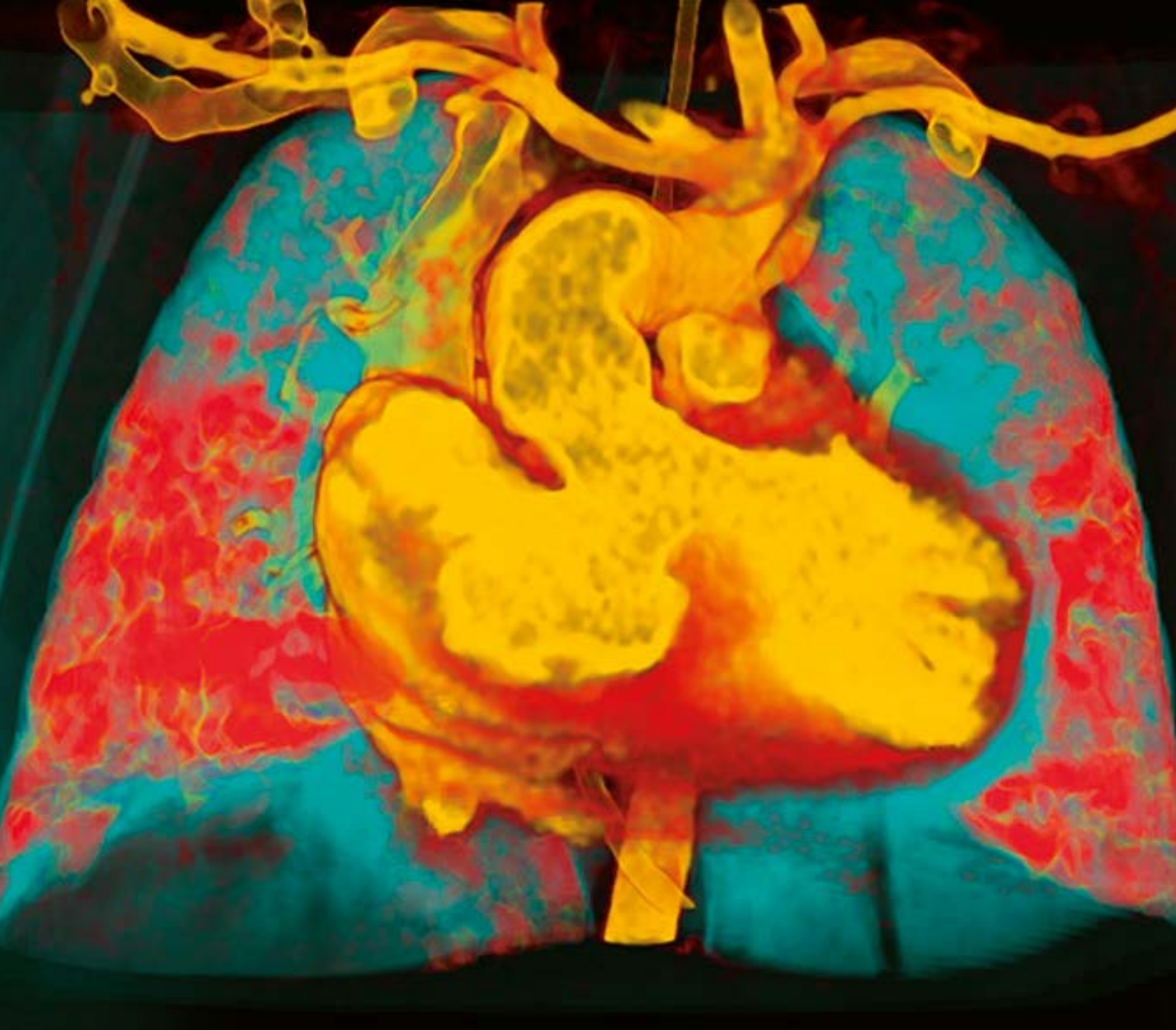


Get further.

With True Dual Energy.

siemens-healthineers.com/clinical-engines

SIEMENS Healthineers

Get further with your CT.

More and more radiologists are relying on the rich diagnostic possibilities offered by True Dual Energy imaging on Siemens Healthineers' CT scanner fleet ranging from SOMATOM Scope up to the outstanding SOMATOM Force.

The question is: What makes True Dual Energy stand out? Look for these three criteria: crisp images with the option for even sharper contrast and significant metal artifact reduction, no extra dose in either Single Source or Dual Source Dual Energy scans, and broad applicability for virtually all clinical questions and patients.

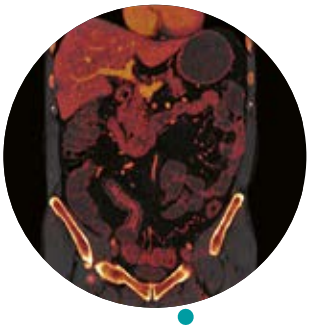
See what's relevant
Dual Energy (DE) from Siemens Healthineers – True Dual Energy – offers crisp image quality with no extra radiation dose. In addition, Dual Energy CT offers you clinical information beyond morphology and allows you to highlight, characterize, quantify, and differentiate the material in your scans.

Deliver to the point
Only with Siemens Healthineers' SOMATOM CT scanners do you get all advantages of True Dual Energy imaging with no dose penalty in either Single Source or Dual Source Dual Energy scans. With the latest dose reduction techniques, such as the Tin Filter, ADMIRE, and CARE Dose4D™, you will find the right dose level for generating valuable diagnostic information at the best possible image quality.

