

Clinical workshop liver lesions

September, 30 2022

THE ROLE OF NUCLEAR MEDICINE



Roland HUSTINX
Dpt of Nuclear Medicine and Oncological
Imaging



PET/CT: we have come a long way

Annals of Oncology 9: 397–401, 1998.

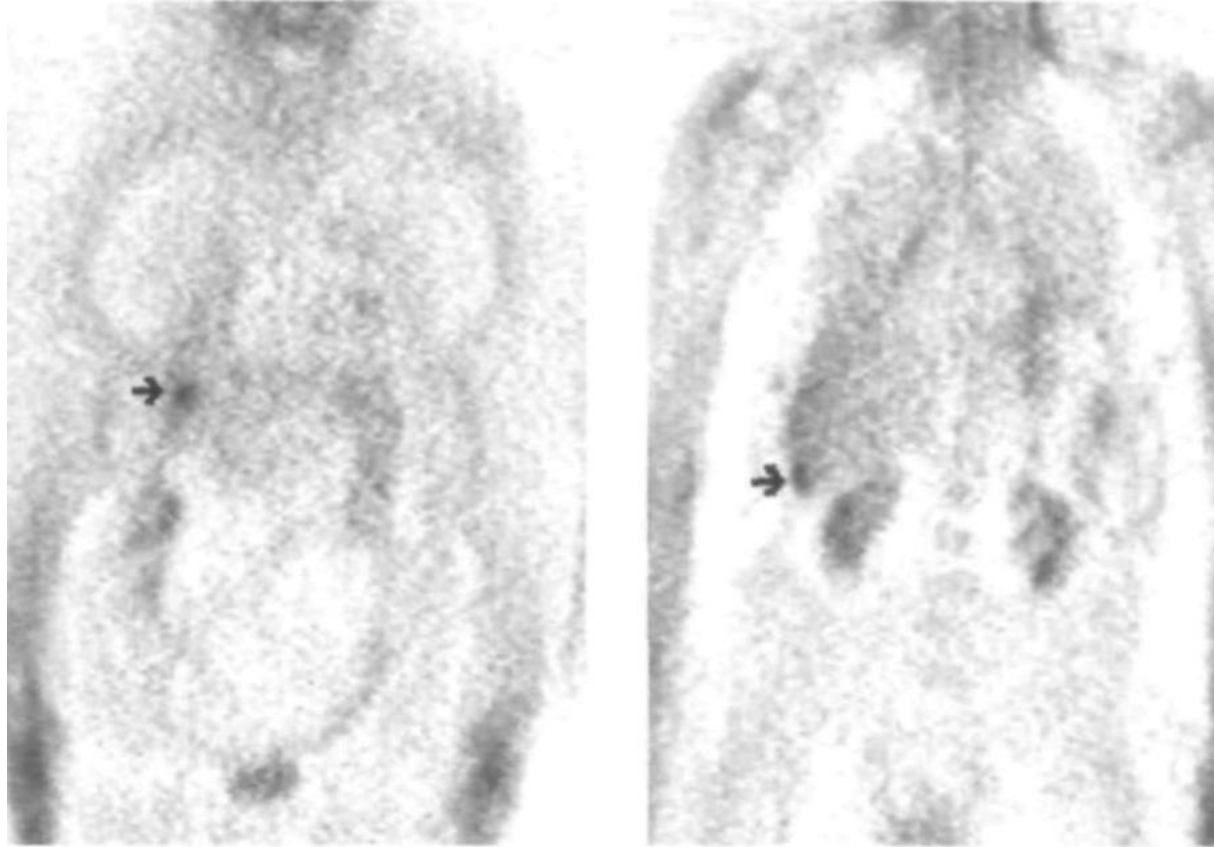
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Original article

Clinical evaluation of whole-body ^{18}F -fluorodeoxyglucose positron emission tomography in the detection of liver metastases*

R. Hustinx,¹ P. Paulus,¹ N. Jacquet,² G. Jerusalem,³ T. Bury⁴ & P. Rigo¹

Divisions of ¹Nuclear Medicine, ²Abdominal Surgery, ³Onco-Hematology, ⁴Pneumology, University Hospital, Sart Tilman, Liege, Belgium



8 to 11 overlapping steps extending from the neck to the pelvis were obtained during a total scanning time of 32 to 44 minutes (4 min/step).

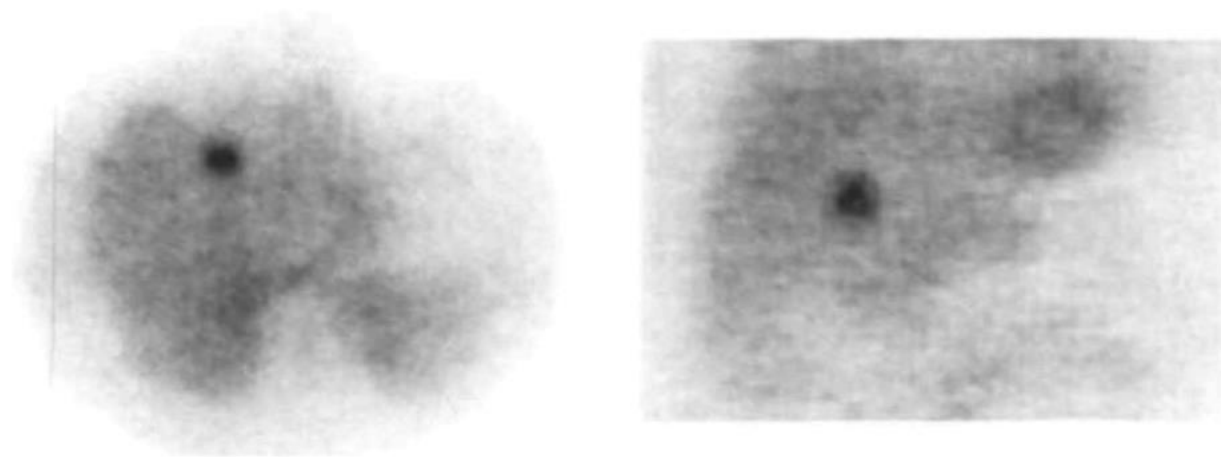
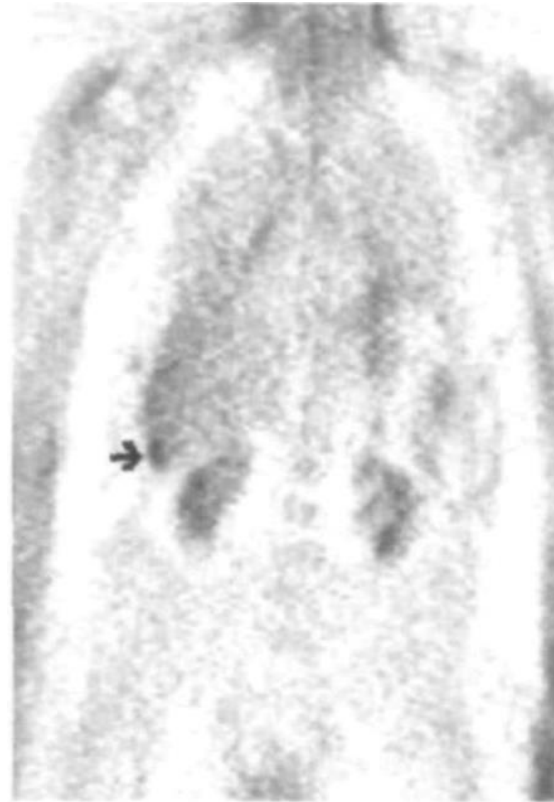
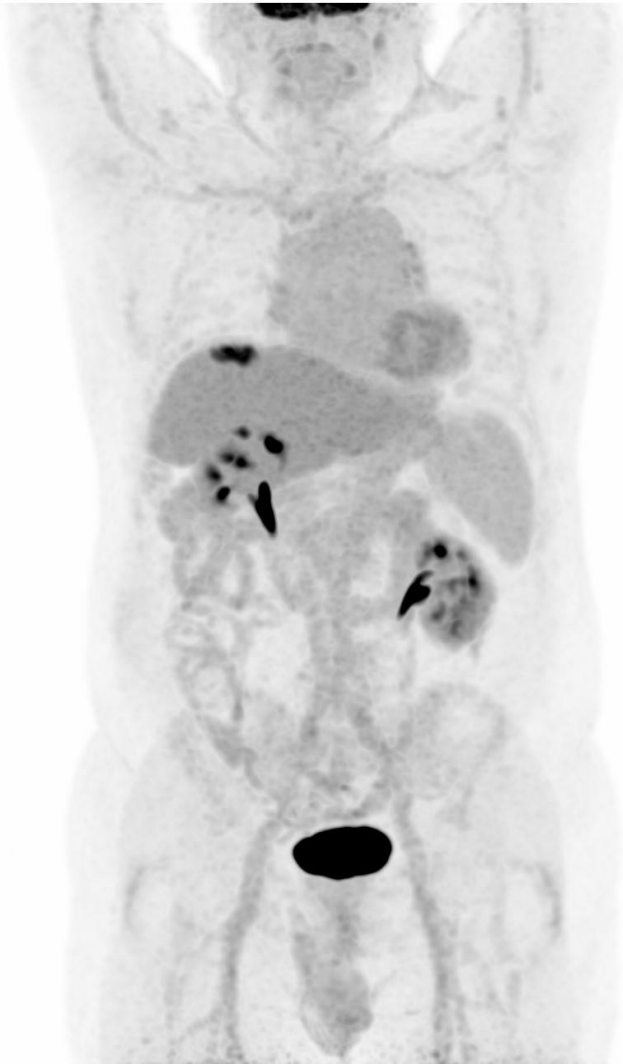
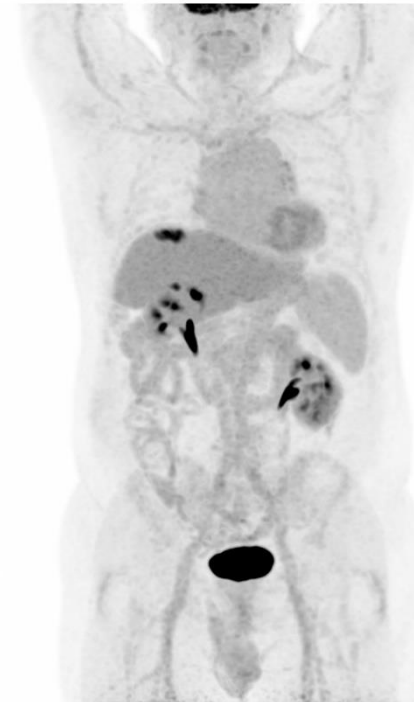
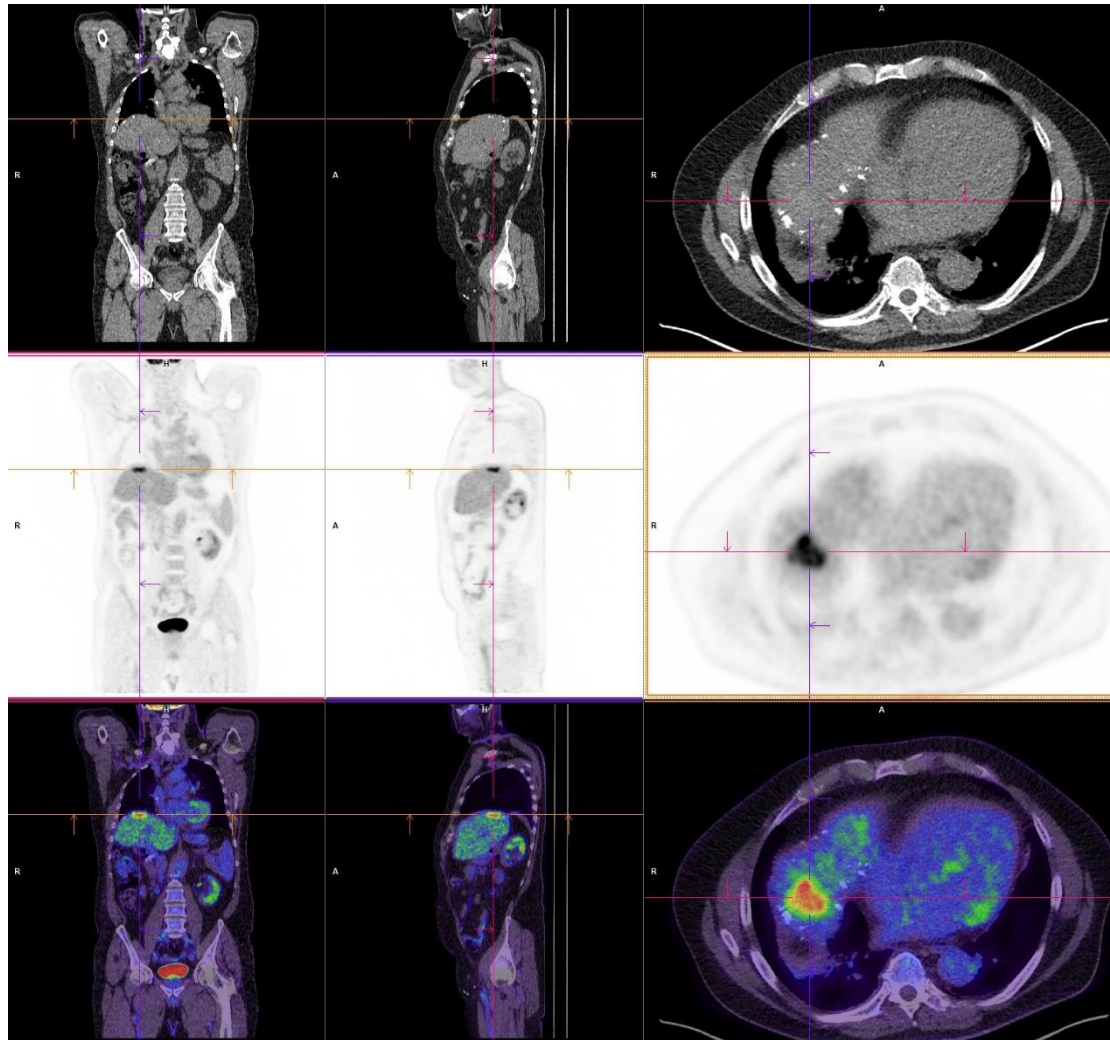


