early diagnosis of COVID-19 is crucial for disease treatment and control of the disease spread. Real-time reverse-transcription polymerase chain reaction (RT-PCR) demonstrated a low sensibility; therefore chest computed tomography (CT) plays a pivotal role not only in the early detection and diagnosis, especially for false negative RT-PCR tests, but also in monitoring the clinical course and in evaluating the disease severity. This paper reports the CT findings with some hints on the temporal changes over the course of the disease: the CT hallmarks of COVID-19 are bilateral distribution of ground glass opacities with or without consolidation in the posterior and peripheral lung, but the predominant findings in later phases include consolidations, linear opacities, "crazy-paving" pattern, "reversed halo" sign and vascular enlargement. The CT findings of COVID-19 overlap with the CT findings of other diseases, in particular the viral pneumonia including influenza viruses, parainfluenza virus, adenovirus, respiratory syncytial virus, rhinovirus, human metapneumovirus, etc. There are differences as well as similarities in the CT features of COVID-19 compared with those of the severe acute respiratory syndrome. The aim of this article is to review the typical and atypical CT findings in COVID-19 patients in order to help radiologists and clinicians to become more familiar with the disease.

Link
https://pubmed.ncbi.nlm.nih.gov/32500509/?from_sort=date&from_size=100&from_term=Carotti+M&from_cauthor_id=32500509&from_pos=1

Citation
Radiol Med. 2020 Jun 4;1-11. doi: 10.1007/s11547-020-01237-4. Online ahead of print.

Title
Disposable Isolation Device to Reduce COVID-19 Contamination During CT Scanning

Author
Amel Amalou, Baris Turkbey, Sheng Xu, Evrim Turkbey, Peng An, Gianpaolo Carrafiello, Anna Maria Ierardi, Robert Suh, Hayet Amalou, Bradford J Wood

Abstract
Center for Interventional Oncology, Radiology and Imaging Sciences, NIH Clinical Center and National Cancer Institute, Center for Cancer Research, National Institutes of Health, Bethesda, MD 20892.
Rationale and objectives: The use of chest computed tomography (CT) in the era of the COVID-19 pandemic raises concern regarding the transmission risks to patients and staff caused by CT room contamination. Meanwhile the Center for Disease Control guidance for air exchange in between patients may heavily impact workflows. To design a portable custom isolation device to reduce imaging equipment contamination during a pandemic. Materials and methods: Center for Disease Control air exchange guidelines and requirements were reviewed. Device functional requirements were outlined and designed. Engineering requirements were reviewed. Methods of practice and risk mitigation plans were outlined including donning and doffing procedures and failure modes. Cost impact was assessed in terms of CT patient throughput. Results: CT air exchange solutions and alternatives were reviewed. Multiple isolation bag device designs were considered. Several designs were custom fabricated, prototyped and reduced to practice. A final design was tested on volunteers for comfort, test-fit, air seal, and breathability. Less than 14 times enhanced patient throughput was estimated, in an ideal setting, which could more than counterbalance the cost of the device itself. Conclusion: A novel isolation bag device is feasible for use in CT and might facilitate containment and reduce contamination in radiology departments during the COVID Pandemic.

Link
https://pubmed.ncbi.nlm.nih.gov/32499157/?from_sort=date&from_size=100&from_term=Amalou+A&from_cauthor_id=32499157&from_pos=1

Citation
Acad Radiol. 2020 May 25;S1076-6332(20)30293-2. doi: 10.1016/j.acra.2020.05.017. Online ahead of print.

Title
Incidental CT Findings in the Lungs in COVID-19 Patients Presenting With Abdominal Pain

Author
Nicholas Voutsinas, Danielle Toussie, Adam Jacobi, Adam Bernheim, Michael Chung

Abstract
As the 2019 novel coronavirus disease (COVID-19) continues to spread, some patients are presenting with abdominal symptoms without respiratory complaints. Our case series documents four patients who presented with abdominal symptoms whose abdominopelvic CT revealed incidental pulmonary parenchymal findings in the imaged lung bases and were subsequently confirmed positive for COVID-19 via laboratory testing. It remains to be seen whether these patients will eventually develop respiratory symptoms. While it is possible that the patients' abdominal complaints are coincidental with CT findings, it is interesting that patients can have such extensive incidental disease in the lungs on CT without respiratory symptoms.

Link
https://pubmed.ncbi.nlm.nih.gov/32492557/?from_sort=date&from_size=100&from_term=Voutsinas+N&from_cauthor_id=32492557&from_pos=1

Citation
Clin Imaging. 2020 May 28;67:1-4. doi: 10.1016/j.clinimag.2020.05.021.

Title

Pulmonary Thromboembolic Disease in Patients with COVID-19 Undergoing Computed Tomography Pulmonary Angiography (CTPA): Incidence and Relationship with Pulmonary Parenchymal Abnormalities

Author

Cheng Fang, Giorgio Garzillo, Bhavna Batohi, James T H Teo, Marko Berovic, Paul S Sidhu, Hasti Robbie.

Abstract

Purpose: This study aims to report the incidence, severity and extent of pulmonary thromboembolic disease (PTD) in patients with confirmed COVID-19 who have undergone CT pulmonary angiography (CTPA) in a tertiary centre. Materials and Methods: This is a retrospective analysis of all patients undergoing CTPA between 23rd March 2020 and 19th April 2020 in a tertiary centre. The presence of PTD, location and involved pulmonary lobes were documented. The pattern and extent of pulmonary parenchymal abnormalities including the presence of fibrosis, lymph node enlargement and pleural effusion were evaluated by two experienced observers independently and consensus was achieved for the most disparate results. Inter-observer agreement was assessed using Kappa statistics. Student t-test, Chi square and Mann-Whitney U tests were used to compare imaging features between PTD and non-PTD sub-groups. Results: During the study period, 2157 patients were confirmed with COVID-19, 297/2157 (13.8%) had CT imaging, 100/2157 (4.6%) were CTPA studies, 93 studies were analysed, excluding suboptimal studies. Overall incidence of PTD was 41/93 (44%) with a third of patients showing segmental and subsegmental PTD (n=28/93, 30%,). D-dimer was elevated in 90/93 (96.8%) of cases. High Wells' score did not differentiate between PE and non-PE groups (p=0.801). The inter-observer agreement was fair (Kappa=0.659) for parenchymal pattern and excellent (Kappa = 0.816) for severity. Lymph node enlargement was found in 34/93 of cases (36.6%) with 29/34 (85.3%) showing no additional source of infection. Fibrosis was seen in 16/93 (17.2%) of cases, mainly demonstrating fibrotic organising pneumonia. Conclusion: There is a high incidence of PTD in COVID -19 patients undergoing CTPA, complicated by lack of a valid risk stratification tool. Our data indicates a much higher suspicion of PTD is needed in severe COVID-19 patients. The concomitant presence of fibrotic features on CT indicates the need for follow-up for evaluation of chronic pulmonary complications.

Link

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Citation

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Title
Development and Evaluation of an AI System for COVID-19 Diagnosis

Author
Cheng Jin, Weixiang Chen, Yukun Cao, Zhanwei Xu, Zimeng Tan, Xin Zhang, Lei Deng, Chuansheng Zheng, Jie Zhou, Heshui Shi, Jianjiang Feng.

Abstract
Early detection of COVID-19 based on chest CT will enable timely treatment of patients and help control the spread of the disease. With rapid spreading of COVID-19 in many countries, however, CT volumes of suspicious patients are increasing at a speed much faster than the availability of human experts. We proposed an artificial intelligence (AI) system for fast COVID-19 detection and performed extensive statistical analysis of CTs of COVID-19 based on the AI system. We developed and evaluated our system on a large dataset with more than 10 thousand CT volumes from COVID-19, influenza-A/B, non- viral community acquired pneumonia (CAP) and non-pneumonia subjects. In such a difficult multi-class diagnosis task, our deep convolutional neural network-based system is able to achieve an area under the receiver operating characteristic curve (AUC) of 97.17%, a sensitivity of 90.19%, and a specificity of 95.76% for COVID-19 on internal test cohort of 3,203 scans and AUC of 97.77% on the publicly available CC-CCII database with 1,943 test samples. In a reader study involving five radiologists, the AI system outperforms all of radiologists in more challenging tasks at a speed of two orders of magnitude above them. Diagnosis performance of chest x-ray (CXR) is compared. Detailed interpretation of deep network is also performed to relate AI results with CT findings. The code is available at https://github.com/ChenWWWeixiang/diagnosis_covid19.

Link
https://www.medrxiv.org/content/10.1101/2020.03.20.20039834v3

Citation
doi: https://doi.org/10.1101/2020.03.20.20039834

Title
CT-based COVID-19 Triage: Deep Multitask Learning Improves Joint Identification and Severity Quantification

Author
Mikhail Goncharov, Maxim Pisov, Alexey Shevtsov, Boris Shirokikh, Anvar Kurmukov, Ivan Blokhin, Valeria Chernina, Alexander Solovev, Victor Gombolevskiy, Sergey Morozov, Mikhail Belyaev.

Abstract
The current COVID-19 pandemic overloads healthcare systems, including radiology departments. Though several deep learning approaches were developed to assist in CT analysis, nobody considered study triage directly as a computer science problem. We describe two basic setups: Identification of COVID-19 to prioritize studies of potentially infected patients to isolate them as early as possible; Severity quantification to highlight studies of severe patients and direct them to a hospital or provide emergency medical care. We formalize these tasks as binary classification and estimation of affected lung percentage. Though similar problems were well-studied separately, we show that existing methods provide reasonable quality only for one of these setups. To consolidate both triage approaches, we employ a multitask learning and propose a convolutional neural network to combine all available labels within a single model. We train our model on approximately 2000 publicly available CT studies and test it with a carefully designed set consisting of 33 COVID patients, 32 healthy patients, and 36 patients with other lung pathologies to emulate a typical patient flow in an out-patient hospital. The developed model achieved 0.951 ROC AUC for Identification of COVID-19 and 0.98 Spearman Correlation for Severity quantification. We release all the code and create a public leaderboard, where other community members can test their models on our dataset.

Link
https://arxiv.org/abs/2006.01441

Citation
arXiv:2006.01441 [eess.IV](or arXiv:2006.01441v1 [eess.IV]

Title
The Chest CT Features of Coronavirus Disease 2019 (COVID-19) in China: A Meta-analysis of 19 Trials

Author
Haitao Yang, Yuzhu Lan, Xiujuan Yao, Sheng Lin, Baosong Xie.

Abstract
Objective: This study aimed to summarize the characteristics of chest CT imaging in Chinese patients with Coronavirus Disease 2019 (COVID-19) to provide reliable evidence for further guiding clinical routine. Methods: PubMed, Embase and Web of Science databases were thoroughly searched to identified relevant articles involving the features of chest CT imaging in Chinese patients with COVID-19. All data were analyzed utilizing R software version i386 4.0.0. Random-effects models were employed to calculate pooled mean differences. Results: 19 trials incorporating 1332 cases were included in the study. The results demonstrated that the incidence of ground-glass opacities (GGO) was 0.79, consolidation was 0.34; mixed GGO and consolidation was 0.46; air bronchogram sign was 0.41; crazy paving pattern was 0.32; interlobular septal thickening was 0.55; reticulation was 0.30; bronchial wall thickening was 0.24; vascular enlargement was 0.74. subpleural linear opacity was 0.28; intrathoracic lymph node enlargement was 0.03; pleural effusions was 0.03. The distribution in lung: the incidence of central was 0.05; peripheral was 0.74; peripheral involving central was 0.38; diffuse was 0.19; unifocal involvement was 0.09; multifocal involvement was 0.57; unilateral was 0.16; bilateral was 0.83; The incidence of lobes involved (>2) was 0.70; lobes involved (≦2) was 0.35. Conclusion: GGO, vascular enlargement, interlobular septal thickening more frequently occurred in patients with COVID-19. Peripheral, bilateral, involved lobes >2 might be the features of COVID-19 in the distribution aspect. Therefore, based on the aboved features of COVID-19 in chest CT imaging, it might be a promising means for identifying COVID-19.

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Citation
doi: https://doi.org/10.1101/2020.05.31.20118059

Title
A Systematic Review of Chest Imaging Findings in COVID-19

Author
Zhonghua Sun, Nan Zhang, Yu Li, Xunhua Xu

Abstract
Chest computed tomography (CT) is frequently used in diagnosing coronavirus disease 2019 (COVID-19) for detecting abnormal changes in the lungs and monitoring disease progression during the treatment process. Furthermore, CT imaging appearances are correlated with patients presenting with different clinical scenarios, such as early versus advanced stages, asymptomatic versus symptomatic patients, and severe versus nonsevere situations. However, its role as a screening and diagnostic tool in COVID-19 remains to be clarified. This article provides a systematic review and meta-analysis of the current literature on chest CT imaging findings with the aim of highlighting the contribution and judicious use of CT in the diagnosis of COVID-19. A search of PubMed/Medline, Web of Science, ScienceDirect, Google Scholar and Scopus was performed to identify studies reporting chest imaging findings in COVID-19. Chest imaging abnormalities associated with COVID-19 were extracted from the eligible studies and diagnostic value of CT in detecting these abnormal changes was compared between studies consisting of both COVID-19 and non-COVID-19 patients. A random-effects model was used to perform meta-analysis for calculation of pooled mean values and 95% confidence intervals (95% CI) of abnormal imaging findings. Fifty-five studies met the selection criteria and were included in the analysis. Pulmonary lesions more often involved bilateral lungs (78%, 95% CI: 45-100%) and were more likely to have a peripheral (65.35%, 95% CI: 25.93-100%) and peripheral plus central distribution (31.12%, 95% CI: 1.96-74.07%), but less likely to have a central distribution (3.57%, 95% CI: 0.99-9.80%). Ground glass opacities (GGO) (58.05%, 95% CI: 16.67-100%), consolidation (44.18%, 95% CI: 1.61-71.46%) and GGO plus consolidation (52.99%, 95% CI: 19.05-76.79%) were the most common findings reported in 94.5% (52/55) of the studies, followed by air bronchogram (42.50%, 95% CI: 7.78-80.39%), linear opacities (41.29%, 95% CI: 7.44-65.06%), crazy-paving pattern (23.57%, 95% CI: 3.13-91.67%) and interlobular septal thickening (22.91%, 95% CI: 0.90-80.49%). CT has low specificity in differentiating pneumonia-related lung changes due to significant overlap between COVID-19 and non-COVID-19 patients with no significant differences in most of the imaging findings between these two groups (P>0.05). Furthermore, normal CT (13.31%, 95% CI: 0.74-38.36%) was reported in 26 (47.3%) studies. Despite widespread use of CT in the diagnosis of COVID-19 patients based on the current literature, CT findings are not pathognomonic as it lacks specificity in differentiating imaging appearances caused by different types of pneumonia. Further, there is a relatively high percentage of normal CT scans. Use of CT as a first-line diagnostic or screening tool in COVID-19 is not recommended.

Link
https://pubmed.ncbi.nlm.nih.gov/32489929/?from_term=A+Systematic+Review+of+Chest+Imaging+Findings+in+COVID-19&from_size=100&from_pos=2

Citation
Quant Imaging Med Surg. 2020 May;10(5):1058-1079. doi: 10.21037/qims-20-564.