Get the most out of your images
Every patient is different. But True Dual Energy offers you dedicated protocols and evaluation software applications for virtually all patients and a wide range of clinical questions.

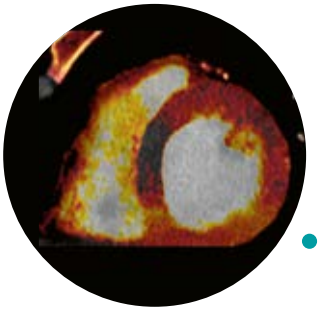
So if you want to highlight, characterize, quantify, and differentiate material, don't settle for less. True Dual Energy offers you leading technology from the company that pioneered it – and that's Siemens Healthineers.

Dual Energy Applications Overview

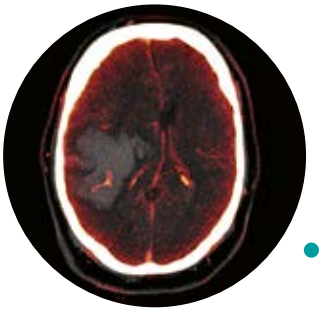


- *syngo*.CT DE Virtual Unenhanced

- *syngo*.CT DE Direct Angio

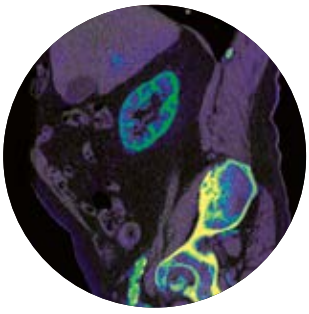


- *syngo*.CT DE Heart PBV



- *syngo*.CT DE Brain Hemorrhage

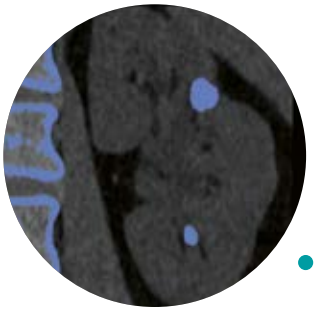
Advanced Package



- *syngo*.CT Dual Energy

Standard Functionality

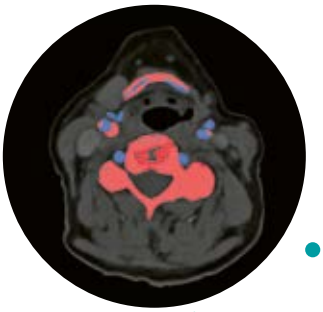
- *syngo*.CT DE Gout



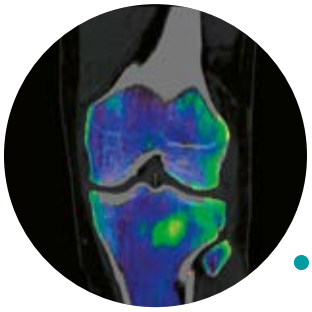
- *syngo*.CT DE Calculi Characterization