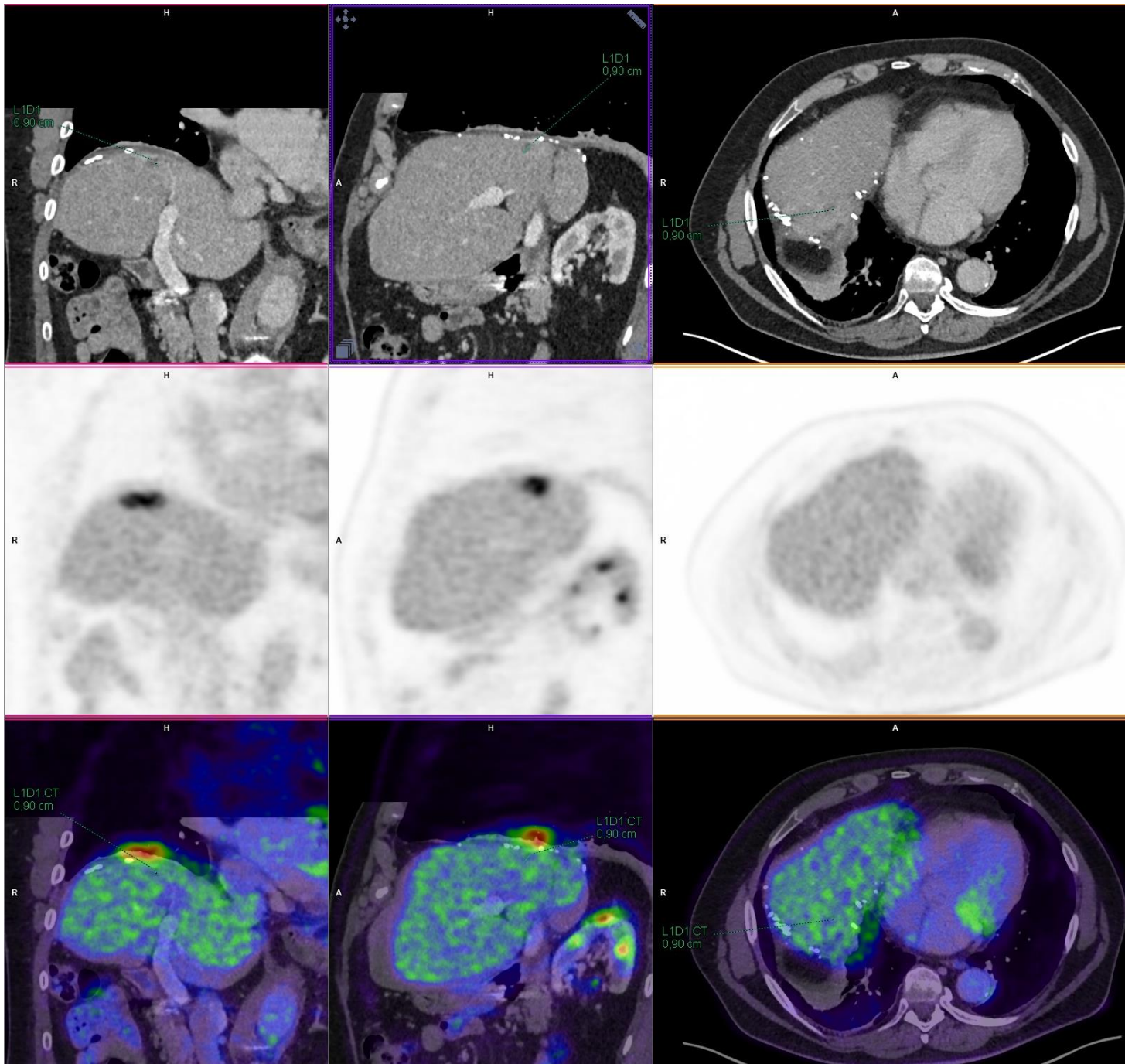
Figure 3. Sixty-eight-year-old man with a previous history of rectal carcinoma. A single liver metastasis is demonstrated by contrast enhanced CT and FDG-PET (left: transverse slice; right: coronal slice). Note the high quality of the attenuation corrected images.



180 cm, 90 kg
Acquisition: 9 minutes

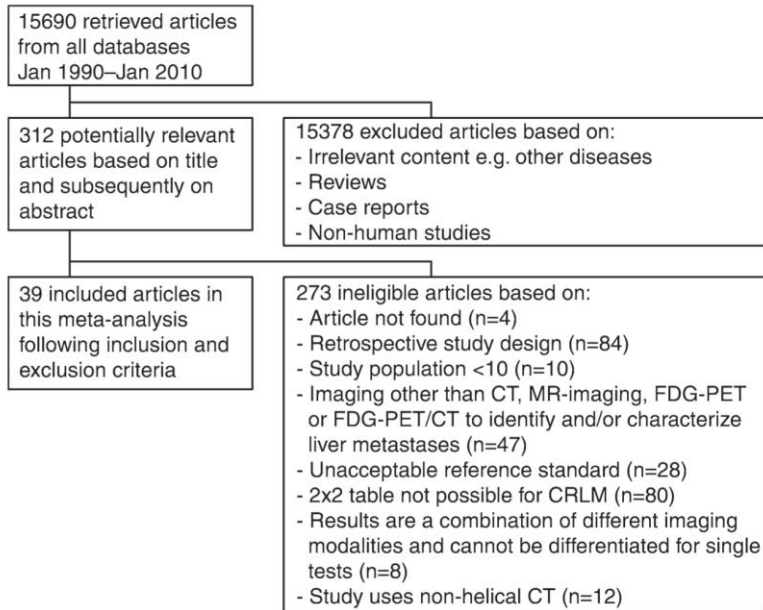
64 y-o male, colon cancer in 2010,
liver recurrence treated by surgery in 2014 - ↗ CEA





Colorectal liver metastases: Diagnosis

Figure 1



Sensitivity Estimates for Each Imaging Modality on a Per-Lesion Basis

Modality*	Mean Sensitivity (%) [†]
CT (<i>n</i> = 38)	74.4 (68.7, 79.3)
MR imaging (<i>n</i> = 61)	80.3 (74.6, 85.0)
FDG PET (<i>n</i> = 8)	81.4 (66.5, 90.6)
FDG PET/CT (<i>n</i> = 1)	66.2 (54.5, 76.2)

Summary of Estimates for Each Imaging Modality on a Per-Patient Basis

Modality*	Mean Sensitivity (%) [†]	Mean Specificity (%) [†]
CT (<i>n</i> = 9)	83.6 (66.9, 92.8)	94.9 (92.9, 96.3)
MR imaging (<i>n</i> = 6)	88.2 (64.8, 96.8)	92.5 (89.5, 94.6)
FDG PET (<i>n</i> = 6)	94.1 (91.6, 95.9)	95.7 (92.7, 97.6)
FDG PET/CT (<i>n</i> = 3)	96.5 (94.2, 97.9)	97.2 (92.8, 99.0)