Title
Association of Clinical and Radiographic Findings With the Outcomes of 93 Patients With COVID-19 in Wuhan, China

Author
Lingli Li, Lian Yang, Shan Gui, Feng Pan, Tianhe Ye, Bo Liang, Yu Hu, Chuansheng Zheng

Abstract
Rationale: To retrospectively analyze serial chest CT and clinical features in patients with coronavirus disease 2019 (COVID-19) for the assessment of temporal changes and to investigate how the changes differ in survivors and nonsurvivors. Methods: The consecutive records of 93 patients with confirmed COVID-19 who were admitted to Wuhan Union Hospital from January 10, 2020, to February 22, 2020, were retrospectively reviewed. A series of chest CT findings and clinical data were collected and analyzed. The serial chest CT scans were scored on a semiquantitative basis according to the extent of pulmonary abnormalities. Chest CT scores in different periods (0 - 5 days, 6 - 10 days, 11 - 15 days, 16 - 20 days, and > 20 days) since symptom onset were compared between survivors and nonsurvivors, and the temporal trend of the radiographic-clinical features was analyzed. Results: The final cohort consisted of 93 patients: 68 survivors and 25 nonsurvivors. Nonsurvivors were significantly older than survivors. For both survivors and nonsurvivors, the chest CT scores were not different in the first period (0 - 5 days) but diverged afterwards. The mortality rate of COVID-19 monotonously increased with chest CT scores, which positively correlated with the neutrophil-to-lymphocyte ratio, neutrophil percentage, D-dimer level, lactate dehydrogenase level and erythrocyte sedimentation rate, while negatively correlated with the lymphocyte percentage and lymphocyte count. Conclusions: Chest CT scores correlate well with risk factors for mortality over periods, thus they may be used as a prognostic indicator in COVID-19. While higher chest CT scores are associated with a higher mortality rate, CT images taken at least 6 days since symptom onset may contain more prognostic information than images taken at an earlier period.

Link
https://pubmed.ncbi.nlm.nih.gov/32483442/?from_single_result=Association+of+Clinical+and+Radiographic+Findings+With+the+Outcomes+of+93+Patients+With+COVID-19+in+Wuhan%2C+China

Citation
Theranostics. 2020 May 15;10(14):6113-6121. doi: 10.7150/thno.46569. eCollection 2020.

Title

CT Manifestations of the Coronavirus Disease 2019 of Imported Infection Versus Second-Generation Infection in Patients Outside the Original District (Wuhan, China) of This Disease: An Observational Study

Author

Yu-Ping Wu, Jin-Ming Cao, Tian-Wu Chen, Rui Li, Feng-Jun Liu, Yue Zeng, Xiao-Ming Zhang, Qi-Wen Mu, Hong-Jun Li

Abstract

To explore the discrepancy in computed tomography (CT) manifestations of the coronavirus disease 2019 (COVID-19) in patients outside the original district (Wuhan, China) between cases with imported infection and second-generation infection, 22 patients with COVID-19 from 2 hospitals in Nanchong, China, 938 km away from the original district (Wuhan, China) of this disease were enrolled. All patients underwent initial and follow-up CT after admission during the treatment, and were divided into 2 groups. Group A and B were composed of 15 patients with a history of exposure to the original district (Wuhan, China) in short-term (i.e., imported infection), and 7 with a close contact with the patients with confirmed COVID-19 or with the healthy individuals from the original district (i.e., second-generation infection), respectively. Initial CT features including extent score and density score between groups were statistically compared. We found that all patients in group A and 3 of 7 patients in group B had abnormal CT findings while 4 of 7 patients in group B had not. Patients with abnormal CT findings were more frequent in group A than in group B ($P < .05$). On initial CT, pure ground glass opacity (GGO), and GGO with consolidation and/or other abnormalities were found in 20% (3/15) and 80% (12/15) patients in group A, respectively, while 1 (14.3%), 2 (28.6%), and 4 (57.1%) had pure GGOs, GGO with focal consolidation, and normal CT appearances in Group B, respectively. Patients with extent and density scores of ≥5 were more frequent in group A than in group B (all P-values < .01). Additionally, 3 of 4 (75%) patients with normal initial CT findings had focal pure GGO lesions on follow-up. In conclusion, COVID-19 in patients with a history of exposure to the original district can be severer than with the second-generation infection on CT.

Link

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Citation

DOI: 10.1097/MD.0000000000020370

Title
Analysis of Thin-Section CT in Patients With Coronavirus Disease (COVID-19) After Hospital Discharge

Author
Jiangping Wei, Pinggui Lei, Hong Yang, Bing Fan, Yingying Qiu, Bingliang Zeng, Peng Yu, Jian Lv, Yinchao Jian, Chengfeng Wan

Abstract
Purpose: To analyze clinical and thin-section computed tomographic (CT) data from the patients with coronavirus disease (COVID-19) to predict the development of pulmonary fibrosis after hospital discharge. Materials and methods: Fifty-nine patients (31 males and 28 females ranging from 25 to 70 years old) with confirmed COVID-19 infection performed follow-up thin-section thorax CT. After 31.5±7.9 days (range, 24 to 39 days) of hospital admission, the results of CT were analyzed for parenchymal abnormality (ground-glass opacification, interstitial thickening, and consolidation) and evidence of fibrosis (parenchymal band, traction bronchiectasis, and irregular interfaces). Patients were analyzed based on the evidence of fibrosis and divided into two groups namely, groups A and B (with and without CT evidence of fibrosis), respectively. Patient demographics, length of stay (LOS), rate of intensive care unit (ICU) admission, peak C-reactive protein level, and CT score were compared between the two groups. Results: Among the 59 patients, 89.8% (53/59) had a typical transition from early phase to advanced phase and advanced phase to dissipating phase. Also, 39% (23/59) patients developed fibrosis (group A), whereas 61% (36/59) patients did not show definite fibrosis (group B). Patients in group A were older (mean age, 45.4±16.9 vs. 33.8±10.2 years) (P = 0.001), with longer LOS (19.1±5.2 vs. 15.0±2.5 days) (P = 0.001), higher rate of ICU admission (21.7% (5/23) vs. 5.6% (2/36)) (P = 0.061), higher peak C-reactive protein level (30.7±26.4 vs. 18.1±17.9 mg/L) (P = 0.041), and higher maximal CT score (5.2±4.3 vs. 4.0±2.2) (P = 0.06) than those in group B. Conclusions: Pulmonary fibrosis may develop early in patients with COVID-19 after hospital discharge. Older patients with severe illness during treatment were more prone to develop fibrosis according to thin-section CT results.

Link
https://pubmed.ncbi.nlm.nih.gov/32425336/?from_term=Analysis+of+Thin-Section+CT+in+Patients+With+Coronavirus+Disease+%28COVID-19%29+After+Hospital+Discharge&from_size=100&from_pos=1

Citation
Clin Imaging. 2020 May 15. doi: 10.1016/j.clinimag.2020.05.001. Online ahead of print.

Title
Utility of Chest CT in Diagnosis of COVID-19 Pneumonia

Author
Ning Luo, Han Zhang, Yang Zhou, ZiXuan Kong, WeiHang Sun, Nan Huang, AoDan Zhang

Abstract
Purpose: We aimed to explore the imaging findings of computed tomography (CT) in diagnosing coronavirus disease 2019 (COVID-19) and its clinical value for further evaluation of suspected cases. Methods: Files of 155 patients visiting the fever clinics at our hospital and affiliated hospitals from January 20th to February 9th, 2020 were searched. Among them, 140 cases (including 82 males and 58 females) were included as suspected COVID-19 cases based on clinical and epidemiological history; the CT image features of 70 cases with suggestive findings on CT, confirmed by positive nucleic acid test were analyzed and evaluated. The sensitivity and specificity of CT in diagnosing COVID-19 were evaluated in patients with epidemiological history. Results: Of the 70 patients, 84.3% showed bilateral lung involvement on CT; 27 cases (38.6%) showed ground-glass opacity (GGO), which was mostly distributed in the subpleural area (55.7%), and this sign was mainly observed in early COVID-19 patients. In addition, 41 cases (58.6%) manifested GGO combined with focal consolidation opacity, 2 (2.8%) had flake-like consolidation opacity, with involvements of the periphery of lung field and the central zone (44.3%), and this sign was mostly observed in severe or critical patients. Concomitant signs such as pleural effusion and mediastinal lymph node enlargement were rare. Among patients with epidemiological history, the sensitivity of CT in diagnosing COVID-19 was 89.7% (70/78), and the specificity was 88.7% (55/62).
Conclusion: CT shows high sensitivity and specificity in diagnosing COVID-19. CT is an important examination method in evaluation of suspected cases and assessment of disease severity.

Link
https://pubmed.ncbi.nlm.nih.gov/32490829/?from_sort=date&from_size=100&from_term=Luo+N&from_cauthor_id=32490829&from_pos=2

Citation
Diagn Interv Radiol. 2020 Jun 3. doi: 10.5152/dir.2020.20144. Online ahead of print.

Title
Novel Coronavirus Disease 2019: Predicting Prognosis by Using a Computed Tomography Severity Score and Clinicolaboratory Data

Author
Ali Sabri, Amir H Davarpanah, Arash Mahdavi, Alireza Abrishami, Mehdi Khazaei, Saman Heydari, Reyhane Asgari, Seyyed Mojtaba Nekooghadam, Julian Dobranowski, Morteza Sanei Taheri

Abstract
Introduction: Currently there are known contributing factors but no comprehensive methods for predicting the risk of mortality or ICU admission in patients with Novel Corona Virus infection (COVID-19). Objectives: The aim of this study is to explore risk factors of mortality and ICU admission in COVID-19 patients using combined CT and clinicolaboratory data.
Patients and methods: Patients with polymerase chain reaction (PCR) confirmed COVID-19 (N= 63) from University Hospitals in Tehran, Iran were studied. All patients underwent CT examination and a total CT score and the number of involved lung lobes were calculated and compared against collected laboratory and clinical information. Univariable and multivariate proportional hazards analysis were used to determine the relationship between the CT, laboratory and clinical data and ICU admission and in-hospital death. Results: By univariable analysis, in-hospital mortality was higher in patients with lower O2 saturation on admission (<88%), higher CT scores and higher number of lung lobes (> 4) involved with a diffuse parenchymal pattern. By multivariable analysis, in-hospital mortality was higher in patients with O2 saturation below 88% on admission and a higher number of lung lobes involved with diffuse parenchymal pattern. The risk of ICU admission was higher with comorbidities (hypertension and ischemic heart disease), SaO2 below 88% and pericardial effusion. Conclusions: We can identify factors affecting in-hospital death and ICU admission in COVID-19. This can help to determine which patients are likely to require ICU admission and to help inform strategic health care planning in critical conditions such as the COVID-19 pandemic.

Link
https://pubmed.ncbi.nlm.nih.gov/32500700/?from_sort=date&from_size=100&from_term=Sabri+A&from_cauthor_id=32500700&from_pos=1

Citation
Pol Arch Intern Med. 2020 Jun 5. doi: 10.20452/pamw.15422. Online ahead of print.

Title
COVID-19 and Acute Pulmonary Embolism: What Should Be Considered to Indicate a Computed Tomography Pulmonary Angiography Scan?

Author
Bruno Lima Moreira, Pablo Rydz Pinheiro Santana, Gláucia Zanetti, Edson Marchiori

Abstract
The full spectrum of COVID-19 is still emerging, although several studies have highlighted that patients infected with the novel coronavirus can potentially develop a hypercoagulable state. However, several aspects related to the incidence and pathophysiology of the association between COVID-19 and pulmonary embolism are not well established. Here, we present a case of a patient with COVID-19 who developed acute pulmonary embolism. Clinical and laboratory data and findings of non-enhanced CT indicate possibility of acute pulmonary embolism, and support the decision to proceed with computed tomography pulmonary angiography that can objectively identify filling defects in pulmonary arterial branches.

Link
https://pubmed.ncbi.nlm.nih.gov/32491103/?from_sort=date&from_size=100&from_term=Moreira+BL&from_cauthor_id=32491103&from_pos=1

Citation
Rev Soc Bras Med Trop . 2020;53:e20200267. doi: 10.1590/0037-8682-0267-2020. Epub 2020 Jun 1.

Title
A 3-month-old Child With COVID-19: A Case Report

Author
Chenxi Li, Fan Luo, Bing Wu

Abstract
Introduction: Coronavirus disease 2019 (COVID-19) is pandemic and is a medical issue. However, children account for a small portion of those with the disease, and there are few published reports of COVID-19 in children. The patient reported in this case report is the youngest case reported in Chengdu, China to date. Patient concerns: A 3-month-old male infant presented with cough and rhinorrhea. Diagnosis: Family members from Wuhan, the epicenter of the epidemic came to stay in the patient's home 16 days before the onset of his disease, and his mother had been diagnosed with COVID-19. He was diagnosed with COVID-19 based on a history of exposure and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), detected using reverse transcription polymerase chain reaction (RT-PCR). Interventions: The patient was admitted to hospital and treated symptomatically with oral medication. Outcomes: The patient recovered completely and was discharged after one month of hospitalization. He tested negative for SARS-CoV-2 using RT-PCR and a chest CT performed 4 weeks after admission showed marked improvement prior to discharge. Conclusion: Clinicians must be aware of the presentation of COVID-19 in children because it differs from that in adults.

Link
https://pubmed.ncbi.nlm.nih.gov/32502054/?from_sort=date&from_size=100&from_term=Li+C&from_cauthor_id=32502054&from_pos=16

Citation
Medicine (Baltimore). 2020 Jun 5;99(23):e20661. doi: 10.1097/MD.0000000000020661.

Title
Spontaneous Pneumothorax and Subcutaneous Emphysema in COVID-19 Patient: Case Report

Author
Burcin Agridag Ucpinar, Cennet Sahin, Ugur Yanc

Abstract
Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome virus coronavirus 2 (SARS-CoV-2). As known, COVID-19 has become a global pandemic and serious health problem. Disease mainly affects lungs and common findings are fever cough and shortness of breath. Computerized tomography (CT) has an important role in initial evaluation and follow up of COVID-19. Main (CT) finding of the disease is bilateral extensive ground-glass opacification (GGO) with a peripheral or posterior distribution, mainly involving the lower lobes. In this case report, we present a pneumothorax and subcutaneous emphysema case in a patient with COVID-19. To the best of authors' knowledge, it is the first illustrated case of pneumothorax accompanying COVID-19 pneumonia.

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https://pubmed.ncbi.nlm.nih.gov/32475804/?from_sort=date&from_size=100&from_term=Ucpinar+BA&from_cauthor_id=32475804&from_pos=1

Citation
J Infect Public Health. 2020 May 26;S1876-0341(20)30478-0. doi: 10.1016/j.jiph.2020.05.012. Online ahead of print.

Title
Use of a Portable Computed Tomography Scanner for Chest Imaging of COVID-19 Patients in the Urgent Care at a Tertiary Cancer Center

Author
David D B Bates, Andriy Vintonyak, Rennie Mohabir, Usman Mahmood, Pat Soto, Jeffrey S Groeger, Michelle S Ginsberg, Marc J Gollub

Abstract
To present a novel use of a portable computed tomography (CT) for evaluation of COVID-19 patients presenting to an urgent care center (UCC). Infection control is imperative for hospitals treating patients with COVID-19, even more so in cancer centers, where the majority of the patient population is susceptible to adverse outcomes from the infection. Over the past several weeks, our department has worked to repurpose a portable CT scanner from our surgical colleagues that operates with fixed-parameters to perform non-contrast, helical, thin-slice chest imaging to address the known pulmonary complications of COVID-19. Despite the technical limitations of the portable CT unit that was repurposed for the UCC, diagnostic-quality images in an acute care setting were successfully obtained. Repurposing of a portable CT scanner for use in COVID-19 patients offers a feasible option to obtain diagnostic quality images while minimizing the risk of exposing other patients and hospital staff to an infected patient.

Link
https://pubmed.ncbi.nlm.nih.gov/32519294/?from_sort=date&from_size=100&from_term=Bates+DDB&from_cauthor_id=32519294&from_pos=1

Citation
Emerg Radiol. 2020 Jun 9;1-4. doi: 10.1007/s10140-020-01801-5. Online ahead of print.