- *syngo*.CT DE Lung Analysis

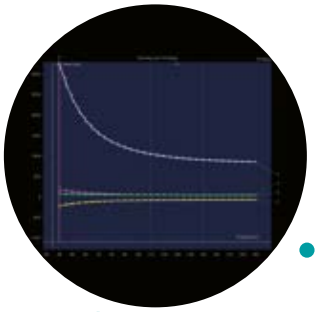
Advanced Package



- *syngo*.CT DE Hardplaque Display

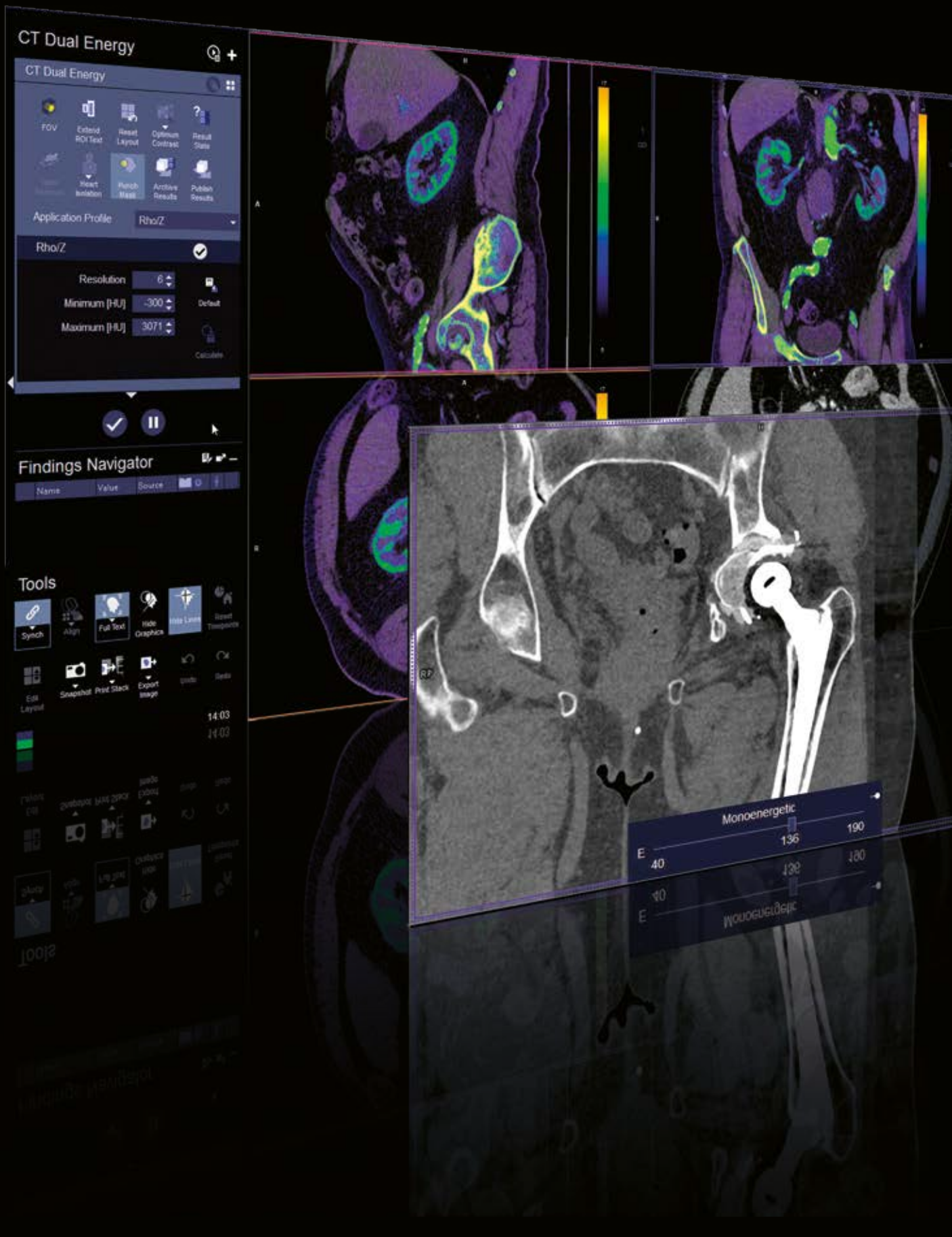


- *syngo*.CT DE Bone Marrow



- *syngo*.CT DE Monoenergetic Plus

Advanced Package


CT Dual Energy
CT Dual Energy
FOV
Extend ROI Text
Reset Layout
Optimum Contrast
Result State
Heart Isolation
Patch Mask
Archive Results
Publish Results
Application Profile
Rho/Z
Rho/Z
Resolution
6
Minimum [HU]
-300
Maximum [HU]
3071
Default
Calculate
Findings Navigator
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Synch
Align
Full Text
Hide Graphics
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Export image
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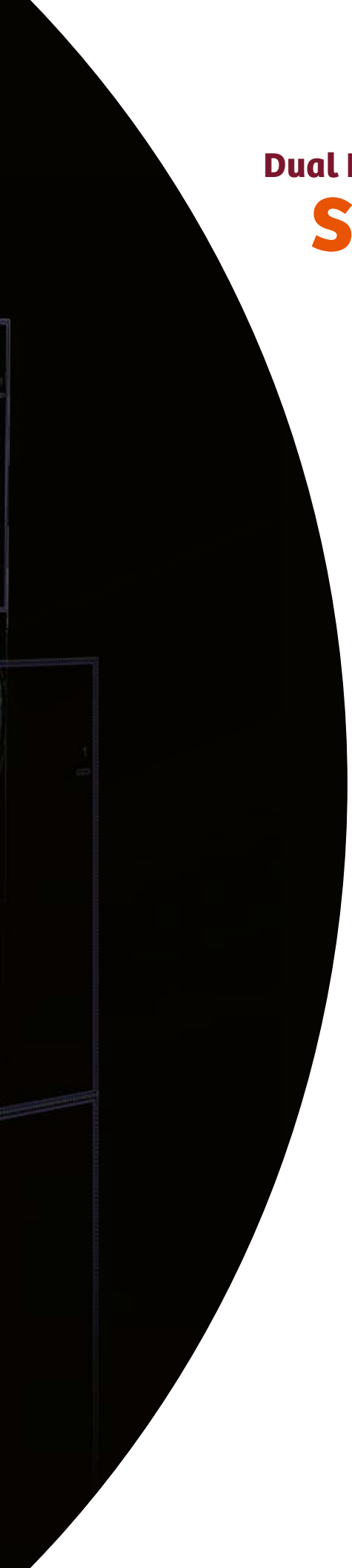


Dual Energy

Standard Functionality

Every *syngo*.via already includes standard CT applications that provide an extensive range of functions and tools required for a variety of specific clinical fields, such as CT Dual Energy reading, among others. *syngo*.via includes what is needed to read and share CT images and results.

syngo.CT Dual Energy

Optimum Contrast for sharper image contrast

Optimum Contrast is an intelligent method that changes the blending ratio of low- and high-energy data on a pixel-by-pixel basis, depending on the corresponding Hounsfield units (CT numbers). For higher CT numbers, which occur in regions of high iodine concentration, larger proportions of the image are taken from low tube-energy data. As a result, areas of contrast enhancement are accentuated.