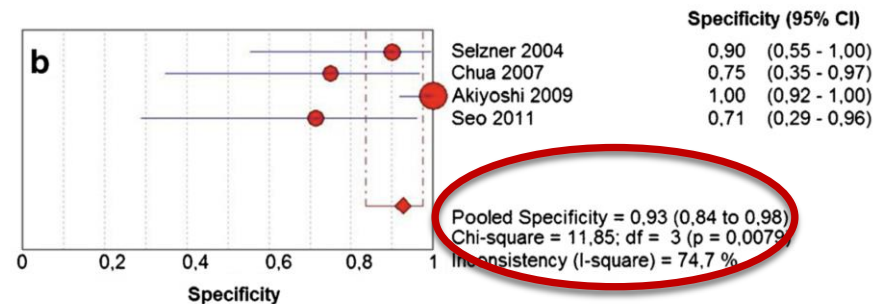
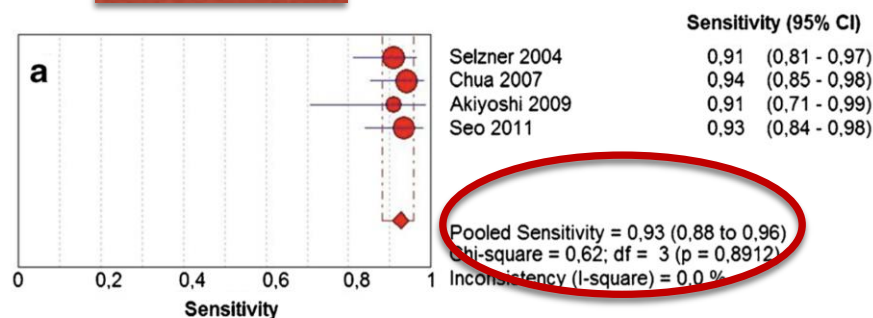
Diagnostic accuracy and impact on management of ^{18}F -FDG PET and PET/CT in colorectal liver metastasis: a meta-analysis and systematic review

Eur J Nucl Med Mol Imaging (2015) 42:152–163

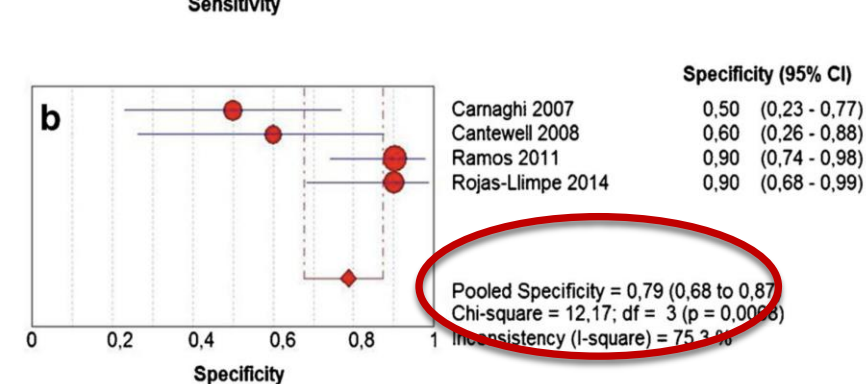
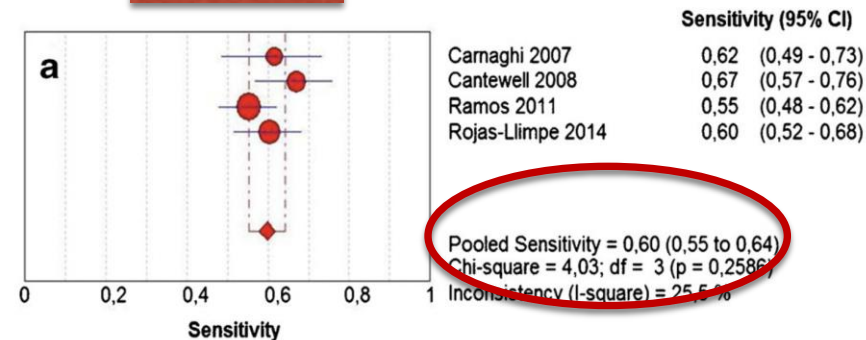
DOI 10.1007/s00259-014-2930-4

Anna Margherita Maffione · Egesta Lopci · Christina Bluemel ·
 Francesco Giammarile · Ken Herrmann · Domenico Rubello

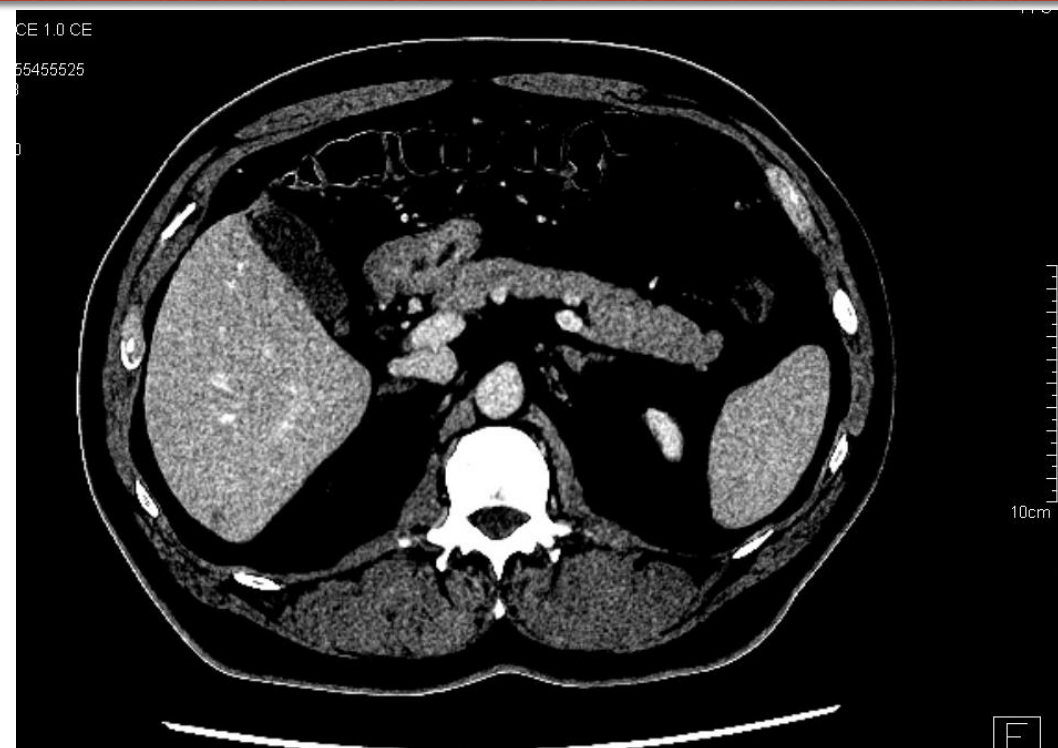
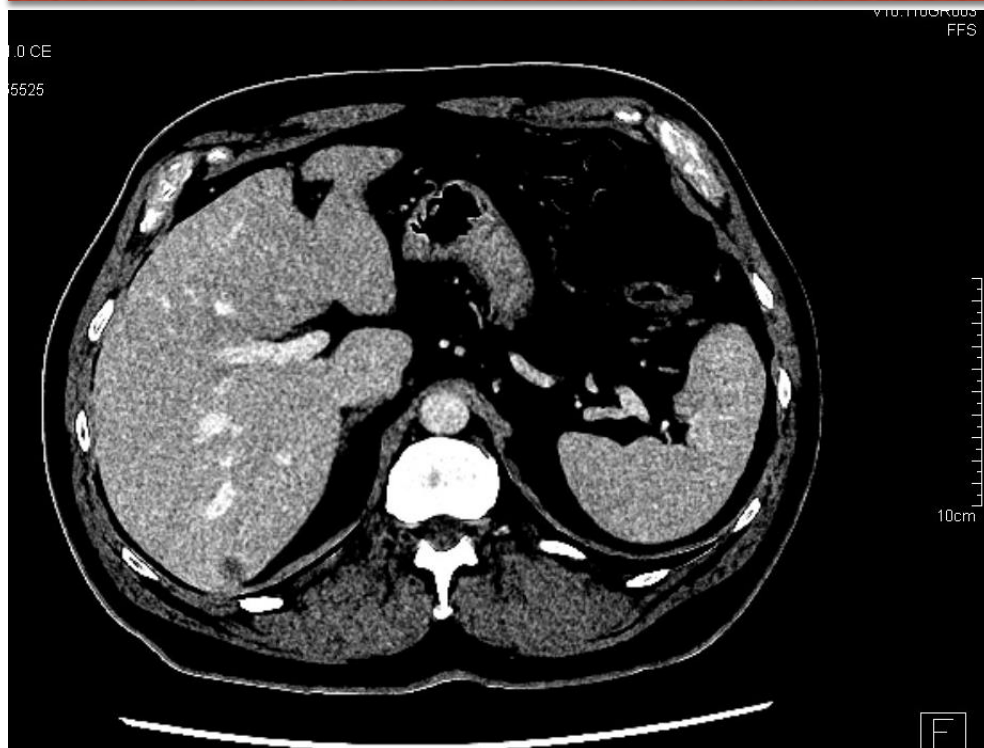
Patients

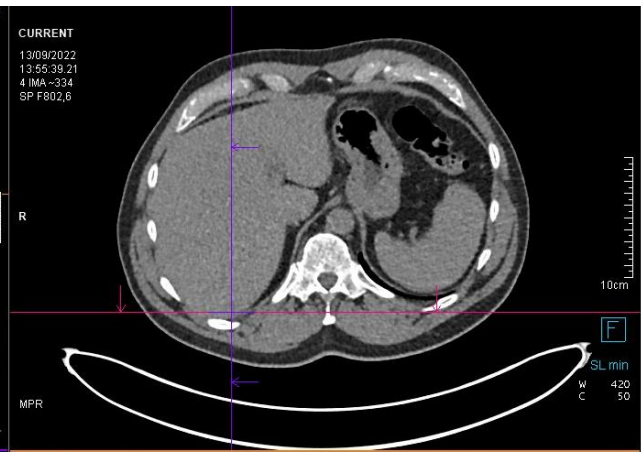
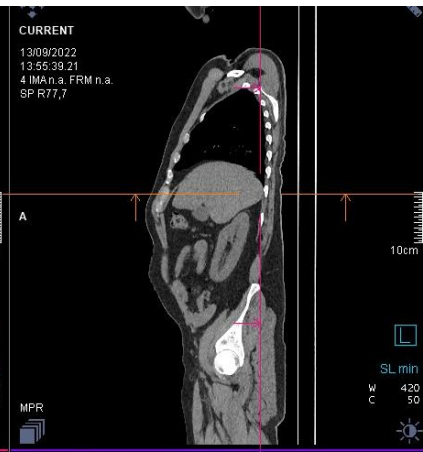
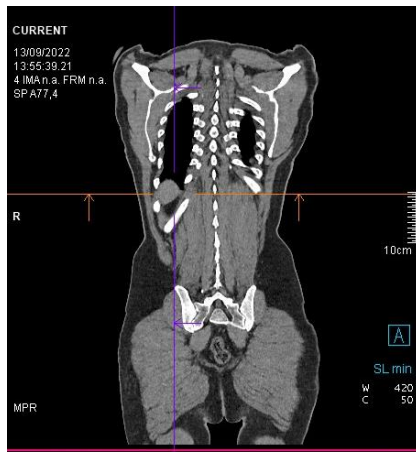