Title
Coronavirus Disease 2019 (COVID-19) Pneumonia Incidentally Detected on Coronary CT Angiogram: A Do-Not-Miss Diagnosis

Author
Shima Behzad, Erik Velez, Mohammad Hosein Najafi, Ali Gholamrezanezhad

Abstract
Coronary CT angiograms are commonly performed for the evaluation of coronary artery disease and coronary arterial anatomy. However, extracardiac findings are frequently detected on these examinations and often can explain patients' underlying symptoms, having a significant impact on patient management. Here in, we discuss three cases of incidentally detected novel COVID-19-infected pneumonia (NCIP). This case series highlights the image findings in NCIP and emphasizes the importance of evaluating all organs in the field of view on coronary CT angiograms. In addition, with the ongoing outbreak of COVID-19 and exponentially increasing incidence throughout the world, this report stresses the need for including NCIP in the differential diagnosis of patients with typical image findings in at-risk populations, as early diagnosis is crucial for appropriate patient management and post-exposure recommendations.

Link
https://pubmed.ncbi.nlm.nih.gov/32519293/?from_sort=date&from_size=100&from_term=Behzad+S&from_cauthor_id=32519293&from_pos=1

Citation
Emerg Radiol. 2020 Jun 9;1-6. doi: 10.1007/s10140-020-01802-4. Online ahead of print.

Title
Acute Pulmonary Embolism in Non-Hospitalized COVID-19 Patients Referred to CTPA by Emergency Department

Author
Alban Gervaise, Caroline Bouzad, Evelyne Peroux, Carole Helissey

Abstract
Objectives: To evaluate the prevalence of acute pulmonary embolism (APE) in non-hospitalized COVID-19 patients referred to CT pulmonary angiography (CTPA) by the emergency department. Methods: From March 14 to April 6, 2020, 72 non-hospitalized patients referred by the emergency department to CTPA for COVID-19 pneumonia were retrospectively identified. Relevant clinical and laboratory data and CT scan findings were collected for each patient. CTPA scans were reviewed by two radiologists to determinate the presence or absence of APE. Clinical classification, lung involvement of COVID-19 pneumonia, and CT total severity score were compared between APE group and non-APE group. Results: APE was identified in 13 (18%) CTPA scans. The mean age and D-dimer of patients from the APE group were higher in comparison with those from the non-APE group (74.4 vs. 59.6 years, p = 0.008, and 7.29 vs. 3.29 µg/ml, p = 0.011). There was no significant difference between APE and non-APE groups concerning clinical type, COVID-19 pneumonia lung lesions (ground-glass opacity: 85% vs. 97%; consolidation: 69% vs. 68%; crazy paving: 38% vs. 37%; linear reticulation: 69% vs. 78%), CT severity score (6.3 vs. 7.1, p = 0.365), quality of CTPA (1.8 vs. 2.0, p = 0.518), and pleural effusion (38% vs. 19%, p = 0.146). Conclusions: Non-hospitalized patients with COVID-19 pneumonia referred to CT scan by the emergency departments are at risk of APE. The presence of APE was not limited to severe or critical clinical type of COVID-19 pneumonia. Key points: • Acute pulmonary embolism was found in 18% of non-hospitalized COVID-19 patients referred by the emergency department to CTPA. Two (15%) patients had main, four (30%) lobar, and seven (55%) segmental acute pulmonary embolism. • Five of 13 (38%) patients with acute pulmonary embolism had a moderate clinical type. • Severity and radiological features of COVID-19 pneumonia showed no significant difference between patients with or without acute pulmonary embolism.

Link
https://pubmed.ncbi.nlm.nih.gov/32518989/?from_sort=date&from_size=100&from_term=Gervaise+A&from_cauthor_id=32518989&from_pos=1

Citation
Eur Radiol. 2020 Jun 9;1-8. doi: 10.1007/s00330-020-06977-5. Online ahead of print.

Title
Early Chest CT Features of Patients With 2019 Novel Coronavirus (COVID-19) Pneumonia: Relationship to Diagnosis and Prognosis

Author
Hui Juan Chen, Jie Qiu, Biao Wu, Tao Huang, Yunsuo Gao, Zhen Ping Wang, Yang Chen, Feng Chen

Abstract
Objective: To determine the consistency between CT findings and real-time reverse transcription-polymerase chain reaction (RT-PCR) and to investigate the relationship between CT features and clinical prognosis in COVID-19. Methods: The clinical manifestations, laboratory parameters, and CT imaging findings were analyzed in 34 COVID-19 patients, confirmed by RT-PCR from January 20 to February 4 in Hainan Province. CT scores were compared between the discharged patients and the ICU patients.
Results: Fever (85%) and cough (79%) were most commonly seen. Ten (29%) patients demonstrated negative results on their first RT-PCR. Of the 34 (65%) patients, 22 showed pure ground-glass opacity. Of the 34 (50%) patients, 17 had five lobes of lung involvement, while the 23 (68%) patients had lower lobe involvement. The lesions of 24 (71%) patients were distributed mainly in the subpleural area. The initial CT lesions of ICU patients were distributed in both the subpleural area and centro-parenchyma (80%), and the lesions were scattered. Sixty percent of ICU patients had five lobes involved, while this was seen in only 25% of the discharged patients. The lesions of discharged patients were mainly in the subpleural area (75%). Of the discharged patients, 62.5% showed pure ground-glass opacities; 80% of the ICU patients were in the progressive stage, and 75% of the discharged patients were at an early stage. CT scores of the ICU patients were significantly higher than those of the discharged patients.
Conclusion: Chest CT plays a crucial role in the early diagnosis of COVID-19, particularly for those patients with a negative RT-PCR. The initial features in CT may be associated with prognosis. Key points: • Chest CT is valuable for the early diagnosis of COVID-19, particularly for those patients with a negative RT-PCR. • The early CT findings of COVID-19 in ICU patients differed from those of discharged patients.

Link
https://pubmed.ncbi.nlm.nih.gov/32518987/?from_sort=date&from_size=100&from_term=Chen+HJ&from_cauthor_id=32518987&from_pos=1

Citation
Eur Radiol. 2020 Jun 9;1-8. doi: 10.1007/s00330-020-06978-4. Online ahead of print.

Title
Correlation Between Chest CT Findings and Clinical Features of 211 COVID-19 Suspected Patients in Wuhan, China

Author
Songlin Song, Feihong Wu, Yiming Liu, Hongwei Jiang, Fu Xiong, Xiaopeng Guo, Hongsen Zhang, Chuansheng Zheng, Fan Yang

Abstract
Background: Chest computed tomography (CT) has been widely used to assess pulmonary involvement in COVID-19. We aimed to investigate the correlation between chest CT and clinical features in COVID-19 suspected patients with or without fever. Methods: We retrospectively enrolled 211 COVID-19 suspected patients who underwent both chest CT and reverse transcription polymerase chain reaction in Wuhan, China. The performance of CT in patients with relevant onset of symptoms, with fever (n = 141) and without fever (n = 70), was assessed respectively. Results: The sensitivity of CT for COVID-19 was 97.3%, with area under the curve (AUC) of 0.71 (95% confidence interval [CI], 0.66-0.76). There were 141 suspected patients with fever and 70 without fever. In the fever group, 4 variables were screened to establish the basic model: age, monocyte, red blood cell, and hypertension. The AUC of the basic model was 0.72 (95% CI, 0.63-0.81), while the AUC of the CT-aided model was 0.77 (95% CI, 0.68-0.85), a significant difference (P < .05). In the nonfever group, only dry cough was screened out to establish the basic model. The AUC was 0.76 (95% CI, 0.64-0.88), which was not significantly different than the CT-aided model (P = .08). Conclusions: Chest CT has a high sensitivity in patients with COVID-19, and it can improve diagnostic accuracy for COVID-19 suspected patients with fever during the initial screen, whereas its value for nonfever patients remains questionable.

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https://pubmed.ncbi.nlm.nih.gov/32518804/?from_sort=date&from_size=100&from_term=Song+S&from_cauthor_id=32518804&from_pos=9

Citation
Open Forum Infect Dis. 2020 May 16;7(6):ofaa171. doi: 10.1093/ofid/ofaa171. eCollection 2020 Jun.

Title
CT Manifestations and Clinical Characteristics of 1115 Patients With Coronavirus Disease 2019 (COVID-19): A Systematic Review and Meta-analysis

Author
Shang Wan, Mingqi Li, Zheng Ye, Caiwei Yang, Qian Cai, Shaofeng Duan, Bin Song

Abstract
Rationale and objectives: We aimed to assess the prevalence of significant computed tomographic(CT) manifestations and describe some notable features based on chest CT images, as well as the main clinical features of patients with coronavirus disease 2019(COVID-19). Materials and methods: A systematic literature search of PubMed, EMBASE, the Cochrane Library, and Web of Science was performed to identify studies assessing CT features, clinical, and laboratory results of COVID-19 patients. A single-arm meta-analysis was conducted to obtain the pooled prevalence and 95% confidence interval (95% CI). Results: A total of 14 articles (including 1115 patients) based on chest CT images were retrieved. In the lesion patterns on chest CTs, we found that pure ground-glass opacities (GGO) (69%, 95% CI 58-80%), consolidation (47%, 35-60%) and "air bronchogram sign" (46%, 25-66%) were more common than the atypical lesion of "crazy-paving pattern" (15%, 8-22%). With regard to disease extent and involvement, 70% (95% CI 46-95%) of cases showed a location preference for the right lower lobe, 65% (58-73%) of patients presented with ≥3 lobes involvement, and meanwhile, 42% (32-53%) of patients had involvement of all five lobes, while 67% (55-78%) of patients showed a predominant peripheral distribution. An understanding of some important CT features might be helpful for medical surveillance and management. In terms of clinical features, muscle soreness (21%, 95% CI 15-26%) and diarrhea (7%, 4-10%) were minor symptoms compared to fever (80%, 74-87%) and cough (53%, 33-72%). Conclusion: Chest CT manifestations in patients with COVID-19, as well as its main clinical characteristics, might be helpful in disease evolution and management.

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https://pubmed.ncbi.nlm.nih.gov/32505599/?from_sort=date&from_size=100&from_term=Wan+S&from_cauthor_id=32505599&from_pos=5

Citation
Acad Radiol. 2020 May 5;S1076-6332(20)30245-2. doi: 10.1016/j.acra.2020.04.033. Online ahead of print.

Title
Dynamic Evolution of COVID-19 on Chest Computed Tomography: Experience From Jiangsu Province of China

Author
Yuan-Cheng Wang, Huanyuan Luo, Songqiao Liu, Shan Huang, Zhen Zhou, Qian Yu, Shijun Zhang, Zhen Zhao, Yizhou Yu, Yi Yang, Duolao Wang, Shenghong Ju

Abstract
Objectives: To determine the patterns of chest computed tomography (CT) evolution according to disease severity in a large coronavirus disease 2019 (COVID-19) cohort in Jiangsu Province, China. Methods: This retrospective cohort study was conducted from January 10, 2020, to February 18, 2020. All patients diagnosed with COVID-19 in Jiangsu Province were included, retrospectively. Quantitative CT measurements of pulmonary opacities including volume, density, and location were extracted by deep learning algorithm. Dynamic evolution of these measurements was investigated from symptom onset (day 1) to beyond day 15. Comparison was made between severity groups. Results: A total of 484 patients (median age of 47 years, interquartile range 33-57) with 954 CT examinations were included, and each was assigned to one of the three groups: asymptomatic/mild (n = 63), moderate (n = 378), severe/critically ill (n = 43). Time series showed different evolution patterns of CT measurements in the groups. Following disease onset, posteroinferior subpleural area of the lung was the most common location for pulmonary opacities. Opacity volume continued to increase beyond 15 days in the severe/critically ill group, compared with peaking on days 13-15 in the moderate group. Asymptomatic/mild group had the lowest opacity volume which almost resolved after 15 days. The opacity density began to drop from day 10 to day 12 for moderately ill patients. Conclusions: Volume, density, and location of the pulmonary opacity and their evolution on CT varied with disease severity in COVID-19. These findings are valuable in understanding the nature of the disease and monitoring the patient's condition during the course of illness. Key points: • Volume, density, and location of the pulmonary opacity on CT change over time in COVID-19. • The evolution of CT appearance follows specific pattern, varying with disease severity.

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https://pubmed.ncbi.nlm.nih.gov/32524223/?from_sort=date&from_size=100&from_term=Wang+YC&from_cauthor_id=32524223&from_pos=5

Citation
Eur Radiol. 2020 Jun 10;1-10. doi: 10.1007/s00330-020-06976-6. Online ahead of print.

Title
Assessment of the Severity of Coronavirus Disease: Quantitative Computed Tomography Parameters Versus Semiquantitative Visual Score

Author
Xi Yin, Xiangde Min, Yan Nan, Zhaoyan Feng, Basen Li, Wei Cai, Xiaoqing Xi, Liang Wang

Abstract
Objective: To compare the accuracies of quantitative computed tomography (CT) parameters and semiquantitative visual score in evaluating clinical classification of severity of coronavirus disease (COVID-19). Materials and methods: We retrospectively enrolled 187 patients with COVID-19 treated at Tongji Hospital of Tongji Medical College from February 15, 2020, to February 29, 2020. Demographic data, imaging characteristics, and clinical data were collected, and based on the clinical classification of severity, patients were divided into groups 1 (mild) and 2 (severe/critical). A semiquantitative visual score was used to estimate the lesion extent. A three-dimensional slicer was used to precisely quantify the volume and CT value of the lung and lesions. Correlation coefficients of the quantitative CT parameters, semiquantitative visual score, and clinical classification were calculated using Spearman's correlation. A receiver operating characteristic curve was used to compare the accuracies of quantitative and semi-quantitative methods. Results: There were 59 patients in group 1 and 128 patients in group 2. The mean age and sex distribution of the two groups were not significantly different. The lesions were primarily located in the subpleural area. Compared to group 1, group 2 had larger values for all volume-dependent parameters ($p < 0.001$). The percentage of lesions had the strongest correlation with disease severity with a correlation coefficient of 0.495. In comparison, the correlation coefficient of semiquantitative score was 0.349. To classify the severity of COVID-19, area under the curve of the percentage of lesions was the highest (0.807; 95% confidence interval, 0.744-0.861: $p < 0.001$) and that of the quantitative CT parameters was significantly higher than that of the semiquantitative visual score ($p = 0.001$). Conclusion: The classification accuracy of quantitative CT parameters was significantly superior to that of semiquantitative visual score in terms of evaluating the severity of COVID-19.

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https://pubmed.ncbi.nlm.nih.gov/32529815/?from_sort=date&from_size=100&from_term=Yin+X&from_cauthor_id=32529815&from_pos=5

Citation
Korean J Radiol. 2020 Jun 11. doi: 10.3348/kjr.2020.0423. Online ahead of print

Title
Neuroimaging Findings in Patients With COVID-19

Author
P Nicholson, L Alshafai, T Krings

Abstract
Little is known about the neurologic sequelae of coronavirus disease 2019 (COVID-19). We assessed neuroimaging findings in 4 patients positive for COVID-19. All had abnormal mental status, deranged coagulation parameters, and markedly elevated D-dimer levels. CT/MR imaging showed a common pattern of multifocal subcortical/cortical petechial-type hemorrhages, while SWI showed more extensive multifocal abnormalities. The appearances are consistent with a thrombotic microangiopathy and may be due to the heightened level of thrombosis in patients with COVID-19.

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https://pubmed.ncbi.nlm.nih.gov/32527843/?from_sort=date&from_size=100&from_term=Nicholson+P&from_cauthor_id=32527843&from_pos=1

Citation
AJNR Am J Neuroradiol. 2020 Jun 11. doi: 10.3174/ajnr.A6630. Online ahead of print.