Monoenergetic imaging for reducing metal artifacts

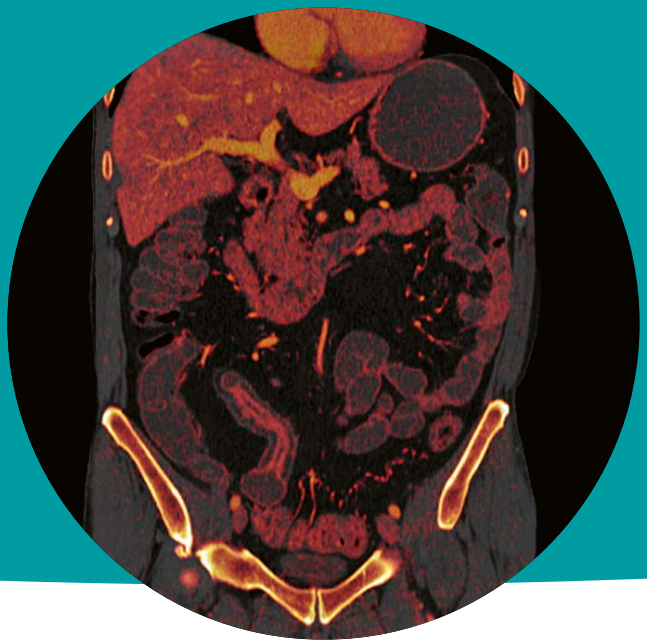
With monoenergetic imaging, metal artifacts can be reduced in both Single Source and Dual Source Dual Energy data. Select the energy level at which implants, clamps, or screws will have the smallest impact on image quality and get unsurpassed scan results.

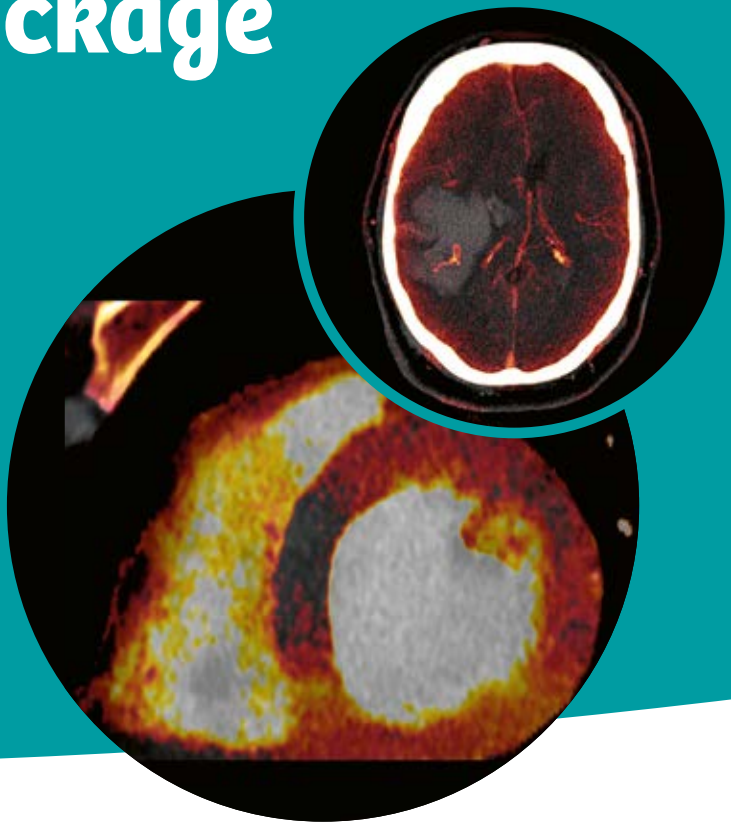
Chemical characterization of different materials

The attenuation of X-rays, among others, depends on the electron density and the effective atomic number. Both parameters are characteristic for different materials. With *syngo*.CT DE Rho/Z, you have access to electron density and effective Z maps in one examination.

Dual Energy

Advanced Package





Quantify lesions with two scans in one

syngo.CT DE Virtual Unenhanced

In modern oncology, CT imaging plays a major role in treatment decisions and follow-ups of current therapy. Especially important are the localization and the characterization of lesions in order to rule out malignancy. Usually, one non-contrast scan and at least one contrast-enhanced scan are performed to locate and characterize oncologic lesions. With DE, it is possible to perform a contrast scan right away and to view a virtual non-contrast image without the need for a non-contrast scan. Another advantage of DE CT is the ability to quantify the iodine uptake [mg/mL] in tissue and lesions.

The iodine uptake may correlate with the malignancy of a lesion. This capability also may help in follow-up scenarios where the effectivity of a therapy can be validated by evaluating the development of the iodine uptake of the treated lesion. *syngo*.CT DE Virtual Unenhanced has been extended by optimized visualization of other organs apart from the liver. Virtual non-contrast (VNC) imaging has been successfully applied for kidney, pancreas, lung, aorta and lymph nodes. For the evaluation of liver lesions, *syngo*.CT DE Virtual Unenhanced still includes the well-established application Liver VNC with an algorithm optimized for liver tissue.