Lesions

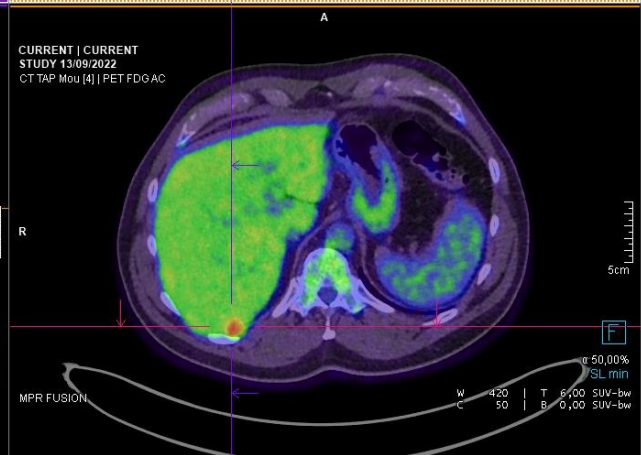
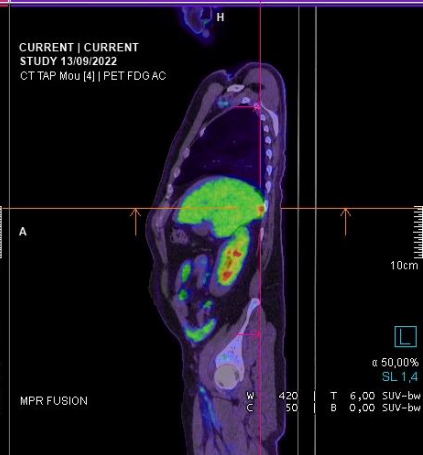
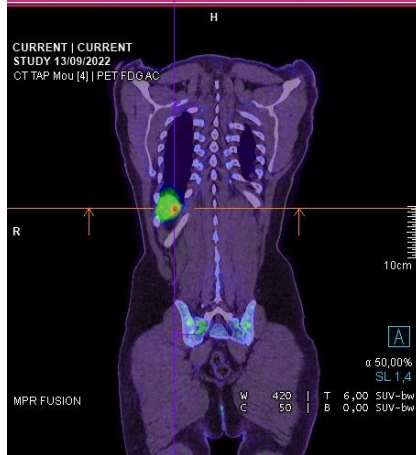
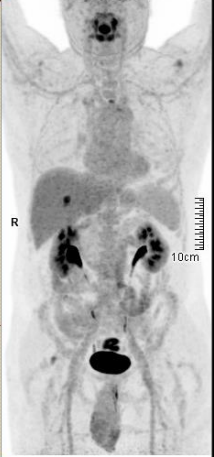
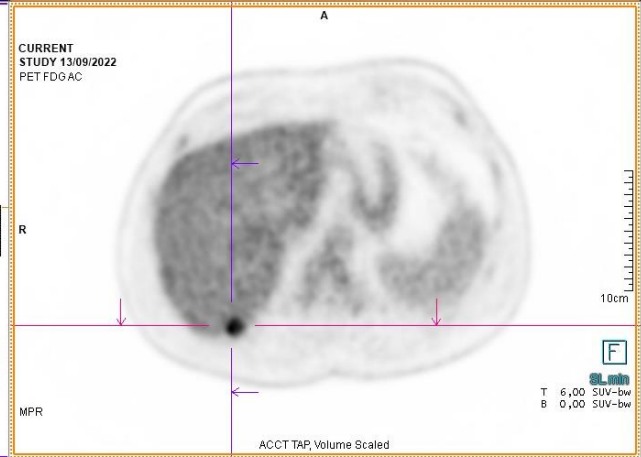
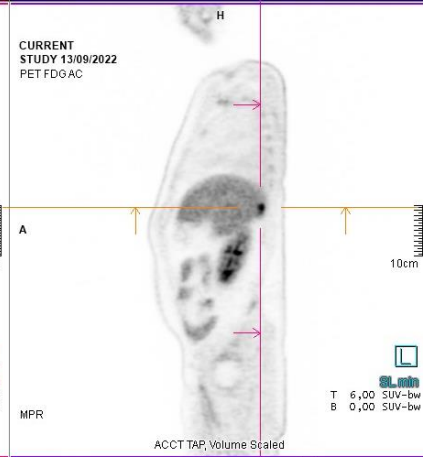
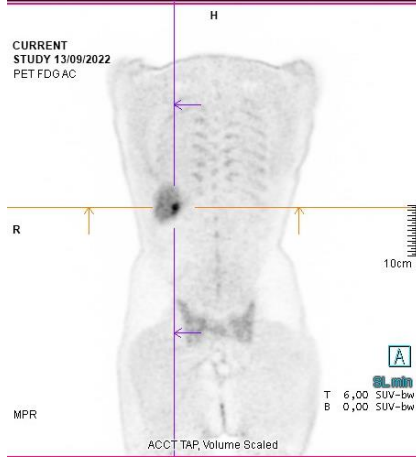


Colon cancer, 2 suspicious lesions on CT





CURRENT
STUDY 13/09/2022
PET FDG AC



1/t1 lava dixon mph fluoro

5489620

673

996



1/t1 lava dixon mph fluoro

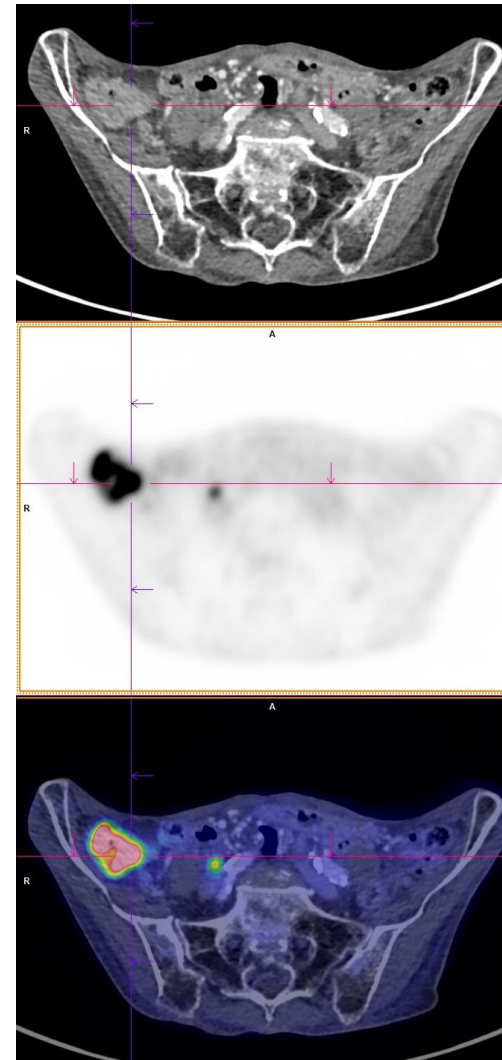
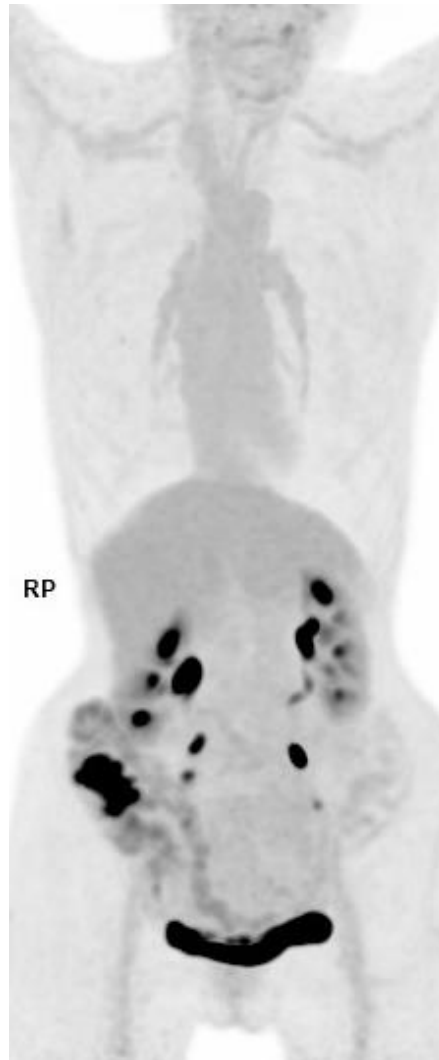
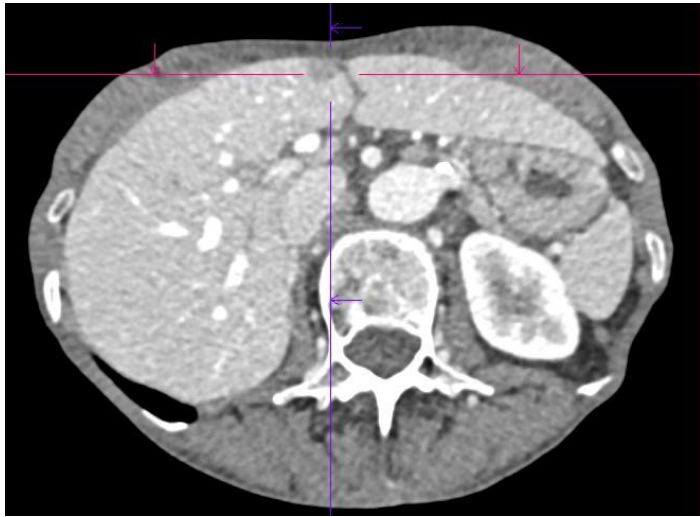
489620

73

6



70 y-o female, Colon cancer, 1 indeterminate lesion on CT



[¹⁸F]FDG is not specific to cancer: non-oncological indications

Short Communication | Published: 15 June 2020

The use of a visual 4-point scoring scale improves the yield of ¹⁸F-FDG PET-CT imaging in the diagnosis of renal and hepatic cyst infection in patients with autosomal dominant polycystic kidney disease

Marie F. Neuville, Pierre Lovinfosse, Alexandre Jadoul, Marie Thys, Laurence Seidel, Roland Hustinx & François Jouret 

European Journal of Nuclear Medicine and Molecular Imaging 48, 254–259 (2021) | [Cite this article](#)

505 Accesses | 7 Citations | 2 Altmetric | [Metrics](#)

European Journal of Clinical Microbiology & Infectious Diseases (2018) 37:1195–1196
<https://doi.org/10.1007/s10096-018-3233-7>