Title
Predictors of Fatality Including Radiographic Findings in Adults With COVID-19

Author
Kaiyan Li, Dian Chen, Shengchong Chen, Yuchen Feng, Chenli Chang, Zi Wang, Nan Wang, Guohua Zhen

Abstract
Background: Older age and elevated d-dimer are reported risk factors for coronavirus disease 2019 (COVID-19). However, whether early radiographic change is a predictor of fatality remains unknown. Methods: We retrospectively reviewed records of all laboratory-confirmed patients admitted to a quarantine unit at Tongji Hospital, a large regional hospital in Wuhan, China, between January 31 and March 5, 2020. Confirmed cases were defined by positive RT-PCR detection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in throat-swab specimens. Chest CT images were reviewed independently by two radiologists. The Tongji Hospital ethics committee approved this study. Results: A total of 102 patients were confirmed to have SARS-CoV-2 infection. As of March 25, 85 confirmed patients were discharged, 15 died, and 2 remained hospitalized. When compared with survivors, non-survivors were older (median age, 69 [interquartile range, 58-77] vs. 55 [44-66], $p = 0.003$), and more likely to have decreased lymphocyte count (0.5 vs. 0.9 × 109/L, $p = 0.006$), elevated lactate dehydrogenase (LDH) (569.0 vs. 272.0 U/L, $p < 0.001$), elevated d-dimer (> 1 μg/mL, 86% vs. 37%, $p = 0.002$) on admission. Older age and elevated LDH were independent risk factors for fatality in a multivariate regression model included the above variables. In a subset of patients with CT images within the first week, higher total severity score, and more involved lung lobes (5 involved lobes) in CT images within the first week were significantly associated with fatality. Moreover, in this subset of patients, higher total severity score was the only independent risk factor in a multivariate analysis incorporating the above mentioned variables. Conclusions: Older age, elevated LDH on admission, and higher severity score of CT images within the first week are potential predictors of fatality in adults with COVID-19. These predictors may help clinicians identify patients with a poor prognosis at an early stage.

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https://pubmed.ncbi.nlm.nih.gov/32527255/?from_sort=date&from_size=100&from_term=Li+K&from_cauthor_id=32527255&from_pos=12

Citation
Respir Res. 2020 Jun 11;21(1):146. doi: 10.1186/s12931-020-01411-2.

Title
Early CT Findings of Coronavirus Disease 2019 (COVID-19) in Asymptomatic Children: A Single-Center Experience

Author
Lan Lan, Dan Xu, Chen Xia, Shaokang Wang, Minhua Yu, Haibo Xu

Abstract
Objective: The current study reported a case series to illustrate the early computed tomography (CT) findings of coronavirus disease 2019 (COVID-19) in pediatric patients. Materials and methods: All pediatric patients who were diagnosed with COVID-19 and who underwent CT scan in Zhongnan Hospital of Wuhan University from January 20, 2020 to February 28, 2020 were included in the current study. Data on clinical and CT features were collected and analyzed. Results: Four children were included in the current study. All of them were asymptomatic throughout the disease course (ranging from 7 days to 15 days), and none of them showed abnormalities in blood cell counts. Familial cluster was the main transmission pattern. Thin-section CT revealed abnormalities in three patients, and one patient did not present with any abnormal CT findings. Unilateral lung involvement was observed in two patients, and one patient showed bilateral lung involvement. In total, five small lesions were identified, including ground-glass opacity (n = 4) and consolidation (n = 1). All lesions had ill-defined margins with peripheral distribution and predilection of lower lobe. Conclusion: Small patches of ground-glass opacity with subpleural distribution and unilateral lung involvement were common findings on CT scans of pediatric patients in the early stage of the disease.

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https://pubmed.ncbi.nlm.nih.gov/32524792/?from_sort=date&from_size=100&from_term=Lan+L&from_cauthor_id=32524792&from_pos=2

Citation
Korean J Radiol. 2020 Jul;21(7):919-924. doi: 10.3348/kjr.2020.0231.

Title
CT Quantitative Analysis and Its Relationship With Clinical Features for Assessing the Severity of Patients With COVID-19

Author
Dong Sun, Xiang Li, Dajing Guo, Lan Wu, Ting Chen, Zheng Fang, Linli Chen, Wenbing Zeng, Ran Yang

Abstract
Objective: To investigate the value of initial CT quantitative analysis of ground-glass opacity (GGO), consolidation, and total lesion volume and its relationship with clinical features for assessing the severity of coronavirus disease 2019 (COVID-19). Materials and methods: A total of 84 patients with COVID-19 were retrospectively reviewed from January 23, 2020 to February 19, 2020. Patients were divided into two groups: severe group (n = 23) and non-severe group (n = 61). Clinical symptoms, laboratory data, and CT findings on admission were analyzed. CT quantitative parameters, including GGO, consolidation, total lesion score, percentage GGO, and percentage consolidation (both relative to total lesion volume) were calculated. Relationships between the CT findings and laboratory data were estimated. Finally, a discrimination model was established to assess the severity of COVID-19. Results: Patients in the severe group had higher baseline neutrophil percentage, increased high-sensitivity C-reactive protein (hs-CRP) and procalcitonin levels, and lower baseline lymphocyte count and lymphocyte percentage ($p < 0.001$). The severe group also had higher GGO score ($p < 0.001$), consolidation score ($p < 0.001$), total lesion score ($p < 0.001$), and percentage consolidation ($p = 0.002$), but had a lower percentage GGO ($p = 0.008$). These CT quantitative parameters were significantly correlated with laboratory inflammatory marker levels, including neutrophil percentage, lymphocyte count, lymphocyte percentage, hs-CRP level, and procalcitonin level ($p < 0.05$). The total lesion score demonstrated the best performance when the data cut-off was 8.2%. Furthermore, the area under the curve, sensitivity, and specificity were 93.8% (confidence interval [CI]: 86.8-100%), 91.3% (CI: 69.6-100%), and 91.8% (CI: 23.0-98.4%), respectively. Conclusion: CT quantitative parameters showed strong correlations with laboratory inflammatory markers, suggesting that CT quantitative analysis might be an effective and important method for assessing the severity of COVID-19, and may provide additional guidance for planning clinical treatment strategies.

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https://pubmed.ncbi.nlm.nih.gov/32524786/?from_sort=date&from_size=100&from_term=Sun+D&from_cauthor_id=32524786&from_pos=4

Citation
Korean J Radiol. 2020 Jul;21(7):859-868. doi: 10.3348/kjr.2020.0293.

Title
Association of "Initial CT" Findings With Mortality in Older Patients With Coronavirus Disease 2019 (COVID-19)

Author
Yan Li, Zhenlu Yang, Tao Ai, Shandong Wu, Liming Xia

Abstract
Objectives: To investigate the association of chest CT findings with mortality in clinical management of older patients. Methods: From January 21 to February 14, 2020, 98 older patients (≥ 60 years) who had undergone chest CT scans ("initial CT") on admission were enrolled. Manifestation and CT score were compared between the death group and the survival group. In each group, patients were sub-grouped based on the time interval between symptom onset and the "initial CT" scan: subgroup1 (interval ≤ 5 days), subgroup2 (interval between 6 and 10 days), and subgroup3 (interval > 10 days). Adjusted ROC curve after adjustment for age and gender was applied. Results: Consolidations on CT images were more common in the death group (n = 46) than in the survival group (n = 52) (53.2% vs 32.0%, p < 0.001). For subgroup1 and subgroup2, a higher mean CT score was found for the death group (33.0 ± 17.1 vs 12.9 ± 8.7, p < 0.001; 38.8 ± 12.3 vs 24.3 ± 11.9, p = 0.002, respectively) and no significant difference of CT score was identified with respect to subgroup3 (p = 0.144). In subgroup1, CT score of 14.5 with a sensitivity of 83.3% and a specificity of 77.3% for the prediction of mortality was an optimal cutoff value, with an adjusted AUC of 0.881. In subgroup2, CT score of 27.5 with a sensitivity of 87.5% and a specificity of 70.6% for the prediction of mortality was an optimal cutoff value, with an adjusted AUC of 0.895. Conclusions: "Initial CT" scores may be useful to speculate prognosis and stratify patients. Severe manifestation on CT at an early stage may indicate poor prognosis for older patients with COVID-19. Key points: • Severe manifestation on CT at an early stage may indicate poor prognosis for older patients with COVID-19. • Radiologists should pay attention to the time interval between symptom onsets and CT scans of patients with COVID-19. • Consolidations on CT images were more common in death patients than in survival patients.

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https://pubmed.ncbi.nlm.nih.gov/32532255/?from_sort=date&from_size=100&from_term=Li+Y&from_cauthor_id=32524220&from_pos=31

Citation
J Transl Med. 2020 Jun 12;18(1):235. doi: 10.1186/s12967-020-02404-x.

Title
COVID-19 in the Radiology Department: What Radiographers Need to Know

Author
N Stogiannos, D Fotopoulos, N Woznitza, C Malamateniou

Abstract
Objectives: The aim is to review current literature related to the diagnosis, management, and follow-up of suspected and confirmed Covid-19 cases. Key findings: Medical Imaging plays an important auxiliary role in the diagnosis of Covid-19 patients, mainly those most seriously affected. Practice differs widely among different countries, mainly due to the variability of access to resources (viral testing and imaging equipment, specialised staff, protective equipment). It has been now well-documented that chest radiographs should be the first-line imaging tool and chest CT should only be reserved for critically ill patients, or when chest radiograph and clinical presentation may be inconclusive. Conclusion: As radiographers work on the frontline, they should be aware of the potential risks associated with Covid-19 and engage in optimal strategies to reduce these. Their role in vetting, conducting and often reporting the imaging examinations is vital, as well as their contribution in patient safety and care. Medical Imaging should be limited to critically ill patients, and where it may have an impact on the patient management plan. Implications for practice: At the time of publication, this review offers the most up-to-date recommendations for clinical practitioners in radiology departments, including radiographers. Radiography practice has to significantly adjust to these new requirements to support optimal and safe imaging practices for the diagnosis of Covid-19. The adoption of low dose CT, rigorous infection control protocols and optimal use of personal protective equipment may reduce the potential risks of radiation exposure and infection, respectively, within Radiology departments.

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https://pubmed.ncbi.nlm.nih.gov/32532596/?from_sort=date&from_size=100&from_term=Stogiannos+N&from_cauthor_id=32532596&from_pos=1

Citation
Radiography (Lond). 2020 Jun 4;S1078-8174(20)30084-5. doi: 10.1016/j.radi.2020.05.012. Online ahead of print.

Title
Clinical and Computed Tomography Characteristics of COVID-19 Associated Acute Pulmonary Embolism: A Different Phenotype of Thrombotic Disease?

Author
L F van Dam, L J M Kroft, L I van der Wal, S C Cannegieter, J Eikenboom, E de Jonge, M V Huisman, F A Klok

Abstract
Introduction: COVID-19 infections are associated with a high prevalence of venous thromboembolism, particularly pulmonary embolism (PE). It is suggested that COVID-19 associated PE represents in situ immunothrombosis rather than venous thromboembolism, although the origin of thrombotic lesions in COVID-19 patients remains largely unknown. Methods: In this study, we assessed the clinical and computed tomography (CT) characteristics of PE in 23 consecutive patients with COVID-19 pneumonia and compared these to those of 100 consecutive control patients diagnosed with acute PE before the COVID-19 outbreak. Specifically, RV/LV diameter ratio, pulmonary artery trunk diameter and total thrombus load (according to Qanadli score) were measured and compared. Results: We observed that all thrombotic lesions in COVID-19 patients were found to be in lung parenchyma affected by COVID-19. Also, the thrombus load was lower in COVID-19 patients (Qanadli score -8%, 95% confidence interval [95%CI] -16 to -0.36%) as was the prevalence of the most proximal PE in the main/lobar pulmonary artery (17% versus 47%; -30%, 95%CI -44% to -8.2). Moreover, the mean RV/LV ratio (mean difference -0.23, 95%CI -0.39 to -0.07) and the prevalence of RV/LV ratio >1.0 (prevalence difference -23%, 95%CI -41 to -0.86%) were lower in the COVID-19 patients. Conclusion: Our findings therefore suggest that the phenotype of COVID-19 associated PE indeed differs from PE in patients without COVID-19, fuelling the discussion on its pathophysiology.

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Citation
Thromb Res. 2020 Jun 6;193:86-89. doi: 10.1016/j.thromres.2020.06.010. Online ahead of print.

Title
Study on the Dynamic Change Law and Correlation Between CT Imaging Manifestations and Cellular Immunity of 2019 Novel Coronavirus Disease

Author
Minxia Yang, Haijia Mao, Lujiao Chen, Li Zhao, Sangying Lv, Yanan Huang, Bo Chen, Mingzhu Wei, Guanzuan Wu, Bingqian Zhang, Xuedong Sun, Guozhong Zhou, Minhui Li, Zhenhua Zhao

Abstract
Purpose: To explore the dynamic changes and correlation between CT imaging manifestations and cellular immunity of COVID-19. Materials and methods: This retrospective review analyzed 23 patients with COVID-19, including 13 males and 10 females aged 27-70 years, with an average age of 48 years. Patients were divided into two groups: group A with 11 critical-severe patients, and group B with 12 common-mild patients. Clinical, laboratory, and radiological data were collected and analyzed. Results: LYM, LYM (%), CD3+, CD4+, and CD8+ decreased, while NEU (%), CRP, and CT scores increased in all patients, WBC in group A increased. In group A, on day 10-12 after disease onset, CT scores and CRP reached the highest point, and day 13-15 LYM, LYM (%) reached the lowest but NEU (%) and WBC reached the highest, CD3+, CD4+ and CD8+ were at the lowest on day 10-15. In group B, on day 7-9, CT scores, NEU (%) and CRP reached the peak, but LYM, LYM (%), CD3+, CD4+ and CD8+ reached the lowest. In all patients, CT scores had a significantly negative correlation with CD3+, CD4+, CD8+, LYM (%), and LYM ($p = 0.001$, $r = - 0.797$; $p = 0.008$, $r = - 0.698$; $p = 0.002$, $r = - 0.775$; $p < 0.001$, $r = - 0.785$; $p = 0.021$, $r = - 0.571$, respectively), and a significantly positive correlation with WBC and NEU (%) ($p < 0.001$, $r = 0.785$; $p = 0.003$, $r = 0.691$, respectively). Conclusion: Dynamic changes of CT manifestations and cellular immunity of patients with COVID-19 were regular and correlation was high between these two parameters.

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https://pubmed.ncbi.nlm.nih.gov/32533391/?from_sort=date&from_size=100&from_term=Yang+M&from_cauthor_id=32533391&from_pos=2

Citation
Jpn J Radiol. 2020 Jun 12. doi: 10.1007/s11604-020-00997-3. Online ahead of print.

Title
COVID-19 Pandemic Shifts Inpatient Imaging Utilization

Author
Jason J. Naidich, Artem Boltyenkov, Jason J. Wang, Jesse Chusid, Danny Hughes, Pina C. Sanelli.

Abstract
Summary statement: The results from this study provide real-world data to inform Radiology practices regarding not only the decline in inpatient imaging volumes, but more importantly the significant shift in the imaging composition mix during the COVID-19 pandemic.