Reveal perfusion defects with only one scan

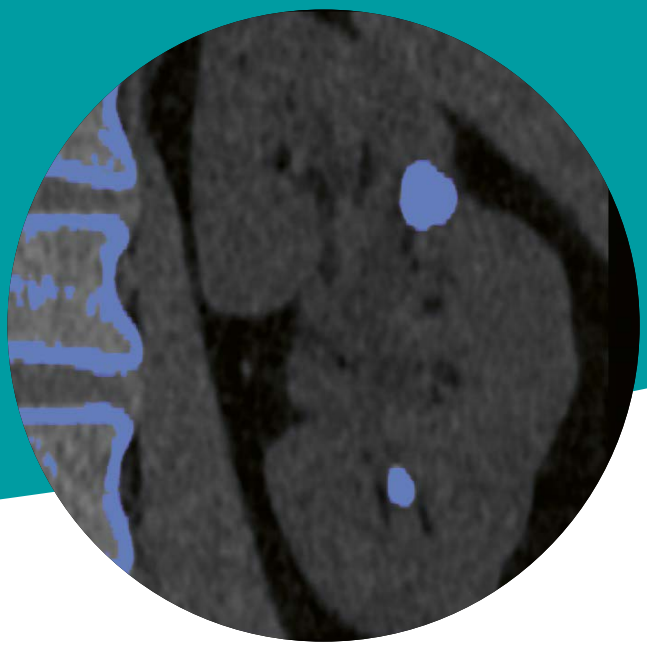
syngo.CT DE Heart PBV

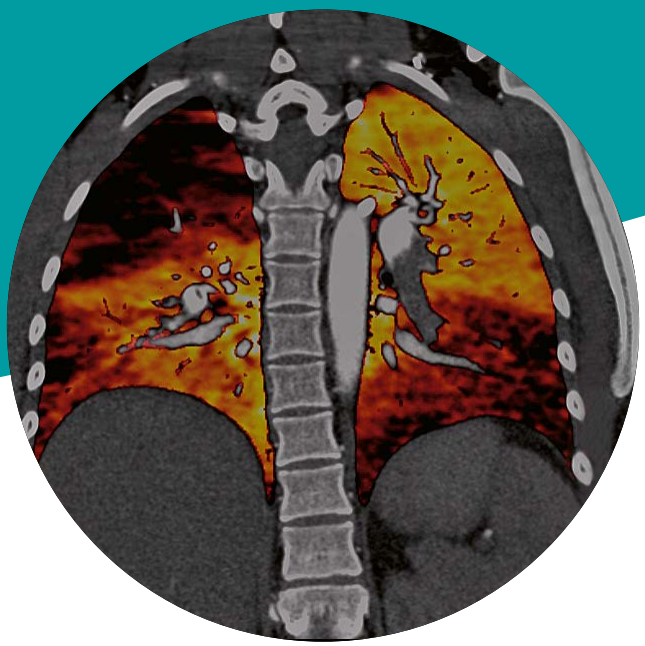
This application uses DE information to visualize and quantify the iodine concentration in the myocardium to reveal perfusional defects. In addition, a virtual non-contrast display can be used to identify myocardial edema. Simultaneous acquisition of the high- and the low-kV datasets diminishes the problem of misregistration due to cardiac motion.

Differentiate hemorrhage from iodine-uptaking bleeds and lesions

syngo.CT DE Brain Hemorrhage

The DE application *syngo*.CT DE Brain Hemorrhage assists you in visualizing iodine concentration and distribution in the brain. Lesions and bleeds may show significant iodine uptake in the image, while inactive hemorrhages are not enhanced.





Characterization of kidney stones

syngo.CT DE Calculi Characterization

syngo.CT DE Calculi Characterization allows identification and characterization of different kinds of kidney stones. The basis for this approach is the utilization of DE CT data in order to calculate a visual color-coded material decomposition into uric acid and other stone types.

syngo.CT DE Calculi Characterization also includes the Kidney Stone Navigator for handy review and evaluation of all potential stones that have been identified.

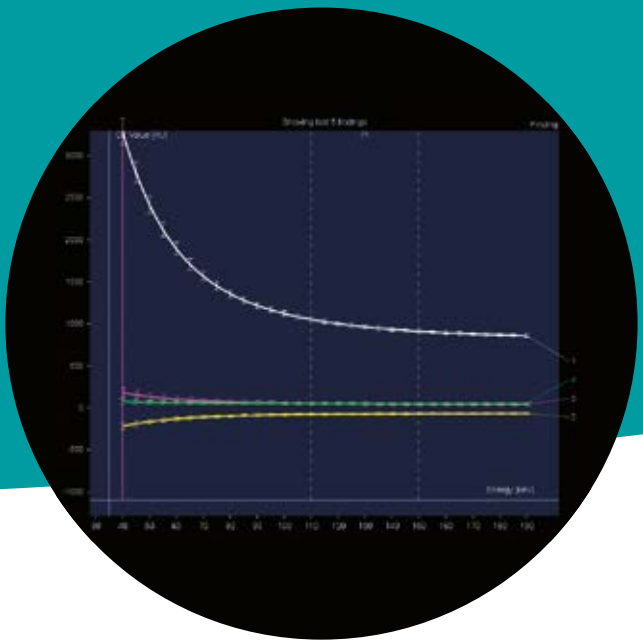
Assessment of perfusion defects and affected vessels at a glance

syngo.CT DE Lung Analysis

syngo.CT DE Lung Analysis is a combination of *syngo* Dual Energy Lung Vessels and *syngo* Dual Energy Lung PBV. *syngo*.CT DE Lung Analysis allows the color-coding of vessels that are affected, e.g., by pulmonary emboli and therefore show a significantly lower iodine concentration than non-affected vessels. It also enables fast evaluation of the related lung perfusion defects without the use of an additional non-contrast scan. *syngo*.CT DE Lung Analysis directly visualizes the local iodine concentration in the lung parenchyma, which is a measure of the local blood volume, thus enabling a display of the area of possibly affected tissue. The application provides you with the needed diagnostic information at a glance.