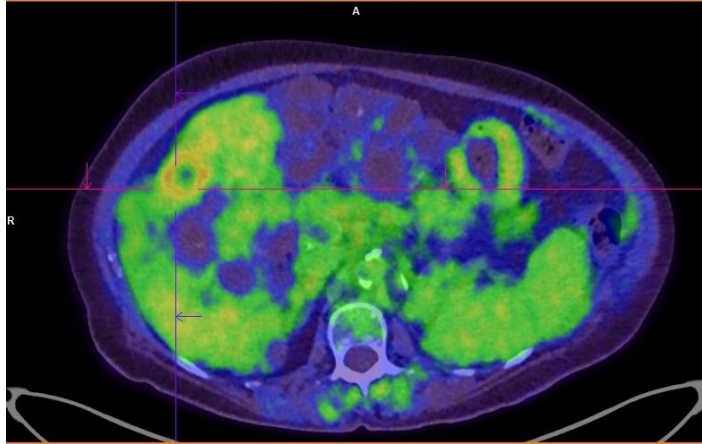
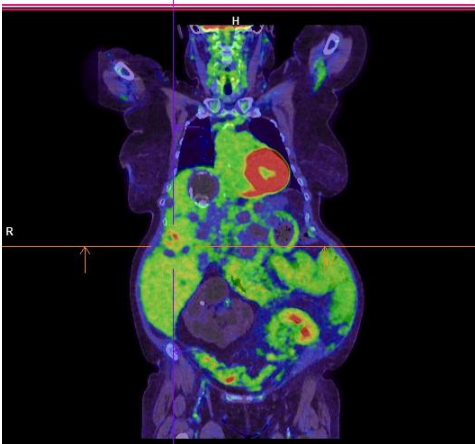
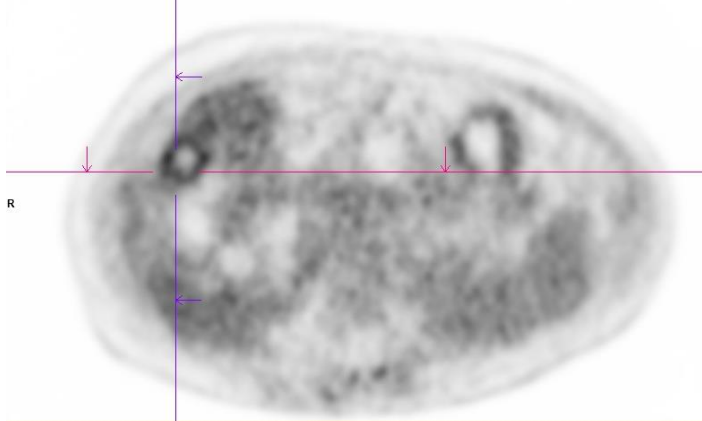
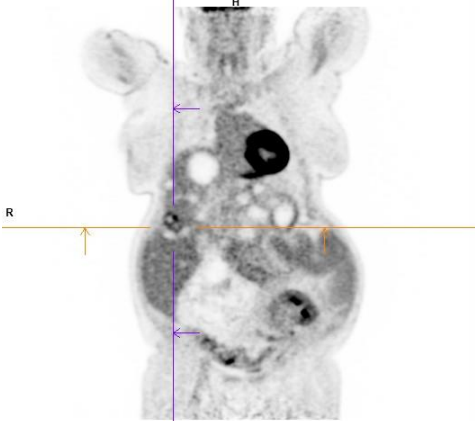
LETTER TO THE EDITOR



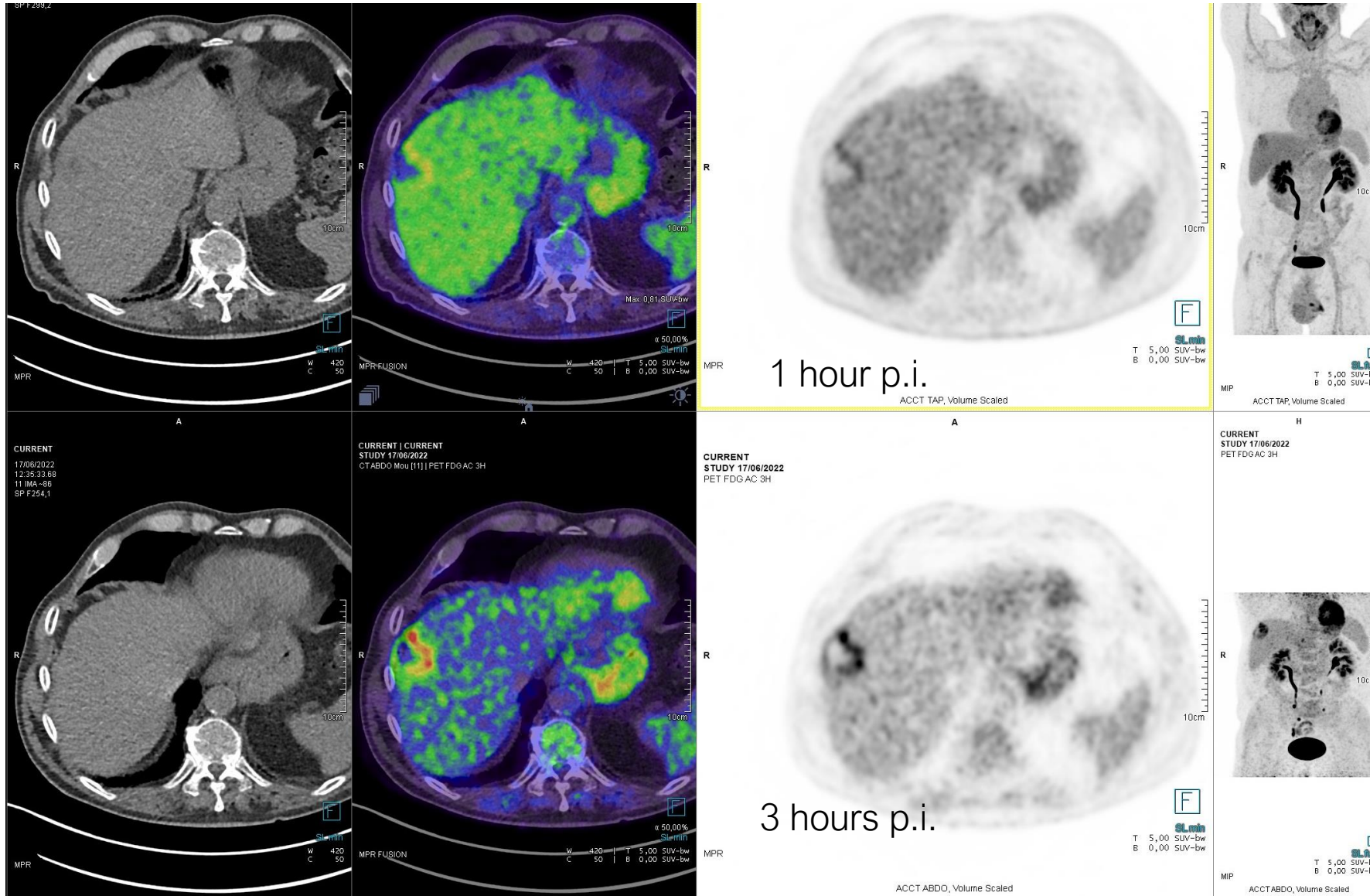
Alveolar echinococcosis in southern Belgium: retrospective experience of a tertiary center

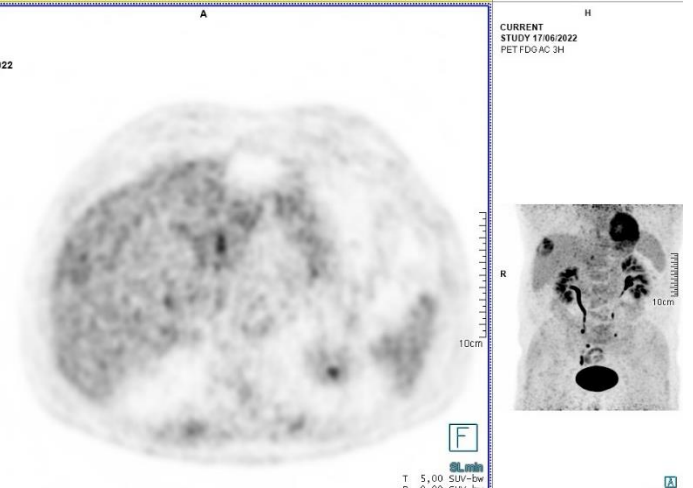
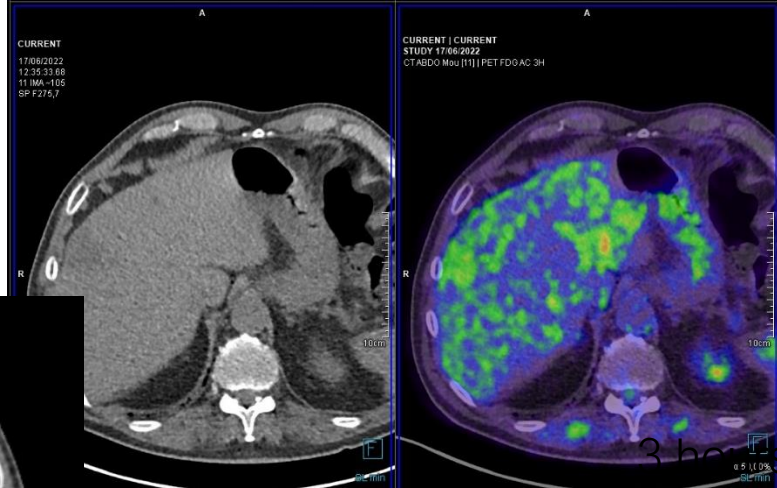
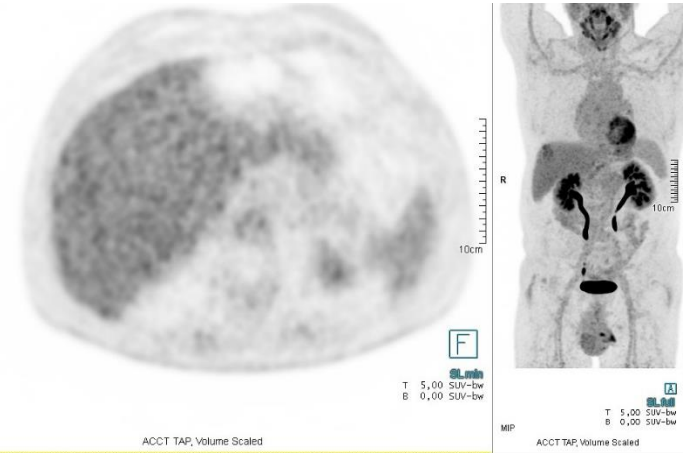
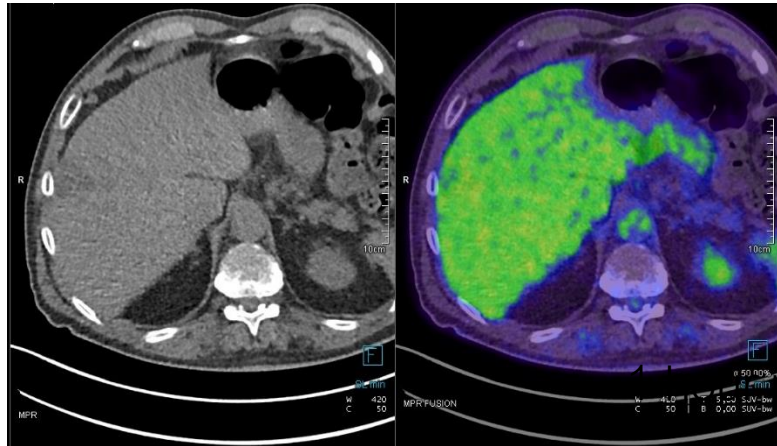
Audrey Cambier^{1,2}  • Philippe Leonard^{1,2} • Bertrand Losson^{1,3} • Jean-Baptiste Giot^{1,2} • Noëlla Bletard^{1,4} • Paul Meunier^{1,5} • Roland Hustinx^{1,6} • Nicolas Meurisse^{1,7} • Jean Delwaide^{1,8} • Pierre Honore^{1,7} • Marie-Pierre Hayette^{1,9} • Olivier Detry^{1,7}