Link
https://www.sciencedirect.com/science/article/pii/S1546144020306517

Citation
https://doi.org/10.1016/j.jacr.2020.06.011

Title

The Limited Sensitivity of Chest Computed Tomography Relative to Reverse Transcription Polymerase Chain Reaction for Severe Acute Respiratory Syndrome Coronavirus-2 Infection: A Systematic Review on COVID-19 Diagnostics

Author

Joseph V Waller, Isabel E Allen, Keldon K Lin, Michael J Diaz, Travis S Henry, Michael D Hope

Abstract

Objectives: Several studies suggest the sensitivity of chest computed tomography (CT) is far greater than that of reverse transcription polymerase chain reaction (RT-PCR) in diagnosing COVID-19 patients, and therefore, CT should be included as a primary diagnostic tool. This systematic review aims to stratify studies as high or low risk of bias to determine the true sensitivity of CT for severe acute respiratory syndrome coronavirus-2 infection according to the unbiased (low risk) studies, a topic of particular importance given the insufficient quantity of RT-PCR kits in many countries. We focus on sensitivity as that is the chief advantage perceived of CT. Materials and methods: This systematic review involved searching the PubMed and Google Scholar databases for articles conducted and published between January 1 and April 15, 2020. The quality assessment tool QUADAS-2 was used to stratify studies according to their risk of bias, and exclusion criteria included not providing the information deemed relevant for such a stratification, such as not indicating if the patients were symptomatic or asymptomatic, or identifying the source of the specimen for the reference standard, RT-PCR (eg, nasal, oropharyngeal, etc). Sensitivity values were then extracted, and random effects meta-analyses were performed. Results: Of 641 search results, 37 studies (n = 9610 patients) were included in the analysis. The mean sensitivity of RT-PCR for COVID-19 reported by the biased studies was 70% (n = 5409/7 studies; 95% confidence interval [CI], 43-97; I = 99.1%), compared with 78% by unbiased studies (n = 534/4 studies; 95% CI, 69-87, I = 89.9%). For chest CT, the mean sensitivity reported by biased studies was 94% (n = 3371 patients/24 studies; 95% CI, 92-96; I = 93.1%), compared with 75% by unbiased studies (n = 957/10 studies; 95% CI, 67-83; I = 89.5%).
Conclusions: The difference between the sensitivities of CT and RT-PCR for severe acute respiratory syndrome coronavirus-2 infection is lower than previously thought, as after stratifying the studies, the true sensitivity for CT based on the unbiased studies is limited.

Link

https://pubmed.ncbi.nlm.nih.gov/32554983/

Citation

Invest Radiol. 2020 Jun 16. doi: 10.1097/RLI.0000000000000700. Online ahead of print.

Title
Pulmonary Vascular Manifestations of COVID-19 Pneumonia

Author
Min Lang, Avik Som, Denston Carey, Nicholas Reid, Dexter P. Mendoza, Efren J. Flores, Matthew D. Li, Jo-Anne O. Shepard, Brent P. Little.

Abstract
Background: Parenchymal findings in COVID-19 pneumonia on computed tomography (CT) have been well characterized. However, the role of pulmonary vascular pathology in COVID-19 pneumonia is still not well understood. Purpose: To investigate pulmonary vascular abnormalities on CT pulmonary angiography in patients with COVID-19 pneumonia. Materials and Methods: In this retrospective study, 48 patients with RT-PCR confirmed COVID-19 infection who had undergone CT pulmonary angiography between 3/22/20 and 4/5/20 in our large urban health care system were included. Patient demographics and clinical data were collected through the electronic medical record system. Twenty-five patients underwent dual energy CT (DECT) as part of the standard CT pulmonary angiogram protocol at a subset of the hospitals. Two thoracic radiologists independently assessed all studies. Disagreement in assessment was resolved by consensus discussion with a third thoracic radiologist. Results: Of the 48 patients, 45 patients required admission, with 18 admitted to the ICU, and 13 requiring intubation. Seven patients (15%) were found to have pulmonary emboli. Dilated vessels were seen in 41 cases (85%), with 38 (78%) and 27 (55%) of cases demonstrating vessel enlargement within and outside of lung opacities, respectively. Dilated distal vessels extending to the pleura and fissures were seen in 40 cases (82%) and 30 cases (61%), respectively. On DECT, mosaic perfusion pattern was observed in 24 cases (96%), regional hyperemia overlapping with areas of pulmonary opacities or immediately surrounding the opacities were seen in 13 cases (52%), opacities associated with corresponding oligemia were seen in 24 cases (96%), and hyperemic halo was seen in 9 cases (36%). Conclusion: Pulmonary vascular abnormalities such as vessel enlargement and regional mosaic perfusion patterns are common in COVID-19 pneumonia. Perfusion abnormalities are also frequently observed at DECT in COVID-19 pneumonia and may suggest an underlying vascular process.

Link
https://pubs.rsna.org/doi/full/10.1148/ryct.2020200277

Citation
https://doi.org/10.1148/ryct.2020200277

Title
Detection of Unsuspected Coronavirus Disease 2019 Cases by Computed Tomography and Retrospective Implementation of the Radiological Society of North America/Society of Thoracic Radiology/American

Author
Min Lang, Avik Som, Dexter P Mendoza, Efren J Flores, Matthew D Li, Jo-Anne O Shepard, Brent P Little

Abstract
Purpose: The purpose of this article was to report the utility of computed tomography (CT) for detecting unsuspected cases of Coronavirus disease 2019 (COVID-19) and the utility of the Radiological Society of North America (RSNA)/Society of Thoracic Radiology (STR)/American College of Radiology (ACR) consensus guidelines for COVID-19 reporting. Materials and methods: A total of 22 patients of the 156 reverse transcriptase polymerase chain reaction confirmed COVID-19 patients who were hospitalized between March 27, 2020 and March 31, 2020 at our quaternary care academic medical center and who underwent CT imaging within 1 week of admission were included in this retrospective study. Demographics and clinical data were extracted from the electronic medical record system. Two thoracic radiologists independently categorized each CT study on the basis of RSNA/STR/ACR consensus guidelines. Disagreement in categorization was resolved by consensus discussion with a third thoracic radiologist.
Results: At the time of imaging, 16 patients (73%) were suspected of COVID-19, and 6 patients (27%) were not. Common symptoms at presentation were fever (73%), cough (77%), and gastrointestinal symptoms (59%). An overall 63% of suspected COVID-19 patients exhibited shortness of breath, whereas 0 unsuspected COVID-19 patients did (P=0.02). On the basis of the RSNA consensus guidelines, 68%, 18%, 9%, and 5% of studies were categorized as "typical appearance," "indeterminate appearance," "atypical appearance," and "negative for pneumonia," respectively. There was no difference of category distribution between suspected and unsuspected COVID-19 patients (P=0.20), with "typical appearance" being the most prevalent in both (69% vs. 67%, respectively). Conclusions: It is important to recognize imaging features of COVID-19 pneumonia even in unsuspected patients. Implementation of the RSNA/STR/ACR consensus guidelines may increase consistency of reporting and convey the level of suspicion for COVID-19 to other health care providers, with "typical appearance" especially warranting further attention.

Link
https://pubmed.ncbi.nlm.nih.gov/32558725/

Citation
J Thorac Imaging . 2020 Jun 17. doi: 10.1097/RTI.0000000000000542. Online ahead of print.

Title
Review of Chest CT Manifestations of COVID-19 Infection

Author
Maria El Homsi, Michael Chung, Adam Bernheim, Adam Jacobi, Michael J King, Sara Lewis, Bachir Taouli

Abstract
Department of Diagnostic, Molecular and Interventional Radiology, Icahn School of Medicine at Mount Sinai, New York, USA.
Coronavirus disease-19 (COVID-19) is a viral pandemic that started in China and has rapidly expanded worldwide. Typical clinical manifestations include fever, cough and dyspnea after an incubation period of 2-14 days. The diagnosis is based on RT-PCR test through a nasopharyngeal swab. Because of the pulmonary tropism of the virus, pneumonia is often encountered in symptomatic patients. Here, we review the pertinent clinical findings and the current published data describing chest CT findings in COVID-19 pneumonia, the diagnostic performance of CT for diagnosis, including differential diagnosis, as well the evolving role of imaging in this disease.

Link
https://pubmed.ncbi.nlm.nih.gov/32550256/

Citation
Eur J Radiol Open. 2020 Jun 7;7:100239. doi: 10.1016/j.ejro.2020.100239. eCollection 2020.

Title
Radiological Society of North America Chest CT Classification System for Reporting COVID-19 Pneumonia: Interobserver Variability and Correlation with RT-PCR

Author
Tom M.H. de Jaegere, Jasenko Krdzalic, Bram A.C.M. Fasen, Robert M. Kwee, COVID-19 CT Investigators South-East Netherlands (CISEN) study group.

Abstract
Purpose: To evaluate the Radiological Society of North America (RSNA) chest CT classification system for reporting COVID-19 pneumonia. Materials and Methods:
Chest CT scans of consecutive patients with suspected COVID-19 were retrospectively and independently evaluated by two chest radiologists and a fifth-year radiology resident using the RSNA chest CT classification system for reporting COVID-19 pneumonia. Interobserver agreement was evaluated by calculating weighted kappa (κ) coefficients. Proportion of patients with real-time reverse transcriptase polymerase chain reaction (RT-PCR) confirmed COVID-19 in each of the four chest CT categories ("typical", "indeterminate", "atypical", and "negative" features for COVID-19) was calculated. Results: Ninety-six patients (61 males, median age 70 years [range 29-94]) were included, of whom 45 had RT-PCR confirmed COVID-19. The number of patients assigned to chest CT categories "typical", "indeterminate", "atypical", and "negative" by the three readers ranged from 18-29, 26-43, 19-31, and 5-8 respectively. □ coefficient between the chest radiologists was 0.663 (95% confidence interval [CI]: 0.565-0.761). □ coefficients between the chest radiologists and the fifth-year radiology resident were 0.570 (95% CI: 0.443-0.696) and 0.564 (95% CI: 0.451-0.678). Proportion of patients with RT-PCR confirmed COVID-19 in the chest CT categories "typical", "indeterminate", "atypical", and "negative" for the three readers ranged from 76.9%-96.6%, 51.2%-64.1%, 2.8%-5.3%, and 20-25%, respectively. Conclusion: The RSNA chest CT classification system for reporting COVID-19 pneumonia has moderate to substantial interobserver agreement. However, the proportion of RT-PCR confirmed COVID-19 cases in the categories "atypical appearance" and "negative for pneumonia" is non-negligible.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200213

Citation
https://doi.org/10.1148/ryct.2020200213

Title
Coronavirus Disease 2019 (COVID-19) in Children: A Systematic Review of Imaging Findings

Author
Susan C Shelmerdine, Jovan Lovrenski, Pablo Caro-Domínguez, Seema Toso, Collaborators of the European Society of Paediatric Radiology Cardiothoracic Imaging Taskforce

Abstract
Background: COVID-19 is a novel coronavirus infection that can cause a severe respiratory illness and has been declared a pandemic by the World Health Organization (WHO). Because children appear to be less severely affected than adults, their imaging appearances have not been extensively reported. Objective: To systematically review available literature regarding imaging findings in paediatric cases of COVID-19. Materials and methods: We searched four databases (Medline, Embase, Cochrane, Google Scholar) for articles describing imaging findings in children with COVID-19. We included all modalities, age <18 years, and foreign language articles, using descriptive statistics to identify patterns and locations of imaging findings, and their association with outcomes. Results: Twenty-two articles were included, reporting chest imaging findings in 431 children, of whom 421 (97.7%) underwent CT. Criteria for imaging were lacking. At diagnosis, 143/421 (34.0%) had a normal CT. Abnormalities were more common in the lower lobes and were predominantly unilateral. The most common imaging pattern was ground-glass opacification (159/255, 62.4%). None of the studies described lymphadenopathy, while pleural effusions were rare (three cases). Improvement at follow-up CT imaging (3-15 days later) was seen in 29/100 (29%), remained normal in 25/100 (25%) and progressed in 9/100 (9%). Conclusion: CT chest findings in children with COVID-19 are frequently normal or mild. Lower lobes are predominantly affected by patchy ground-glass opacification. Appearances at follow-up remain normal or improve in the majority of children. Chest CT imaging adds little to the further management of the patient and should be reserved for severe cases or for identifying alternative diagnoses.

Link
https://pubmed.ncbi.nlm.nih.gov/32556807/

Citation
Pediatr Radiol. 2020 Jun 18;1-14. doi: 10.1007/s00247-020-04726-w. Online ahead of print.

Title
Diagnostic Utility of Additional Whole-Chest CT as Part of an Acute Abdominal Pain CT Imaging Pathway During the COVID-19 Pandemic

Author
N E Hamilton, G H Adam, D L Ifan, S S Lam, K Johnson, K A G Vedwan, J S Shambrook, C R Peebles, S P Harden, A Abbas

Abstract
Aim: To evaluate the diagnostic utility of additional whole-chest computed tomography (CT) in identifying otherwise unheralded COVID-19 lung disease as part of an acute abdominal pain CT imaging pathway in response to the COVID-19 pandemic. Materials and methods: Consecutive patients (n=172) who underwent additional whole-chest CT via a COVID-19 acute abdominal pain CT imaging pathway between 27 March and 3 May 2020 were evaluated in this retrospective single-centre study. Chest CT examinations were graded as non-COVID-19, indeterminate for, or classic/probable for COVID-19. CT examinations in the latter two categories were further divided into one of three anatomical distributions (lung base, limited chest [below carina], whole chest [above carina]) based on location of findings. Reverse transcriptase-polymerase chain reaction (RT-PCR) results and clinical features of COVID-19 were assessed to determine if COVID-19 was clinically suspected at the time of CT referral. Results: Twenty-seven of the 172 (15.7%) patients had CT features potentially indicative of COVID-19 pneumonia, 6/27 (3.5%) demonstrating a classic/probable pattern and 21/27 (12.2%) demonstrating an indeterminate pattern. After correlation with clinical features and RT-PCR 8/172 (4.7%) were defined as COVID-19 positive, of which only 1/172 (0.6%) was clinically unsuspected of COVID-19 at the time of CT referral. All COVID-19 positive cases could be identified on review of the lung base alone. Conclusion: Whole-chest CT as part of an acute abdominal pain CT imaging pathway has a very low diagnostic yield for our cohort of patients. All COVID-19-positive patients in our cohort were identified on review of the lung bases on the abdominal CT and this offers an alternative imaging approach in this patient group.

Link
https://pubmed.ncbi.nlm.nih.gov/32546365/

Citation
Clin Radiol. 2020 Jun 9;S0009-9260(20)30215-4. doi: 10.1016/j.crad.2020.06.002. Online ahead of print

Title
A Novel Machine Learning-derived Radiomic Signature of the Whole Lung Differentiates Stable From Progressive COVID-19 Infection: A Retrospective Cohort Study

Author
Liping Fu, Yongchou Li, Aiping Cheng, PeiPei Pang, Zhenyu Shu

Abstract
Objective: This study aimed to use the radiomics signatures of a machine learning-based tool to evaluate the prognosis of patients with coronavirus disease 2019 (COVID-19) infection. Methods: The clinical and imaging data of 64 patients with confirmed diagnoses of COVID-19 were retrospectively selected and divided into a stable group and a progressive group according to the data obtained from the ongoing treatment process. Imaging features from whole-lung images from baseline computed tomography (CT) scans were extracted and dimensionality reduction was performed. Support vector machines were used to construct radiomics signatures and to compare differences between the 2 groups. We also compared the differences of signature scores in the clinical, laboratory, and CT image feature subgroups and finally analyzed the correlation between the radiomics features of the constructed signature and the other features including clinical, laboratory, and CT imaging features. Results: The signature has a good classification effect for the stable group and the progressive group, with area under curve, sensitivity, and specificity of 0.833, 80.95%, and 74.42%, respectively. Signature score differences in laboratory and CT imaging features between subgroups were not statistically significant (P>0.05); cough was negatively correlated with GLCM Entropy_angle 90_offset4 (r=-0.578), but was positively correlated with ShortRunEmphhasis_AllDirect_offset4_SD (r=0.454); C-reactive protein was positively correlated with Cluster Prominence_ AllDirect_offset 4_ SD (r=0.47). Conclusion: The radiomics signature of the whole lung based on machine learning may reveal the changes of lung microstructure in the early stage and help to indicate the progression of the disease.

Link
https://pubmed.ncbi.nlm.nih.gov/32555006/

Citation
J Thorac Imaging. 2020 Jun 16. doi: 10.1097/RTI.0000000000000544. Online ahead of print.