Dual Energy

Advanced Package



Accurate and non-invasive diagnosis of gout

syngo.CT DE Gout

syngo.CT DE Gout facilitates the visualization of deposited uric acid crystals in peripheral extremities by automatically color-coding these crystals to visualize those deposits. Conventional methods of diagnosing gout, for example the aspiration of the joint, are limited in feasibility – especially in acute cases where the joint is inflamed and painful. In these cases an aspiration may not be performable. Furthermore, gout can be difficult to diagnose because there are various forms of arthritis that have similar symptoms.

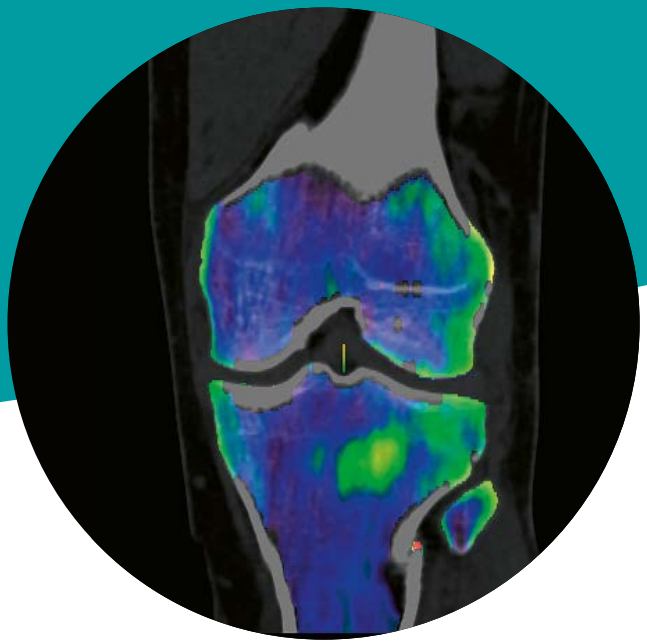
syngo.CT DE Gout overcomes these limitations by being non-invasive, more specific, and fast. It also provides insight into areas that cannot be reached by conventional aspiration, since uric acid crystals can also be located in periarticular soft tissues, such as tendons and ligaments.

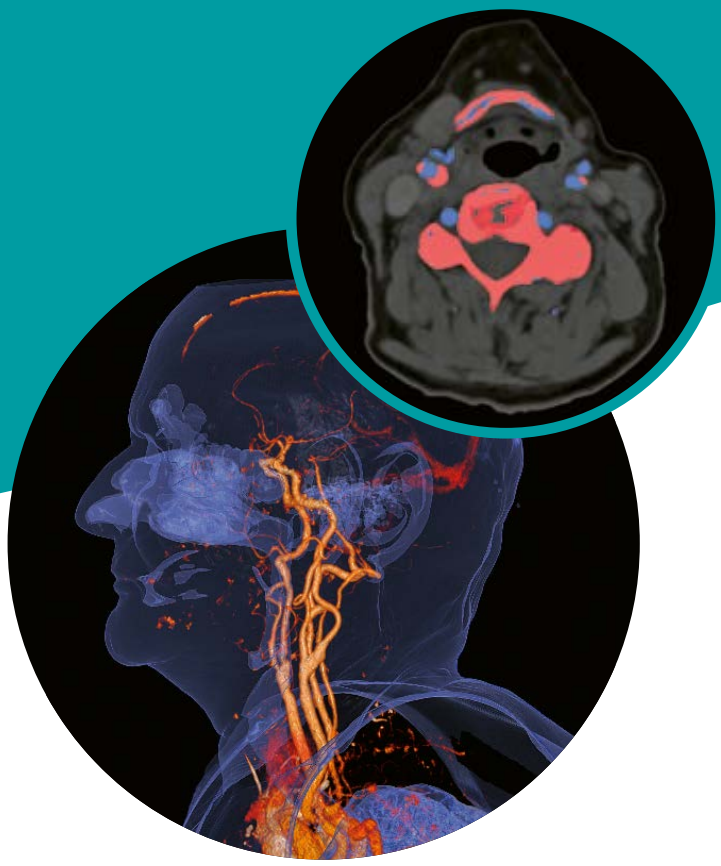
Maximize image quality with new algorithm

syngo.CT DE Monoenergetic Plus

Monoenergetic imaging has become a reliable routine tool for image quality enhancement and metal artifact reduction. The DE application *syngo*.CT DE Monoenergetic Plus allows users to display monoenergetic images in a range of 40–190 keV. By displaying multiple monoenergetic regions of interest and the associated absorption curves, Monoenergetic Plus lets users easily compare and quantify lesions and tissues.

The ability to export statistical information for further evaluation is very beneficial for various research and diagnostic tasks. In addition, high enhancement is observed even for low iodine concentrations at low energy levels.





Evaluation of the bone marrow

syngo.CT DE Bone Marrow

Bone marrow can be affected by various pathologies, such as bone bruises after trauma and diffuse tumor infiltrations. Up to now, the major modality for imaging these pathologies has been MRI. With the benefits of True Dual Energy, CT imaging can now also aid in the diagnosis.

The DE application *syngo*.CT DE Bone Marrow allows for the segmentation and visualization (color-coding) of the bone marrow based on a material decomposition into bone marrow and calcium. This application can be used both for Dual Source and Single Source data sets.

Differentiate calcified plaques from iodine contrast

syngo.CT DE Hardplaque Display

In contrast-enhanced CT scans of the vessel system (CTA), it can be difficult to differentiate between calcified plaques and iodine contrast. Also the plaque can make it quite challenging to assess the grade of the stenosis. *syngo*.CT DE Harplaque Display enables the identification (color-coding) and automatic removal of calcifications from a DE CTA image. By differentiating between hard plaques and contrast agent, this DE application helps to display the true vessel lumen without interfering hard plaques.