Infected liver cyst



Dual time-point $[^{18}\text{F}]$ FDG imaging for Alveolar Echinococcosis





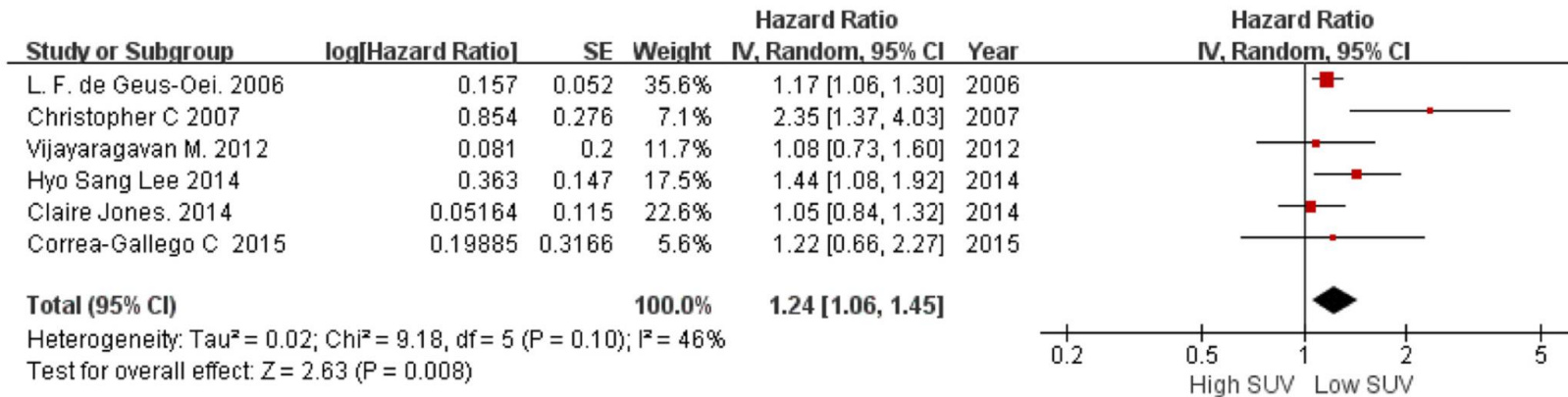
RESEARCH ARTICLE

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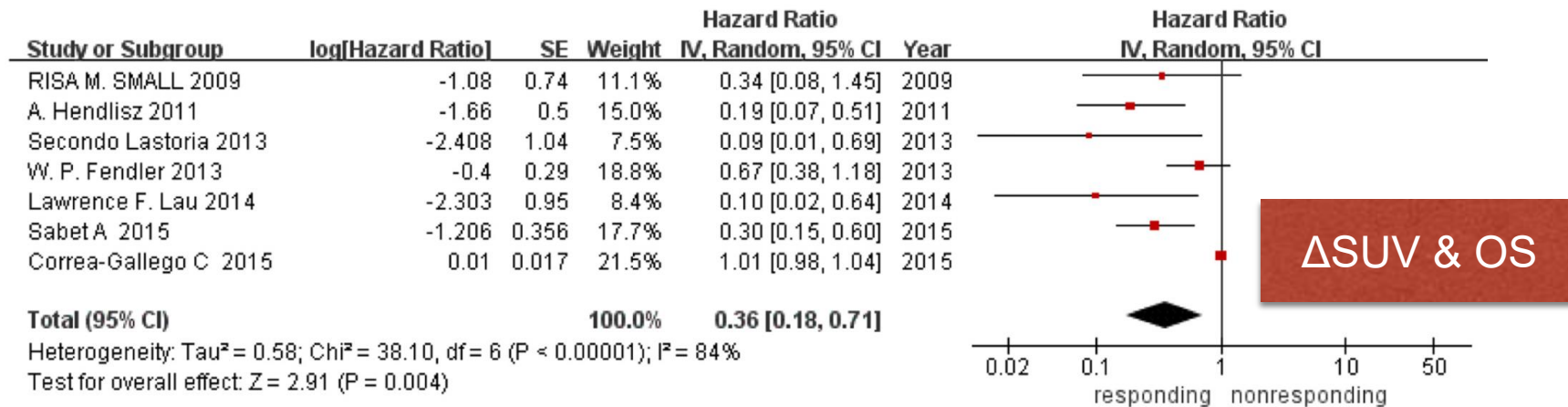
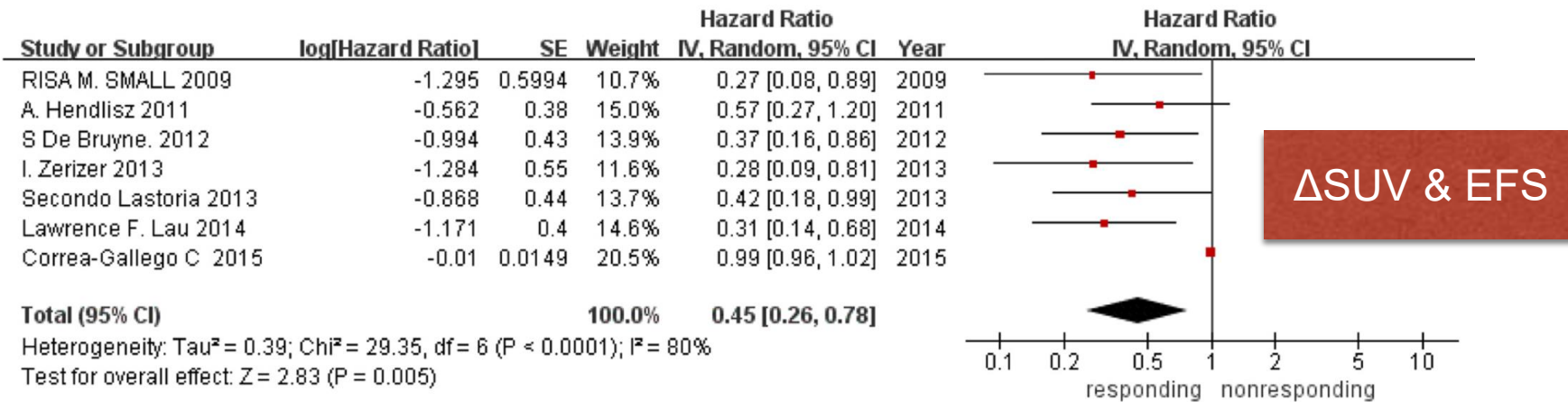
Prognostic significance of ^{18}F FDG PET/CT in colorectal cancer patients with liver metastases: a meta-analysis



Qian Xia¹, Jianjun Liu¹, Cheng Wu², Shaoli Song¹, Linjun Tong¹, Gang Huang^{1*}, Yuanbo Feng³, Yansheng Jiang³, Yewei Liu³, Ting Yin³ and Yicheng Ni^{3*}

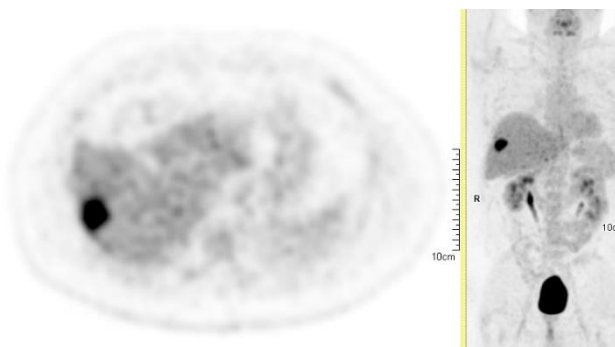
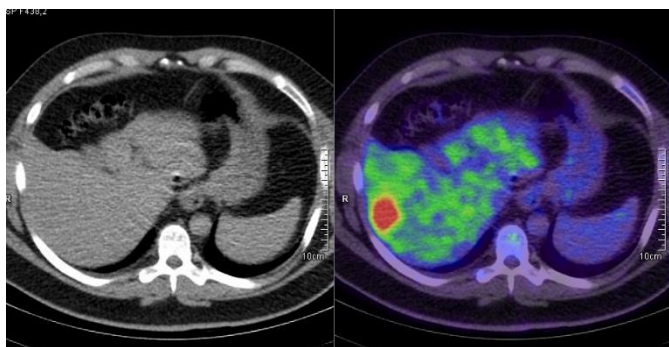


Hot lesions are not good

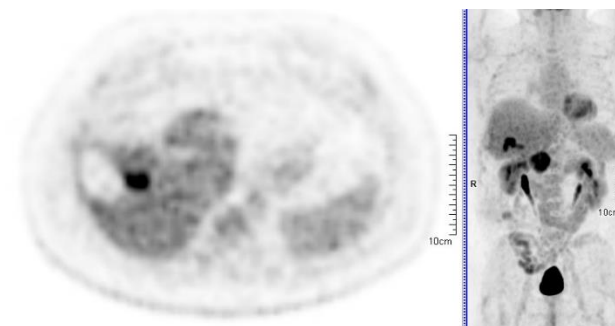
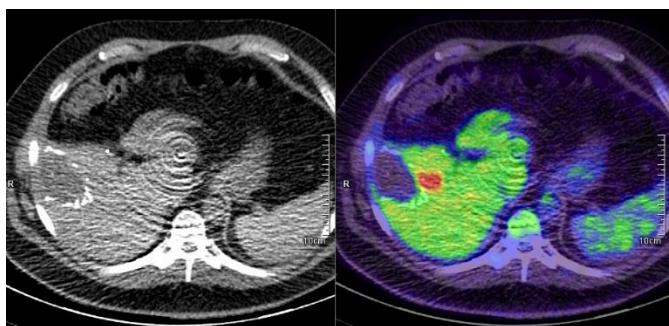


Metabolic response is good...
 ...not easily actionable during treatment
 ...but very useful in the follow up

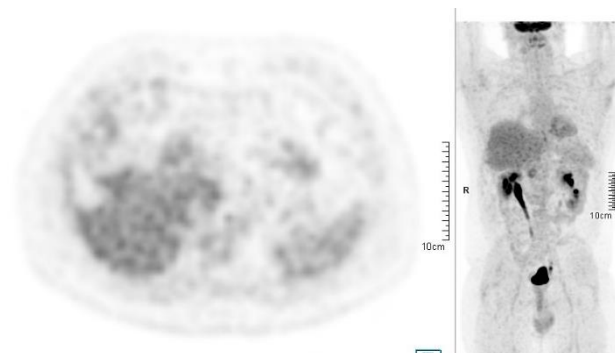
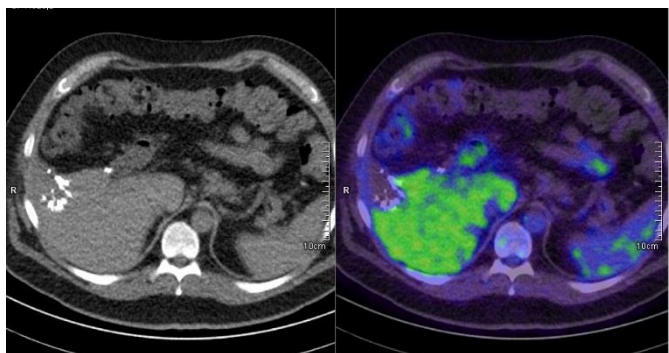
50 y-o male, recto-sigmoid junction treated in 2018