Title
CT-derived Pulmonary Vascular Metrics and Clinical Outcome in COVID-19 Patients

Author
Pietro Spagnolo, Andrea Cozzi, Riccardo Alessandro Foà, Angelo Spinazzola, Lorenzo Monfardini, Claudio Bnà, Marco Alì, Simone Schiaffino, Francesco Sardanelli

Abstract
To assess pulmonary vascular metrics on chest CT of COVID-19 patients, and their correlation with pneumonia extent (PnE) and outcome, we analyzed COVID-19 patients with an available previous chest CT, excluding those performed for cardiovascular disease. From February 21 to March 21, 2020, of 672 suspected COVID-19 patients from two centers who underwent CT, 45 RT-PCR-positives (28 males, median age 75, IQR 66-81 years) with previous CTs performed a median 36 months before (IQR 12-72 months) were included. We assessed PnE, pulmonary artery (PA) diameter, ascending aorta (Ao) diameter, and PA/Ao ratio. Most common presentations were fever and dyspnea (15/45) and fever alone (13/45). Outcome was available for 41/45 patients, 15/41 dead and 26/41 discharged. Ground-glass opacities (GGOs) alone were found in 29/45 patients, GGOs with consolidations in 15/45, consolidations alone in 1/45. All but one patient had bilateral pneumonia, 9/45 minimal, 22/45 mild, 9/45 moderate, and 5/45 severe PnE. PA diameter (median 31 mm, IQR 28-33 mm) was larger than before (26 mm, IQR 25-29 mm) ($P<0.001$), PA/Ao ratio (median 0.83, IQR 0.76-0.92) was higher than before (0.76, IQR 0.72-0.82) ($P<0.001$). Patients with adverse outcome (death) had higher PA diameter ($P=0.001$), compared to discharged ones. Only weak correlations were found between ΔPA or ΔPA/Ao and PnE ($\rho \leq 0.453$, $P \leq 0.032$), with 4/45 cases with moderate-severe PnE and minimal increase in PA metrics. In conclusion, enlarged PA diameter was associated to death in COVID-19 patients, a finding deserving further investigation as a potential driver of therapy decision-making.

Link
https://pubmed.ncbi.nlm.nih.gov/32550141/

Citation
Quant Imaging Med Surg. 2020 Jun;10(6):1325-1333. doi: 10.21037/qims-20-546.

Title
Pitfalls of Computed Tomography in the Coronavirus 2019 (COVID-19) Era: A New Perspective on Ground-Glass Opacities

Author
Sara Mehrabi, Silvia Fontana, Francesca Mambrin, Hoang Quyen Nguyen, Elda Righi, Evelina Tacconelli, Giancarlo Mansueto

Abstract
Aim To study ground-glass opacities (GGO) not only from the coronavirus 2019 (COVID-19) pneumonia" perspective but also as a radiological presentation of other pathologies with comparable features. Methods We enrolled 33 patients admitted to Policlinico Universitario G. B. Rossi who underwent non-contrast-enhanced (NCE) or contrast-enhanced (CE) chest computed tomography (CT) between March 12 and April 12. All patients with CT-detected ground-glass opacity (GGO) were included. All patients resulted as COVID-19 negative at the reverse transcription-polymerase chain reaction (RT-PCR) assay. We studied the different pathologies underlying GGO features: neoplastic diseases and non-neoplastic diseases (viral pneumonias, interstitial pneumonias, and cardiopulmonary diseases) in order to avoid pitfalls and to reach the correct diagnosis. Results All CT scans detected GGOs. Symptomatic patients were 25/33 (75.7%). At the clinical presentation, they reported fever and dry cough; in six out of 25 cases, dyspnea was also reported (24%). Thirty-three (33; 100%) showed GGO at CT: 15/33 (45.45%) presented pure GGO, and 18/33 (54.54%) showed GGO with consolidation. The RT-PCR assay was negative in 100%. We investigated other potential underlying diseases to explain imaging features: neoplastic causes (8/33, 24.24%) and non-neoplastic causes, in particular, infectious pneumonias (16/33, 48,48 %, viral and fungal), interstitial pneumonias (4/33, 12,12%), and cardio-pulmonary disease (5/33, 15,15%). Conclusions GGO remains a diagnostic challenge. Although CT represents a fundamental diagnostic tool because of its sensitivity, it still needs to be integrated with clinical data to achieve the best clinical management. In the presence of typical imaging features (e.g. GGO and consolidation), the radiologist should focus on the pandemic and manage a suspect patient as COVID-19 positive until proven to be negative.

Link
https://pubmed.ncbi.nlm.nih.gov/32550070/

Citation
Cureus. 2020 May 16;12(5):e8151. doi: 10.7759/cureus.8151.

Title
Chest CT Study of Fifteen COVID-19 Patients With Positive RT-PCR Retest Results After Discharge

Author
Chenxi Li, Fan Luo, Liqiu Xie, Yueqin Gao, Na Zhang, Bing Wu

Abstract
Background: Our hospital is a designated institution for COVID-19 patients in Chengdu, China. This study aimed to analyze the clinical and chest CT features of 15 COVID-19 patients with positive reverse transcription-polymerase chain reaction (RT-PCR) retest results after discharge. Patients who met the current standards of discharge could still carry the SARS-CoV-2 virus. Methods: Clinical manifestations, laboratory data, and chest CT images were retrospectively reviewed and analyzed. Results: The most common symptoms at Covid-19COVID-19 initial onset were fever (12/15, 80%) and cough (11/15, 73.3%). Most of the patients had a normal white blood cells (12/15, 80%), neutrophils (12/15, 80%), and lymphocytes count (13/15, 86.7%); some patients had increased C-reactive protein (CRP) (5/15, 33.3%), and increased lactate dehydrogenase (LDH) (4/15, 26.7%) during first admission. Five patients (33.3%) had a cough before their first discharge. The average interval from the first discharge to re-admission was 17 days (range, 9-30 days). At re-admission, two (13.3%) patients presented with cough, and one (6.6%) had chest pain with anxiety. At re-admission, all patients had normal clinical results except five (33.3%) patients had increased CRP compared with first discharging, two (13.3%) patients had increased neutrophils count, and one (6.6%) had increased CRP. The majority of patients had normal procalcitonin. Ground glass opacities (GGOs) and reticulation in the peripheral and subpleural areas were the most common CT manifestations, and six patients (40%) showed a transformation from reticulation to GGOs when re-admitted. Conclusions: There may be no specific clinical characteristics to predict the re-detectability of the virus. A regular medical observation and a bi-monthly follow-up is recommended.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7276372/

Citation
Quant Imaging Med Surg. 2020 Jun; 10(6): 1318–1324.

Title
Chest Lesion CT Radiological Features and Quantitative Analysis in RT-PCR Turned Negative and Clinical Symptoms Resolved COVID-19 Patients

Author
Siyao Du, Si Gao, Guoliang Huang, Shu Li, Wei Chong, Ziyi Jia, Gang Hou, Yì Xiáng J Wáng, Lina Zhang

Abstract
Background: Many studies have described lung lesion computed tomography (CT) features of coronavirus disease 2019 (COVID-19) patients at the early and progressive stages. In this study, we aim to evaluate lung lesion CT radiological features along with quantitative analysis for the COVID-19 patients ready for discharge. Methods: From February 10 to March 10, 2020, 125 COVID-19 patients (age: 16-67 years, 63 males) ready for discharge, with two consecutive negative reverse transcription-polymerase chain reaction (RT-PCR) and no clinical symptoms for more than 3 days, were included. The pre-discharge CT was performed on all patients 1-3 days after the second negative RT-PCR test, and the follow-up CTs were performed on 44 patients 2-13 days later. The imaging features and quantitative analysis were evaluated on both the pre-discharge and the follow-up CTs, by both radiologists and an artificial intelligence (AI) software. Results: On the pre-discharge CT, the most common CT findings included ground-glass opacity (GGO) (99/125, 79.2%) with bilateral mixed distribution, and fibrosis (56/125, 44.8%) with bilateral subpleural distribution. Enlarged mediastinal lymph nodes were also commonly observed (45/125, 36.0%). AI enabled quantitative analysis showed the right lower lobe was mostly involved, and lesions most commonly had CT value of -570 to -470 HU consistent with GGO. Follow-up CT showed GGO decrease in size and density (40/40, 100%) and fibrosis reduction (17/26, 65.4%). Compared with the pre-discharge CT results, quantitative analysis shows the lung lesion volume regressed significantly at follow-up. Conclusions: For COVID-19 patients ready for discharge, GGO and fibrosis are the main CT features and they further regress at follow-up.

Link
https://pubmed.ncbi.nlm.nih.gov/32550139/

Citation
Quant Imaging Med Surg. 2020 Jun;10(6):1307-1317. doi: 10.21037/qims-20-531.

Title
Imaging Features of the Initial Chest Thin-Section CT Scans From 110 Patients After Admission With Suspected or Confirmed Diagnosis of COVID-19

Author
Cheng-Juan Long, Ping Fang, Tie-Jun Song, Jing-Chao Zhang, Qing Yang

Abstract
Background: In December 2019, an outbreak of a novel coronavirus pneumonia, now called COVID-19, occurred in Wuhan, Hubei Province, China. COVID-19, which is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has spread quickly across China and the rest of the world. This study aims to evaluate initial chest thin-section CT findings of COVID-19 patients after their admission at our hospital. Methods: Retrospective study in a tertiary referral hospital in Anhui, China. From January 22, 2020 to February 16, 2020, 110 suspected or confirmed COVID-19 patients were examined using chest thin-section CT. Patients in group 1 (n = 51) presented with symptoms of COVID-19 according to the diagnostic criteria. Group 2 (n = 29) patients were identified as a high degree of clinical suspicion. Patients in group 3 (n = 30) presented with mild symptoms and normal chest radiographs. The characteristics, positions, and distribution of intrapulmonary lesions were analyzed. Moreover, interstitial lesions, pleural thickening and effusion, lymph node enlargement, and other CT abnormalities were reviewed. Results: CT abnormalities were found only in groups 1 and 2. The segments involved were mainly distributed in the lower lobes (58.3%) and the peripheral zone (73.8%). The peripheral lesions, adjacent subpleural lesions, accounted for 51.8%. Commonly observed CT patterns were ground-glass opacification (GGO) (with or without consolidation), interlobular septal thickening, and intralobular interstitial thickening. Compared with group 1, patients in group 2 presented with smaller lesions, and all lesions were distributed in fewer lung segments. Localized pleural thickening was observed in 51.0% of group 1 patients and 48.2% of group 2 patients. The prevalence of lymph node enlargement in groups 1 and 2 combined was extremely low (1 of 80 patients), and no significant pleural effusion or pneumothorax was observed (0 of 80 patients). Conclusion: The common features of chest thin-section CT of COVID-19 are multiple areas of GGO, sometimes accompanied by consolidation. The lesions are mainly distributed in the lower lobes and peripheral zone, and a large proportion of peripheral lesions are accompanied by localized pleural thickening adjacent to the subpleural region.

Link
https://pubmed.ncbi.nlm.nih.gov/32539692/

Citation
BMC Med Imaging. 2020 Jun 15;20(1):64. doi: 10.1186/s12880-020-00464-5.

Title
Clinical and Radiological Features of Novel Coronavirus Pneumonia

Author
Qiuting Zheng, Yibo Lu, Fleming Lure, Stefan Jaeger, Puxuan Lu

Abstract
Recently, COVID-19 has spread in more than 100 countries and regions around the world, raising grave global concerns. COVID-19 transmits mainly through respiratory droplets and close contacts, causing cluster infections. The symptoms are dominantly fever, fatigue, and dry cough, and can be complicated with tiredness, sore throat, and headache. A few patients have symptoms such as stuffy nose, runny nose, and diarrhea. The severe disease can progress rapidly into the acute respiratory distress syndrome (ARDS). Reverse transcription polymerase chain reaction (RT-PCR) and Next-generation sequencing (NGS) are the gold standard for diagnosing COVID-19. Chest imaging is used for cross validation. Chest CT is highly recommended as the preferred imaging diagnosis method for COVID-19 due to its high density and high spatial resolution. The common CT manifestation of COVID-19 includes multiple segmental ground glass opacities (GGOs) distributed dominantly in extrapulmonary/subpleural zones and along bronchovascular bundles with crazy paving sign and interlobular septal thickening and consolidation. Pleural effusion or mediastinal lymphadenopathy is rarely seen. In CT imaging, COVID-19 manifests differently in its various stages including the early stage, the progression (consolidation) stage, and the absorption stage. In its early stage, it manifests as scattered flaky GGOs in various sizes, dominated by peripheral pulmonary zone/subpleural distributions. In the progression state, GGOs increase in number and/or size, and lung consolidations may become visible. The main manifestation in the absorption stage is interstitial change of both lungs, such as fibrous cords and reticular opacities. Differentiation between COVID-19 pneumonia and other viral pneumonias are also analyzed. Thus, CT examination can help reduce false negatives of nucleic acid tests.

Link
https://content.iospress.com/articles/journal-of-x-ray-science-and-technology/xst200687

Citation
DOI: 10.3233/XST-200687

Title
Clinical and Radiological Characteristics of Pediatric Patients With COVID-19: Focus on Imaging Findings

Author
Afshin Mohammadi, Iraj Mohebbi, Kamal Khademvatani, Habibollah Pirnejad, Javad Mirza-Aghazadeh, Naser Gharebaghi, Ali Abbasian Ardakani, Mohammad Mirza-Aghazadeh-Attari

Abstract
Purpose: CT imaging has been a detrimental tool in the diagnosis of COVID-19, but it has not been studied thoroughly in pediatric patients and its role in diagnosing COVID-19. Methods: 27 pediatric patients with COVID-19 pneumonia were included. CT examination and molecular assay tests were performed from all participants. A standard checklist was utilized to extract information, and two radiologists separately reviewed the CT images. Results: The mean age of patients was 4.7 ± 4.16 (mean ± SD) years. Seventeen patients were female, and ten were male. The most common imaging finding was ground-glass opacities followed by consolidations. Seven patients had a single area of involvement, five patients had multiple areas of involvement, and four patients had diffuse involvement. The sensitivity of CT imaging in diagnosing infections was 66.67%. Also, some uncommon imaging findings were seen, such as a tree-in-bud and lung collapse. Conclusion: CT imaging shows less involvement in pediatric compared to adult patients, due to pediatric patients having a milder form of the disease. CT imaging also has a lower sensitivity in detecting abnormal lungs compared to adult patients. The most common imaging findings are ground-glass opacities and consolidations, but other non-common imaging findings also exist.

Link
https://pubmed.ncbi.nlm.nih.gov/32535725/

Citation
Jpn J Radiol. 2020 Jun 13;1-6. doi: 10.1007/s11604-020-01003-6. Online ahead of print.

Title
CT Imaging Features of COVID-19 Pneumonia: Initial Experience From Turkey

Author
Akın Çinkooğlu, Cenk Hepdurgun, Selen Bayraktaroğlu, Naim Ceylan, Recep Savaş

Abstract
Purpose: We aimed to demonstrate the computed tomography (CT) findings observed at the initial presentation of coronavirus disease 2019 (COVID-19) pneumonia and reveal the most frequent infiltration and distribution patterns of the disease. Methods: One hundred and eighty-five patients (87 men, 98 women; mean age, 48.7 years), who underwent RT-PCR sampling and high-resolution CT examination in our hospital between March 15, 2020, and April 15, 2020, and got a definitive diagnosis of COVID-19 disease via initial or follow-up RT-PCR test, were included in the study. We comprehensively analyzed the most common and relatively rare CT imaging features (e.g., distribution pattern, density of the lesions, additional CT signs) in patients diagnosed with COVID-19 pneumonia. Results: Thirty-eight patients (20.6%) had no evidence of pneumonia on their initial high-resolution CT images. Among 147 patients (79.4%) who had parenchymal infiltration consistent with pneumonia, 10 (6.8%) had a negative baseline RT-PCR test, and positivity was detected as a result of repeated tests. Most of the patients had multifocal (89.1%) and bilateral (86.4%) lesions. The most common location, right lower lobe, was affected in 87.8% of the patients. Lesions were distributed predominantly at peripheral (87.1%) and posterior (46.3%) areas of lung parenchyma. Most of the patients had pure ground glass opacity (GGO) (82.3%) followed by GGO with consolidation (32.7%) and crazy paving pattern (21.8%). Pure consolidation, solid nodules, halo sign, reverse halo sign, vascular enlargement, subpleural line, air-bronchogram, and bronchiectasis were the other findings observed in at least 15% of the cases. Halo sign, acinar nodules, air-bubble sign, pleural thickening and effusion, mediastinal and/or hilar lymphadenopathy were seen rarely (2%-12.9%). Pericardial effusion, pneumothorax, cavitation, and tree-in-bud pattern were not detected in our study group. Conclusion: Multifocal and bilateral GGO infiltration predominantly distributed in peripheral, posterior, and lower lung areas was the most common infiltration pattern.