Accurate bone removal even in complex body regions

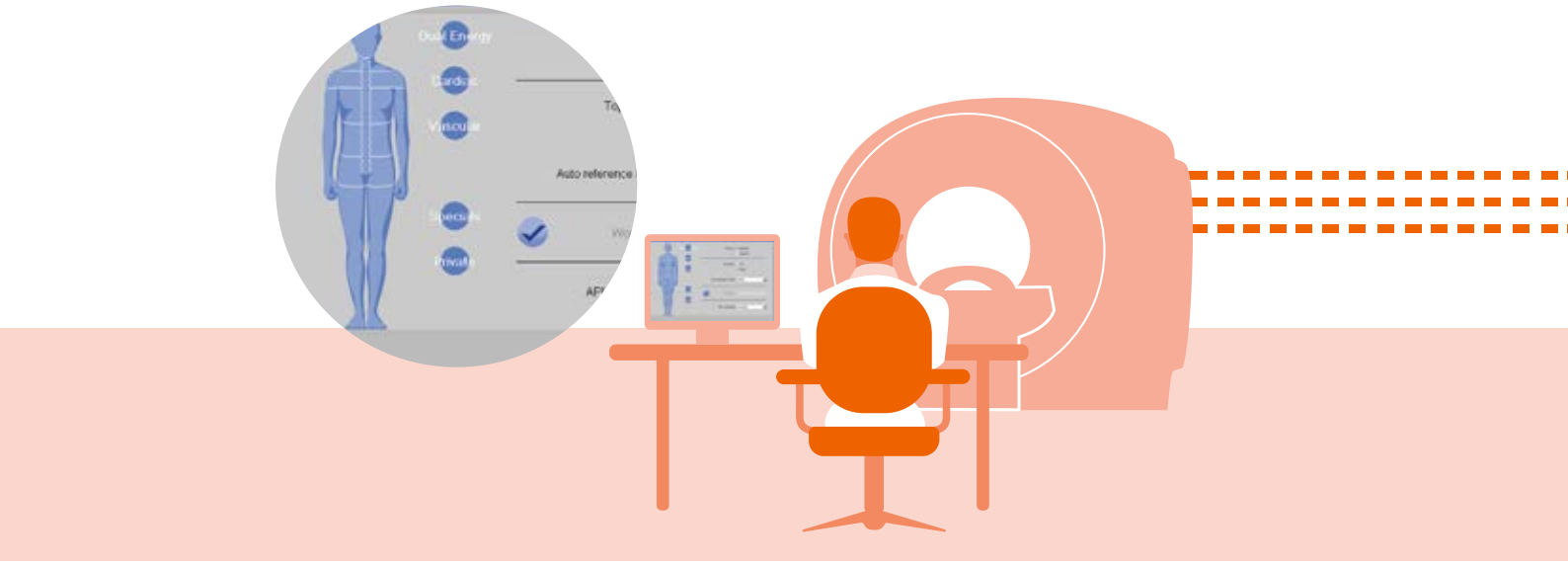
syngo.CT DE Direct Angio

syngo.CT DE Direct Angio accurately highlights vessel structures on CT angiography (CTA) data sets, and surpresses bone structures to provide you with a bonefree view of the vessel system, e.g., to subtract bone in CTAs. Overcoming limitations of conventional bone removal software, the DE approach reliably isolates even complex vasculature, such as at the base of the skull, where CTAs are difficult to interpret.