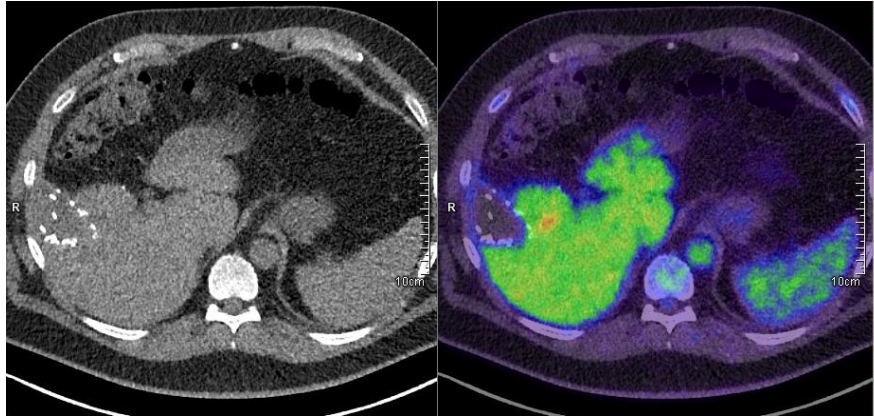
2020: liver relapse → surgery



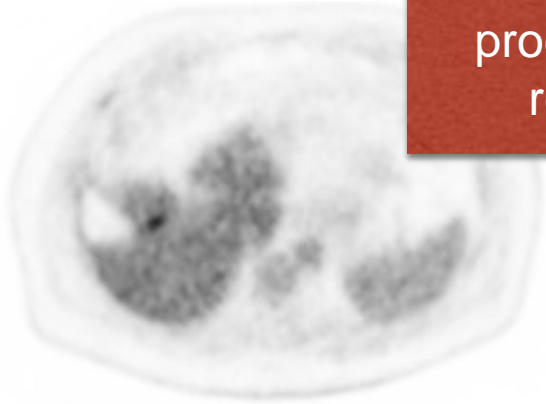
10/2021: relapse → chemo



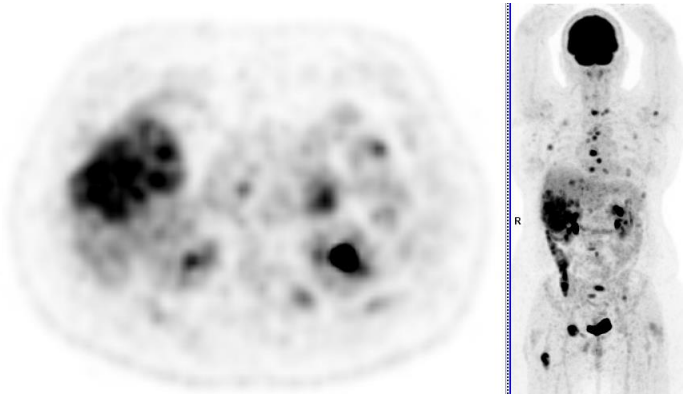
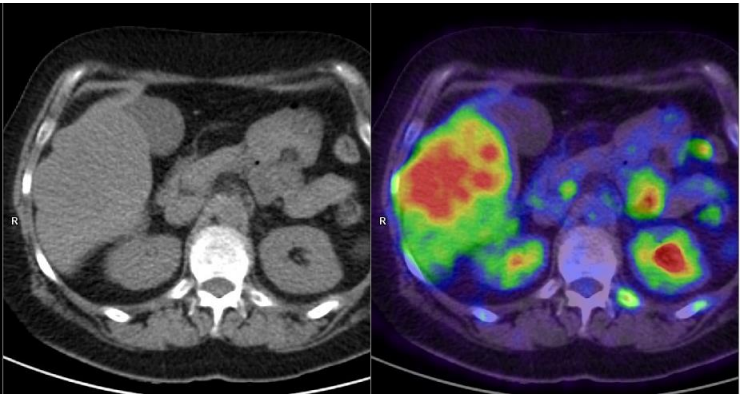
01/2022: CR in the liver



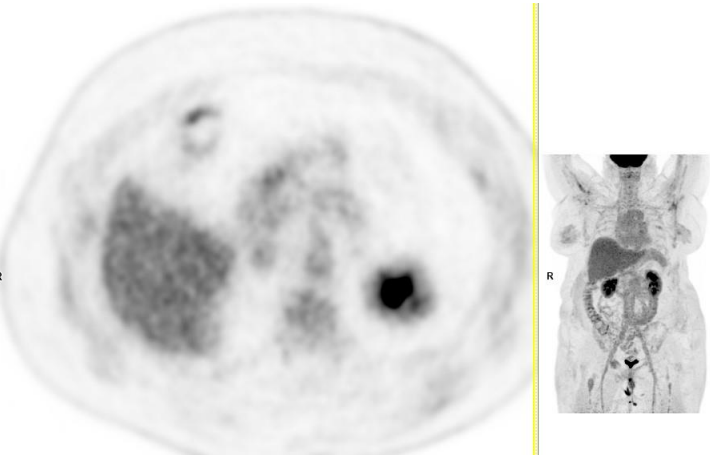
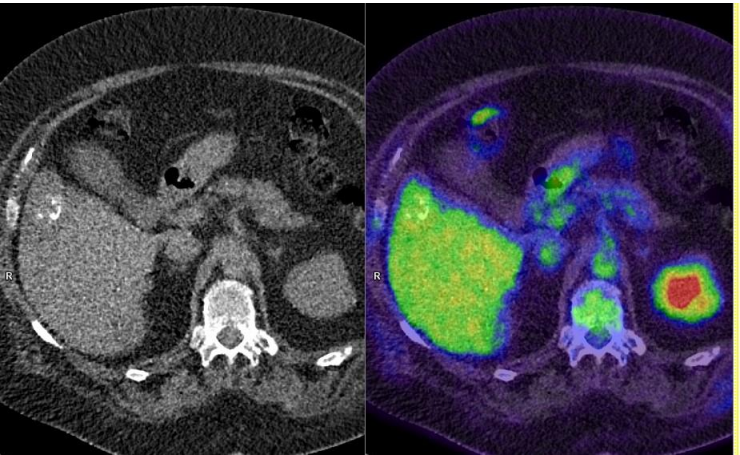
08/2022:
progression/
relapse



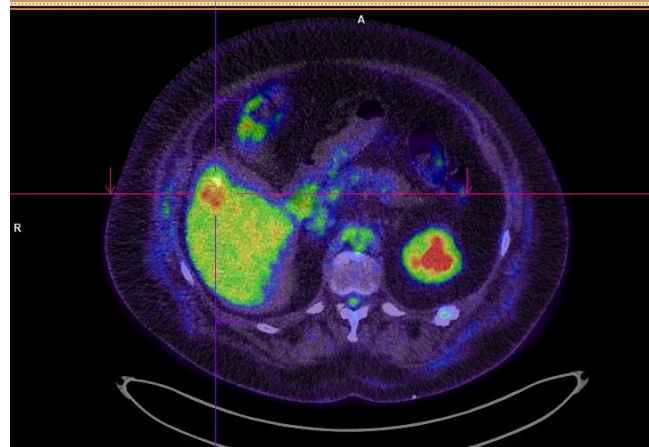
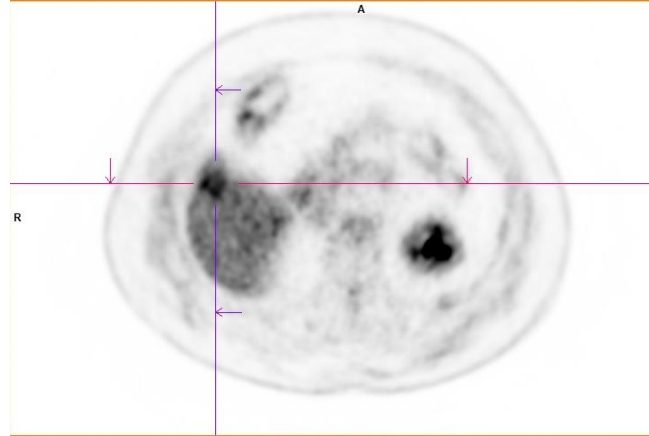
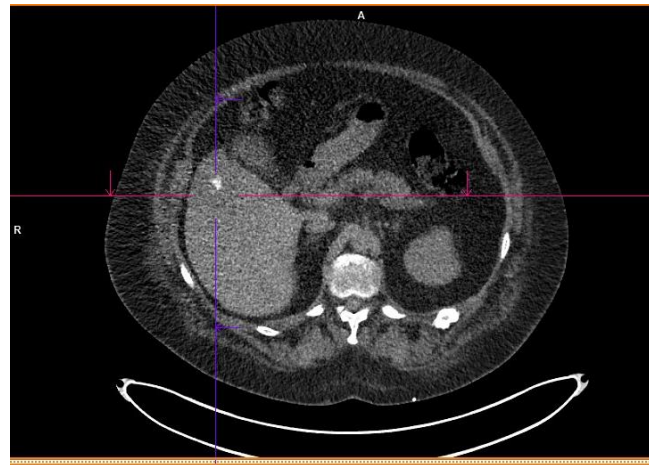
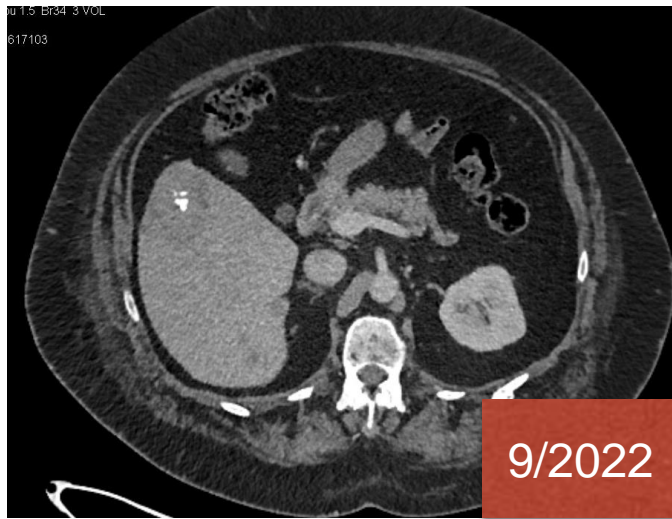
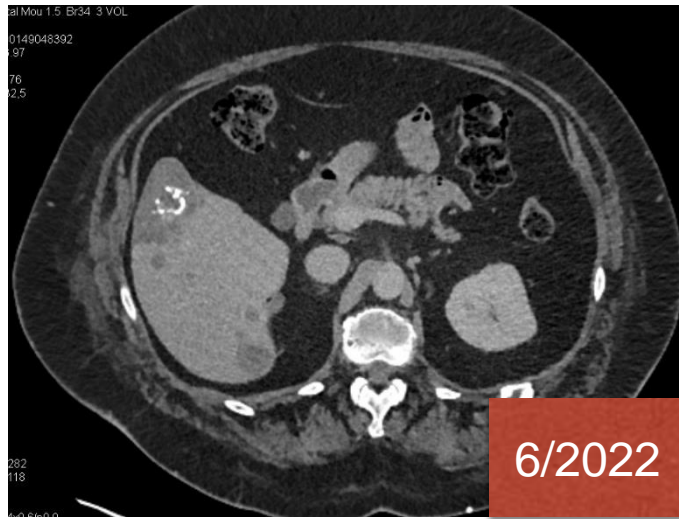
48 y-o female, GIST