Link
https://pubmed.ncbi.nlm.nih.gov/32558645/

Citation
Diagn Interv Radiol. 2020 Jun 19. doi: 10.5152/dir.2020.20307. Online ahead of print.

Title
Incidental Typical COVID-19 Appearance on the Lung Bases, Visualized at Abdominal CT for a Patient That Presented With Abdominal Pain and Nausea

Author
Amr Adnan Sendi, Doaa Fahmi Saggat, Saeed Jaber Alzahrani

Abstract
This is a case report of a 55-year-old male patient, medically free presented to the emergency department at our hospital, King Fahd Armed Forces Hospital, Jeddah, Saudi Arabia. The patient presented with generalized abdominal pain and nausea only, without fever or any respiratory symptoms. On a computed tomography scan examination of the abdomen to rule out bowel ischemia, an incidental finding of a typical appearance of COVID-19 pneumonia was found at the visualized lung bases. The diagnosis of COVID-19 was confirmed afterward by laboratory testing. Conclusion: Typical COVID-19 findings can be suggested on lung bases at abdominal CT.

Link
https://pubmed.ncbi.nlm.nih.gov/32542102/

Citation
Radiol Case Rep. 2020 Aug;15(8):1238-1241. doi: 10.1016/j.radcr.2020.05.039. Epub 2020 May 21.

COVID-19

Scientific letter

Title
Managing high clinical suspicion COVID-19 inpatients with negative RT-PCR: a pragmatic and limited role for thoracic CT

Author
Tavare AN, Braddy A, Brill S, Jarvis H, Sivaramakrishnan A, Barnett J, Creer DD, Hare SS.

Link
https://pubmed.ncbi.nlm.nih.gov/32317269/

Citation
Thorax. 2020 Apr 21. pii: thoraxjnl-2020-214916. doi: 10.1136/thoraxjnl-2020-214916. [Epub ahead of print]

Title
An update on CT chest findings in coronavirus disease-19 (COVID-19)

Author
Sahu KK, Lal A, Mishra AK.

Link
https://pubmed.ncbi.nlm.nih.gov/32204949/

Citation
Heart Lung. 2020 Mar 20;S0147-9563(20)30094-7. doi: 10.1016/j.hrtlng.2020.03.007.

Title
CT Findings of Coronavirus Disease (COVID-19) Severe Pneumonia

Author
Guan W, Liu J, Yu C.

Link
https://pubmed.ncbi.nlm.nih.gov/32208010/

Citation
AJR Am J Roentgenol. 2020 Mar 24;W1-W2. doi: 10.2214/AJR.20.23035.

Title
The evolution of CT characteristics in the patients with COVID-19 pneumonia

Author
Lei P, Fan B, Yuan Y.

Link
https://pubmed.ncbi.nlm.nih.gov/32201155/

Citation
J Infect. 2020 Mar 19;S0163-4453(20)30143-2. doi: 10.1016/j.jinf.2020.03.014.

Title
The Progression of Computed Tomographic (CT) Images in Patients with Coronavirus Disease (COVID-19) Pneumonia: The CT progression of COVID-19 pneumonia

Author
Lei DP.

Link
https://pubmed.ncbi.nlm.nih.gov/32205140/

Citation
J Infect. 2020 Mar 20;S0163-4453(20)30151-1. doi: 10.1016/j.jinf.2020.03.020.

Title
Essentials for Radiologists on COVID-19: An Update- Radiology Scientific Expert Panel

Author
Kanne JP, Little BP, Chung JH, Elicker BM, Ketai LH.

Link
https://pubs.rsna.org/doi/10.1148/radiol.2020200527?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Citation
Radiology. Feb 27 2020https://doi.org/10.1148/radiol.2020200527

Title
Recommendation of low-dose CT in the detection and management of COVID-2019.

Author
Kang Z1, Li X1, Zhou S2.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=Recommendation+of+low-dose+CT+in+the+detection+and+management+of+COVID-2019

Citation
Eur Radiol. 2020 Mar 19. doi: 10.1007/s00330-020-06809-6.

Title
Clinical and CT imaging features of 2019 novel coronavirus disease (COVID-19)

Author
Zhu Y, Gao ZH, Liu YL, Xu DY, Guan TM, Li ZP, Kuang JY, Li XM, Yang YY, Feng ST.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32277968

Citation
J Infect. 2020 Apr 8;S0163-4453(20)30161-4. doi: 10.1016/j.jinf.2020.03.033.

Title
A role for CT in COVID-19? What data really tell us so far

Author
Hope MD, Raptis CA, Shah A, Hammer MM, Henry TS; six signatories.

Link
https://pubmed.ncbi.nlm.nih.gov/32224299/

Citation
Lancet. 2020 Apr 11;395(10231):1189-1190. doi: 10.1016/S0140-6736(20)30728-5. Epub 2020 Mar 27.

Title
CT screening for early diagnosis of SARS-CoV-2 infection

Author
Huang Y, Cheng W, Zhao N, Qu H, Tian J.

Link
https://pubmed.ncbi.nlm.nih.gov/32222164/

Citation
Lancet Infect Dis. 2020 Mar 26;S1473-3099(20)30241-3. doi: 10.1016/S1473-3099(20)30241-3.

Title
CT screening for early diagnosis of SARS-CoV-2 infection - Authors' reply

Author
Shi H, Han X, Cao Y, Alwalid O, Zheng C.

Link
https://pubmed.ncbi.nlm.nih.gov/32222163/

Citation
Lancet Infect Dis. 2020 Mar 26;S1473-3099(20)30247-4. doi: 10.1016/S1473-3099(20)30247-4.

Title
Protection of CT suites from COVID-19 infection in a tertiary emergency hospital

Author
Katsumori T, Yoshikawa T.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32248511

Citation
Jpn J Radiol. 2020 Apr 4. doi: 10.1007/s11604-020-00964-y.

Title
CT chest findings in coronavirus disease-19 (COVID-19)

Author
Lal A, Mishra AK, Sahu KK.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32265095

Citation
J Formos Med Assoc. 2020 Apr 4. doi: 10.1016/j.jfma.2020.03.010.

Title
Favorable changes of CT findings in a patient with COVID-19 pneumonia after treatment with tocilizumab

Author
Cellina M, Orsi M, Bombaci F, Sala M, Marino P, Oliva G.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32278585

Citation
Diagn Interv Imaging. 2020 Mar 31;S2211-5684(20)30087-5. doi: 10.1016/j.diii.2020.03.010.

Title
CT Manifestation of COVID-19 Pneumonia; Role of Multiplanar Imaging

Author
Ostad SP, Haseli S, Iranpour P.

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7144862/

Citation
Acad Radiol. 2020 Apr 7 doi: 10.1016/j.acra.2020.03.028

Title
A call for caution in extrapolating chest CT sensitivity for COVID-19 derived from hospital data to patients among general population

Author
Wáng YXJ.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32269938

Citation
Quant Imaging Med Surg. 2020 Mar;10(3):798-799. doi: 10.21037/qims.2020.03.04.

Title
The role of CT in case ascertainment and management of COVID-19 pneumonia in the UK: insights from high-incidence regions

Author
Chua F, Armstrong-James D, Desai SR, Barnett J, Kouranos V, Kon OM, José R, Vancheeswaran R, Loebinger MR, Wong J, Cutino-Moguel MT, Morgan C, Ledot S, Lams B, Yip WH, Li L, Lee YC, Draper A, Kho SS, Renzoni E, Ward K, Periselneris J, Grubnic S, Lipman M, Wells AU, Devaraj A.

Link
https://pubmed.ncbi.nlm.nih.gov/32220663/

Citation
Lancet Respir Med. 2020 Mar 25;S2213-2600(20)30132-6. doi: 10.1016/S2213-2600(20)30132-6.

Title
Regarding "Artificial Intelligence Distinguishes COVID-19 from Community Acquired Pneumonia on Chest CT“

Author
Dadário AMV, Paiva JPQ, Chate RC, Machado BS, Szarf G.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32243239

Citation
Radiology. 2020 Apr 3:201178. doi: 10.1148/radiol.2020201178. [Epub ahead of print]

Title
The indispensable role of chest CT in the detection of coronavirus disease 2019 (COVID-19)

Author
Liu J, Yu H, Zhang S.

Link
https://pubmed.ncbi.nlm.nih.gov/32246209/

Citation
Eur J Nucl Med Mol Imaging. 2020 Apr 3;1-2. doi: 10.1007/s00259-020-04795-x.

Title
CT Findings of Pregnant Women With Coronavirus Disease (COVID-19) Pneumonia.

Author
Moradi B, Kazemi MA, Gity M.

Link
https://pubmed.ncbi.nlm.nih.gov/32286871/

Citation
AJR Am J Roentgenol. 2020 Apr 14;W1. doi: 10.2214/AJR.20.23212. Online ahead of print.

Title
CT Is Not a Screening Tool for Coronavirus Disease (COVID-19) Pneumonia

Author
Erturk SM.

Link
https://pubmed.ncbi.nlm.nih.gov/32286875/

Citation
AJR Am J Roentgenol. 2020 Apr 14;W1. doi: 10.2214/AJR.20.23220.

Title
Reply to "CT Is Not a Screening Tool for Coronavirus Disease (COVID-19) Pneumonia"

Author
Lin Y, Zhao W, Liu J.

Link
https://pubmed.ncbi.nlm.nih.gov/32301632/

Citation
AJR Am J Roentgenol. 2020 Apr 17;W1. doi: 10.2214/AJR.20.23288.

Title
CT of Coronavirus Disease (COVID-19) Pneumonia: A Reference Standard Is Needed

Author
Erturk SM.

Link
https://pubmed.ncbi.nlm.nih.gov/32302207/

Citation
AJR Am J Roentgenol. 2020 Apr 17;W1. doi: 10.2214/AJR.20.23286.

Title
Chest CT Findings and Clinical Conditions of Coronavirus Disease (COVID-19)

Author
Joob B, Wiwanitkit V.

Link
https://pubmed.ncbi.nlm.nih.gov/32233926/

Citation
AJR Am J Roentgenol. 2020 Apr 1;W1. doi: 10.2214/AJR.20.23064.

Title
Reply to "Chest CT Findings and Clinical Conditions of Coronavirus Disease (COVID-19)"

Author
Zhong Z, Zhao W, Liu J.

Link
https://pubmed.ncbi.nlm.nih.gov/32286873/

Citation
AJR Am J Roentgenol. 2020 Apr 14;W1. doi: 10.2214/AJR.20.23289.

Title
Acute Pulmonary Embolism Associated with COVID-19 Pneumonia Detected by Pulmonary CT Angiography

Author
Grillet F, Behr J, Calame P, Aubry S, Delabrousse E.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32317269

Citation
Radiology. 2020 Apr 23:201544. doi: 10.1148/radiol.2020201544. [Epub ahead of print]

Title
Acute Pulmonary Embolism in COVID-19 Patients on CT Angiography and Relationship to D-Dimer Levels

Author
Leonard-Lorant I, Delabranche X, Severac F, Helms J, Pauzet C, Collange O, Schneider F, Labani A, Bilbault P, Moliere S, Leyendecker P, Roy C, Ohana M.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32324103

Citation
Radiology. 2020 Apr 23:201561. doi: 10.1148/radiol.2020201561. [Epub ahead of print]

Title
Accuracy and reproducibility of low-dose submillisievert chest CT for the diagnosis of COVID-19

Author
Dangis A, Gieraerts C, De Bruecker Y, Janssen L, Valgaeren H, Obbels D, Gillis M, Van Ranst M, Frans J, Demeyere A, Symons R.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32324102

Citation
Radiology. 2020 Apr 23;201561. doi: 10.1148/radiol.2020201561. Online ahead of print.

Title
Computed Tomographic Features and Short-term Prognosis of Coronavirus Disease 2019 (COVID-19) Pneumonia: A Single-Center Study from Kashan, Iran

Author
Tabatabaei SMH, Talari H, Moghaddas F, Rajebi H.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200196

Citation
Radiology. 2020 Mar 17 https://doi.org/10.1148/ryct.2020200110

Title
Thin-section Chest CT Imaging of Coronavirus Disease 2019 Pneumonia: Comparison Between Patients with Mild and Severe Disease

Author
Yu M, Xu D, Lan L, Tu M, Liao R, Cai S, Cao Y, Xu L, Liao M, Zhang X, Xiao SY, Li Y, Xu H.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200140

Citation
Radiology. Apr 23 2020https://doi.org/10.1148/ryct.2020200140

Title
CT on the Diamond Princess: What Might This Tell Us About Sensitivity for COVID-19?

Author
Isikbay M, Hope MD, Raptis CA, Shah A, Bierhals AJ, Bhalla S, Hammer MM, Kligerman SJ, Jeudy J, Filev PD, Henry TS.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200126

Citation
Radiology. Apr 23 2020https://doi.org/10.1148/ryct.2020200126

Title
Vascular Abnormalities as Part of Chest CT Findings in COVID-19

Author
Qanadli SD, Rotzinger DC.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200155

Citation
Radiology. Apr 20 2020https://doi.org/10.1148/ryct.2020200155

Title
Reply to "Vascular Changes Detected With Thoracic CT in Coronavirus Disease (COVID-19) Might Be Significant Determinants for Accurate Diagnosis and Optimal Patient Management"

Author
Salehi S, Abedi A, Gholamrezanezhad A.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32319792

Citation
AJR Am J Roentgenol. 2020 Apr 24:W1. doi: 10.2214/AJR.20.23339. [Epub ahead of print]

Title
Characteristic CT findings distinguishing 2019 novel coronavirus disease (COVID-19) from influenza pneumonia

Author
Wang H, Wei R, Rao G, Zhu J, Song B.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32330077

Citation
Eur Radiol. 2020 Apr 22. doi: 10.1007/s00330-020-06880-z. [Epub ahead of print]

Title
CT imaging features of 4,121 patients with COVID-19: a meta-analysis

Author
Zhu J, Zhong Z, Li H, Ji P, Pang J, Li B, Zhang J.

Link
https://pubmed.ncbi.nlm.nih.gov/32314805/

Citation
J Med Virol. 2020 Apr 21. doi: 10.1002/jmv.25910. Online ahead of print.