Reading as simple as it should be

Rapid Results for Dual Energy

SOMATOM CT scanner



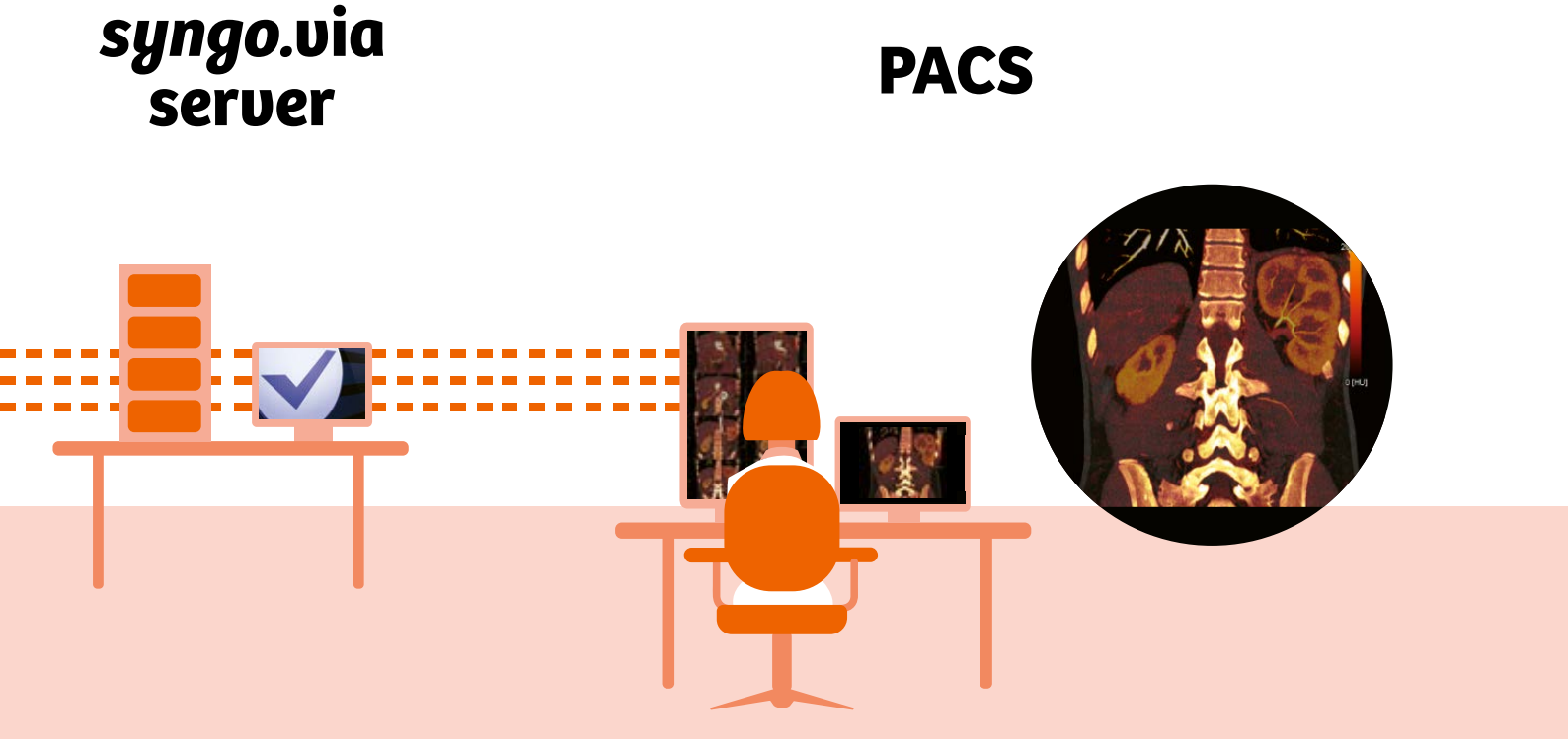
Why waste time in CT post-processing?

Rapid Results improves your efficiency by reducing your workflow steps:

Rapid Results enables direct communication between *syngo*.via and SOMATOM CT scanners, triggering zero-click post-processing within the selected scan protocol. In that way, *syngo*.via automatically creates and sends ready-to-read results wherever you are, to your PACS or a film printer. Rapid Results knows what you need, just when you need it. This is reading as simple as it should be.

Rapid Results – reloaded with *syngo*.via VB20

DE imaging often requires experienced operators well trained in this technique, and the quality of the results will strongly depend on their knowledge and skills. Rapid Results helps you make DE routine, with no need to change your clinical workflow. Rapid Results will automatically generate standard visualizations of different anatomies in any required orientation and thickness. Just define your workflow once and let Rapid Results produce the decision basis, from virtual unenhanced maps, key in oncology cases, to mono-energetic images for reduced metal artifact reduction or Lung PBV maps for pulmonary embolism assessment. Equipped with it, you are prepared for an emergency – e.g., at night, when experienced operators may not be available.



Your benefits with Rapid Results:

1. Clinical innovations like CT Bone Reading for routine exams regardless of expertise level
2. Standardized and consistent image quality independent of operator
3. Post-processing becomes part of the standard reconstruction task
4. Ready-to-read results wherever you want them

Dual Energy

Applications

SOMATOM Force
Dual Source Dual Energy

SOMATOM Drive
Dual Source Dual Energy

syngo.via	*syngo*.CT DE Advanced Applications	*syngo*.CT DE Gout	●	●
		syngo.CT DE Calculi Characterization	●	●
		syngo.CT DE Direct Angio	●	●
		syngo.CT DE Lung Analysis (contains Lung PBV)	●	●
		syngo.CT DE Virtual Unenhanced	●	●
		syngo.CT DE Virtual Unenhanced – Liver VNC	●	●
		syngo.CT DE Brain Hemorrhage	●	●
		syngo.CT DE Monoenergetic Plus	●	●
		syngo.CT DE Hardplaque Display	●	●
		syngo.CT DE Heart PBV	●	●
		syngo.CT DE Bone Marrow	●	●
	syngo.CT Dual Energy Standard Functionality	*syngo*.CT DE Rho/Z[7]	●	●
		Optimum Contrast	●	●
		Monoenergetic	●	●
		Rapid Results	●	●

• Available
∘ Available, but usage not recommended or meaningful
[1] Not yet approved for USA
[2] With mandatory scan delay after injection of >75 s (no arterial phase, liver only)
[3] Only for visualization of static iodine enhancement after interventional procedures (not for CTA)

SOMATOM
Definition Flash
Dual Source Dual Energy

SOMATOM
Definition AS+ / Edge
TwinBeam Dual Energy

SOMATOM
Definition AS+ / Edge
Dual Spiral Dual Energy

SOMATOM
Definition AS
Dual Spiral Dual Energy

SOMATOM
Perspective / Scope Power
Dual Spiral Dual Energy

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[4] Not for visualization of iodine, only for metal artifact reduction
[5] Not for visualization of iodine, basic metal artifact reduction
[6] Mainly for visualization of iodine, basic metal artifact reduction
[7] Not cleared for use as a basis for radiation therapy planning, but for visualization only

Clinical cases: Courtesy of Erasmus University Medical Center Rotterdam, The Neatherlands; Hospital Povisa, Vigo, Spain and Centre Hospitalier de Pau, Pau, France.

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