Title
Chest CT in patients suspected of COVID-19 infection: A reliable alternative for RT-PCR

Author
Majidi H, Niksolat F.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=Chest+CT+in+patients+suspected+of+COVID-19+infection%3A+A+reliable+alternative+for+RT-PCR

Citation
Am J Emerg Med. 2020 Apr 8. pii: S0735-6757(20)30244-8. doi: 10.1016/j.ajem.2020.04.016. [Epub ahead of print]

Title
CT challenges the result of SARS-CoV-2 nucleic acid test in a suspected COVID-19 case

Author
Yan K, Zhang J, Zhang Y, Zhang S, Ting C, Zheng J.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32319876

Citation
Infect Control Hosp Epidemiol. 2020 Apr 22:1-5. doi: 10.1017/ice.2020.171. [Epub ahead of print]

Title
COVID-19 and chest CT: do not put the sensitivity value in the isolation room and look beyond the numbers

Author
Adams HJA, Kwee TC, Kwee RM.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32339083

Citation
Radiology. 2020 Apr 27:201709. doi: 10.1148/radiol.2020201709. [Epub ahead of print]

Title
Reply to "Clinical Features and Chest CT Manifestations of Coronavirus Disease (COVID-19)“

Author
Yang W.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32343609

Citation
AJR Am J Roentgenol. 2020 Apr 28:W1. doi: 10.2214/AJR.20.23342. [Epub ahead of print]

Title
COVID-19 Evaluation by Low-Dose High Resolution CT Scans Protocol

Author
Radpour A, Bahrami-Motlagh H, Taaghi MT, Sedaghat A, Karimi MA, Hekmatnia A, Haghighatkhah HR, Sanei-Taheri M, Arab-Ahmadi M, Azhideh A.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=COVID-19+Evaluation+by+Low-+Dose+High+Resolution+CT+Scans+Protocol

Citation
Acad Radiol. 2020 Apr 17. pii: S1076-6332(20)30208-7. doi: 10.1016/j.acra.2020.04.016. [Epub ahead of print]

Title
COVID-19 Protection Guidelines in Outpatient Medical Imaging Centers

Author
Sedaghat A, Gity M, Radpour A, Karimi MA, Haghighatkhah HR, Keshavarz E, Hekmatnia A, Arab-Ahmadi M, Sanei-Taheri M, Azhideh A.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32336647

Citation
Acad Radiol. 2020 Apr 17. pii: S1076-6332(20)30212-9. doi: 10.1016/j.acra.2020.04.019. [Epub ahead of print]

Title
Targeted early chest CT in COVID-19 outbreaks as diagnostic tool for containment of the pandemic- A multinational opinion.

Author
Amalou A, Türkbey B, Sanford T, Harmon S, Türkbey EB, Xu S, An P, Carrafiello G, Cariati M, Patella F, Obinata H, Mori H, Sun K, Spiro DJ, Suh R, Amalou H, Wood BJ.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32352918

Citation
Diagn Interv Radiol. 2020 Apr 30. doi: 10.5152/dir.2020.20231. [Epub ahead of print]

Title
Chest CT as a screening tool for COVID-19 in unrelated patients and asymptomatic subjects without contact history is unjustified

Author
Liu WH, Wang XW, Cai ZQ, Wang X, Huang XL, Jin ZG.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32355653

Citation
Quant Imaging Med Surg. 2020 Apr;10(4):876-877. doi: 10.21037/qims.2020.04.02

Title
Unmatched clinical presentation and chest CT manifestation in a patient with severe coronavirus disease 2019 (COVID-19)

Author
Zhang B, Zhang J, Chen H, Yang K, Zhang S.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32355651

Citation
Quant Imaging Med Surg. 2020 Apr;10(4):871-873. doi: 10.21037/qims.2020.03.12.

Title
Hypoxaemia related to COVID-19: vascular and perfusion abnormalities on dual-energy CT

Author
Lang M, Som A, Mendoza DP, Flores EJ, Reid N, Carey D, Li MD, Witkin A, Rodriguez-Lopez JM, Shepard JO, Little B**P.**

Link
https://www.ncbi.nlm.nih.gov/pubmed/32359410

Citation
Lancet Infect Dis. 2020 Apr 30. pii: S1473-3099(20)30367-4. doi: 10.1016/S1473-3099(20)30367-4. [Epub ahead of print]

Title
Incidentally discovered COVID-19 pneumonia: the role of diagnostic imaging

Author
Pozzessere C, Rotzinger DC, Ghaye B, Lamoth F, Beigelman-Aubry C.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32367421

Citation
Eur Radiol. 2020 May 4. doi: 10.1007/s00330-020-06914-6. [Epub ahead of print]

Title
CT and COVID-19: Chinese experience and recommendations concerning detection, staging and follow-up

Author
Fan L, Liu S.

Link
https://www.ncbi.nlm.nih.gov/pubmed/?term=CT+and+COVID-19%3A+Chinese+experience+and+recommendations+concerning+detection%2C+staging+and+follow-up

Citation
Eur Radiol. 2020 May 6. doi: 10.1007/s00330-020-06898-3. [Epub ahead of print]

Title
Aspiration Pneumonia or COVID-19 Infection: A Diagnostic Challenge

Author
Zarei F, Reza J, Sefidbakht S, Iranpour P, Haghighi RR.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32381329

Citation
Acad Radiol. 2020 May 3. pii: S1076-6332(20)30246-4. doi: 10.1016/j.acra.2020.04.034. [Epub ahead of print]

Title
"Reversed halo sign" on 3D CT in COVID-19

Author
Bekci T.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32352916

Citation
Diagn Interv Radiol. 2020 Apr 30. doi: 10.5152/dir.2020.20254. [Epub ahead of print]

Title
Lessons learned from chest CT in COVID-19.

Author
Soyer P.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32362428

Citation
Diagn Interv Imaging. 2020 May;101(5):261-262. doi: 10.1016/j.diii.2020.04.006.

Title
The Role of Repeat Chest CT Scan in the COVID-19 Pandemic

Author
Mahdavi A, Haseli S, Mahdavi A, Bakhshayeshkaram M, Foroumandi M, Nekooghadam SM, Raoufi M, Taheri MS.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32389601

Citation
Acad Radiol. 2020 May 3. pii: S1076-6332(20)30243-9. doi: 10.1016/j.acra.2020.04.031. [Epub ahead of print]

Title
Pulmonary infarction secondary to pulmonary thromboembolism in COVID-19 diagnosed with dual-energy CT pulmonary angiography

Author
Marsico S, Espallargas Giménez I, Carbullanca Toledo SJ, Del Carpio Bellido LA, Maiques Llácer JM, Zuccarino F.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32402687

Citation
Rev Esp Cardiol (Engl Ed). 2020 Apr 27. pii: S1885-5857(20)30174-2. doi: 10.1016/j.rec.2020.04.013. [Epub ahead of print]

Title
Value of Chest CT as COVID 19 screening tool in children

Author
Merkus PJ, Klein WM.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32398302

Citation
Eur Respir J. 2020 May 12. pii: 2001241. doi: 10.1183/13993003.01241-2020. [Epub ahead of print]

Title
A case series of chest imaging manifestation of COVID-19

Author
Vegar-Zubović S, Izetbegović S, Zukić F, Jusufbegović M, Kristić S, Prevljak S, Šehić A, Julardžija F.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32410816

Citation
Radiography (Lond). 2020 May 14. doi: 10.1016/j.radi.2020.05.003. [Epub ahead of print]

Title
Low-dose CT in COVID-19 outbreak: radiation safety, image wisely, and image gently pledge

Author
Tofighi S, Najafi S, Johnston SK, Gholamrezanezhad A.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32390122

Citation
Emerg Radiol. 2020 May 10. doi: 10.1007/s10140-020-01784-3. [Epub ahead of print]

Title
Acute Pulmonary Embolism and COVID-19

Author
Poyiadi N, Cormier P, Patel PY, Hadied MO, Bhargava P, Khanna K, Nadig J, Keimig T, Spizarny D, Reeser N, Klochko C, Peterson EL, Song T.

Link
https://www.ncbi.nlm.nih.gov/pubmed/32407256

Citation
Radiology. 2020 May 14:201955. doi: 10.1148/radiol.2020201955. [Epub ahead of print]

Title
Chest CT and Coronavirus Disease (COVID-19): A More Complete Review

Author
Joseph B Fraiman

Link
https://www.ajronline.org/doi/full/10.2214/AJR.20.23428

Citation
American Journal of Roentgenology: W1-W1. 10.2214/AJR.20.23428

Title
The Role of Non-Contrast Chest CT in Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) Pediatric Patients

Author
Rishi Philip Mathew, Merin Jose, Ajith Toms

Link
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7232910/

Citation
Indian J Pediatr. 2020 May 18 : 1.
doi: 10.1007/s12098-020-03338-4 [Epub ahead of print]

Title
Admission Chest CT Score Predicts 5-day Outcome in Patients With COVID-19

Author
Elyas Mahdjoub, Waqaas Mohammad, Thomas Lefevre, Marie-Pierre Debray, Antoine Khalil, Study Group

Link
https://pubmed.ncbi.nlm.nih.gov/32468085/?from_single_result=Admission+Chest+CT+Score+Predicts+5-day+Outcome+in+Patients+With+COVID-19

Citation
Intensive Care Med. 2020 May 28. doi: 10.1007/s00134-020-06118-y. Online ahead of print.

Title
Regarding “Serial Quantitative Chest CT Assessment of COVID-19: Deep-Learning Approach”

Author
Marcelo Straus Takahashi, Matheus Ribeiro Furtado de Mendonça, Ian Pan, Rogerio Zaia Pinetti, Felipe C Kitamura.

Link
https://pubs.rsna.org/doi/full/10.1148/ryct.2020200242

Citation
Published Online:May 27 2020https://doi.org/10.1148/ryct.2020200242

Title
Alternative Strategies for CT Unit Management During the COVID-19 Pandemic: A Single Center Experience

Author
Recep Savaş

Link
https://pubmed.ncbi.nlm.nih.gov/32490827/?from_sort=date&from_size=100&from_term=Sava%C5%9F+R&from_cauthor_id=32490827&from_pos=1

Citation
Diagn Interv Radiol. 2020 Jun 3. doi: 10.5152/dir.2020.20313. Online ahead of print.

Title
Abdomen CT Findings in a COVID-19 Patient With Intestinal Symptoms and Possibly False Negative RT-PCR Before Initial Discharge

Author
Yi Guo, Xiaofei Hu, Fei Yu, Jiao Chen, Wei Zheng, Jun Liu, Ping Zeng

Link
https://pubmed.ncbi.nlm.nih.gov/32489939/?from_single_result=Abdomen+CT+Findings+in+a+COVID-19+Patient+With+Intestinal+Symptoms+and+Possibly+False+Negative+RT-PCR+Before+Initial+Discharge

Citation
Quant Imaging Med Surg. 2020 May;10(5):1158-1161. doi: 10.21037/qims-20-463.

Title
Radiological Follow-Up of Twelve COVID-19 Patients With Initially Normal Chest CT

Author
Chuanjun Xu, Qiuzhen Xu, Chao Du, Jinlong Li, Zhiliang Hu, Yongxiang Yi

Link
https://pubmed.ncbi.nlm.nih.gov/32489938/?from_sort=date&from_size=100&from_term=Xu+C&from_cauthor_id=32489938&from_pos=11

Citation
Quant Imaging Med Surg. 2020 May;10(5):1153-1157. doi: 10.21037/qims-20-539.

Title
Computed Tomography (CT) Intestinal Alterations of Coronavirus Disease 2019 (COVID-19) From the Imaging Perspective: A Case Description

Author
Lei Tang, Xinge Cheng, Chong Tian, Rongpin Wang, Hourong Zhou, Weidong Wu, Lin Yan, Xianchun Zeng

Link
https://pubmed.ncbi.nlm.nih.gov/32489936/?from_sort=date&from_size=100&from_term=Tang+L&from_cauthor_id=32489936&from_pos=13

Citation
Quant Imaging Med Surg. 2020 May;10(5):1145-1149. doi: 10.21037/qims.2020.04.09.

Title
The Role of Pulmonary CT Scans for Children During the COVID-19 Pandemic

Author
Ian P Sinha, Musa Kaleem

Link
https://pubmed.ncbi.nlm.nih.gov/32498685/?from_sort=date&from_size=100&from_term=Sinha+IP&from_cauthor_id=32498685&from_pos=1

Citation
BMC Med. 2020 Jun 5;18(1):171. doi: 10.1186/s12916-020-01647-1.

Title
Anormal Pulmonary Function and Residual CT Abnormalities in Rehabilitating COVID-19 Patients After Discharge: A Prospective Cohort Study

Author
Jingjing You, Lu Zhang, Ma-Yi-di-Li Ni-Jia-Ti, Jue Zhang, Fuyin Hu, Luyan Chen, Yuhao Dong, Ke Yang, Bin Zhang, Shuixing Zhang

Link
https://pubmed.ncbi.nlm.nih.gov/32512021/?from_sort=date&from_size=100&from_term=You+J&from_cauthor_id=32512021&from_pos=3

Citation
J Infect. 2020 Jun 5;S0163-4453(20)30382-0. doi: 10.1016/j.jinf.2020.06.003. Online ahead of print.

Title
COVID-19 Carrier or Pneumonia: Positive Real-Time Reverse-Transcriptase Polymerase Chain Reaction but Negative or Positive Chest CT Results

Author
Pinggui Lei, Bing Fan, Yipeng Sun

Link
https://pubmed.ncbi.nlm.nih.gov/32524793/?from_sort=date&from_size=100&from_term=Lei+P&from_cauthor_id=32524793&from_pos=2

Citation
Korean J Radiol. 2020 Jul;21(7):925-928. doi: 10.3348/kjr.2020.0360.

Title
On the Role of Chest Radiography and CT in the Coronavirus Disease (COVID-19) Pandemic

Author
Nicola Flor, Roberto Dore, Francesco Sardanelli

Link
https://pubmed.ncbi.nlm.nih.gov/32538693/

Citation
AJR Am J Roentgenol. 2020 Jun 15;W1. doi: 10.2214/AJR.20.23411. Online ahead of print.

Title
Coronavirus Disease (COVID-19) Detected at the Lung Apices During CT Angiography in Acute Stroke Assessment

Author
John P Hynes, Paul Moore, John G Murray

Link
https://pubmed.ncbi.nlm.nih.gov/32538694/

Citation
AJR Am J Roentgenol. 2020 Jun 15;W1. doi: 10.2214/AJR.20.23484. Online ahead of print.

Title
Evidence of Added Value of Chest CT in Coronavirus Disease (COVID-19) Pneumonia With Initial Negative RT-PCR Results

Author
Ling Ling Chan, Eng King Tan

Link
https://pubmed.ncbi.nlm.nih.gov/32559115/

Citation
AJR Am J Roentgenol. 2020 Jun 19;W1. doi: 10.2214/AJR.20.23815. Online ahead of print.

Title
CT Fluid-Blood Levels in COVID-19 Intracranial Hemorrhage

Author
N K Wee, E B Fan, K C H Lee, Y W Chia, T C C Lim

Link
https://pubmed.ncbi.nlm.nih.gov/32554426/

Citation
AJNR Am J Neuroradiol. 2020 Jun 18. doi: 10.3174/ajnr.A6672. Online ahead of print.

Title
Clarification on Pleural Effusions in COVID-19

Author
Avinash Aujayeb.

Link
https://pubs.rsna.org/doi/10.1148/ryct.2020200330

Citation
https://doi.org/10.1148/ryct.2020200330

Title
Thoracic Computed Tomography Features of Coronavirus Disease 2019 Patients With Emphysema

Author
Stephanie Tittaferrante, Rohit Gupta, Victor Kim, Temple University COVID-19 Research Group

Link
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Chronic Obstr Pulm Dis. 2020 Jun 15;7(3). doi: 10.15326/jcopdf.7.3.2020.0166. Online ahead of print.

Title
Appropriate Terms for Chest CT Features in COVID-19 Infection

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Michele Scialpi, Irene Piscioli, Antonio Improta, Danilo Delli Carpini, Francesco Mancioli

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Citation
Jpn J Radiol. 2020 Jun 15;1. doi: 10.1007/s11604-020-01002-7. Online ahead of print.

Title
Positive Conversion of COVID-19 After Two Consecutive Negative RT-PCR Results: A Role of Low-Dose CT

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Kum Ju Chae, Gong Yong Jin, Chang-Seop Lee, Heung Bum Lee, Ju-Hyung Lee, Keun-Sang Kwon

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