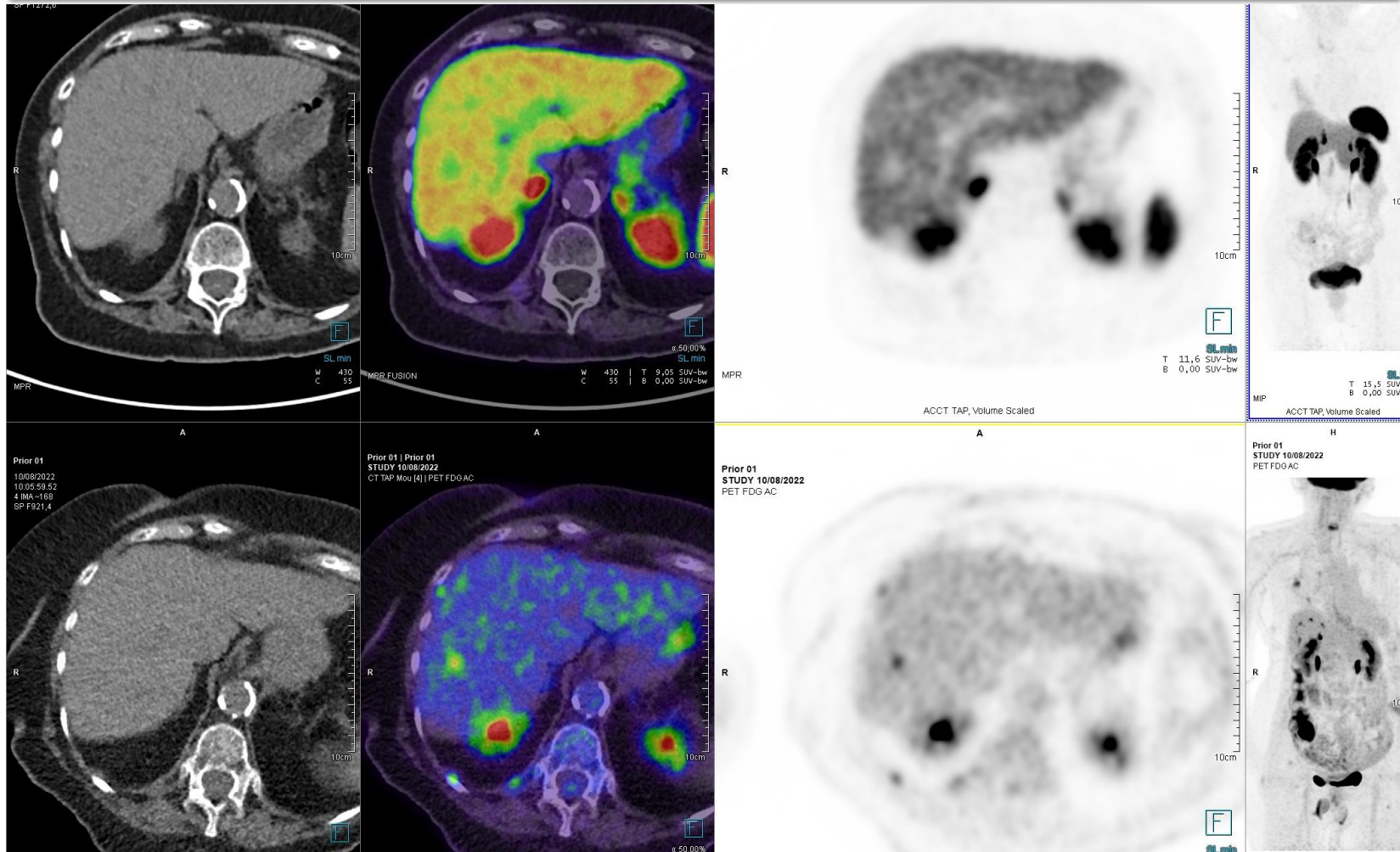
5/2021



6/2022



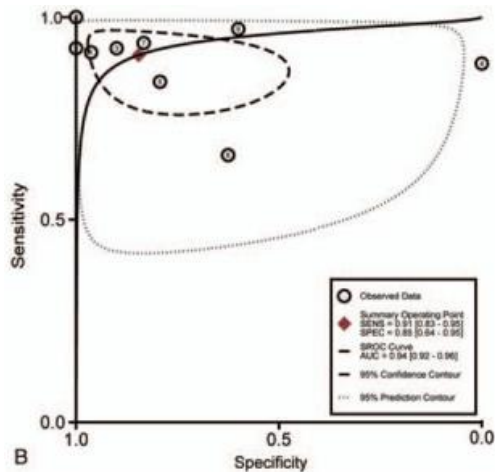
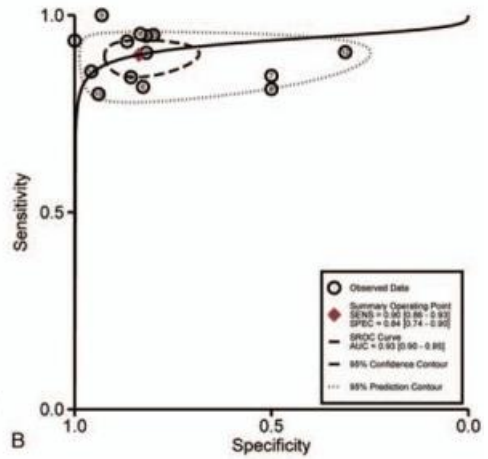
Beyond [¹⁸F]FDG: [⁶⁸Ga]DOTA-peptides for NET



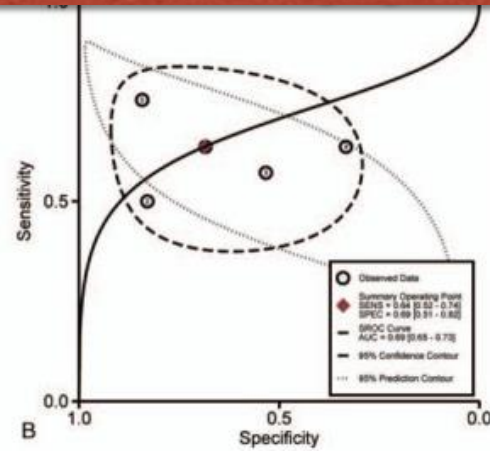
Atypical carcinoid: [¹⁸F]FDG + / [⁶⁸Ga]DOTANOC -

Cholangiocarcinoma

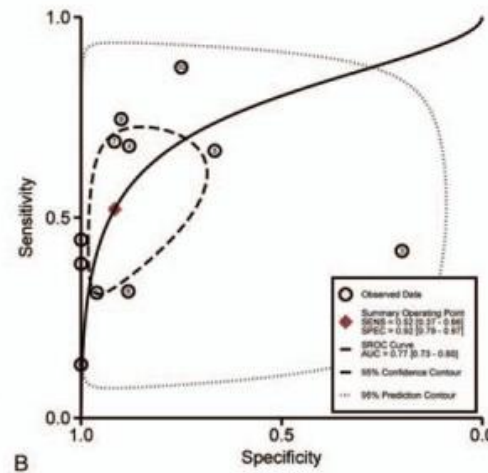
Diagnosis of primary



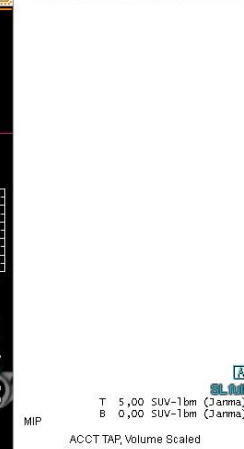
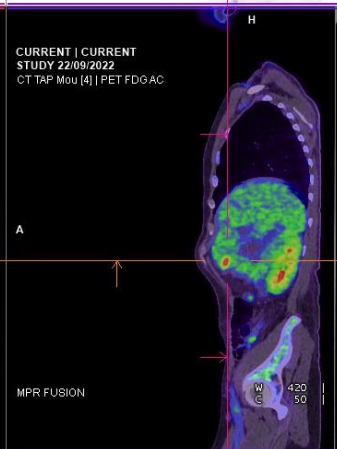
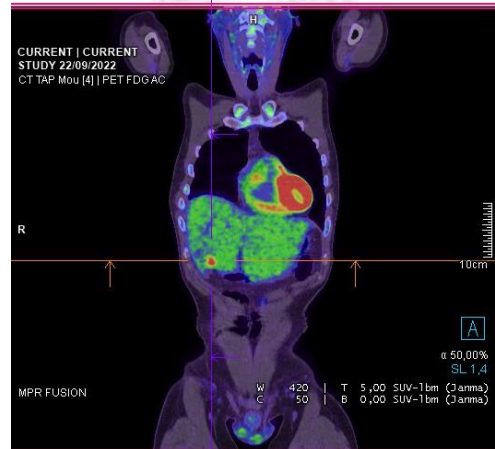
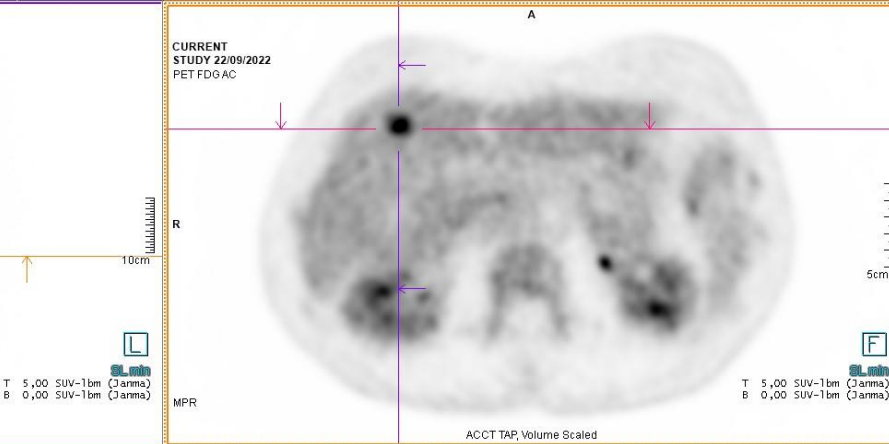
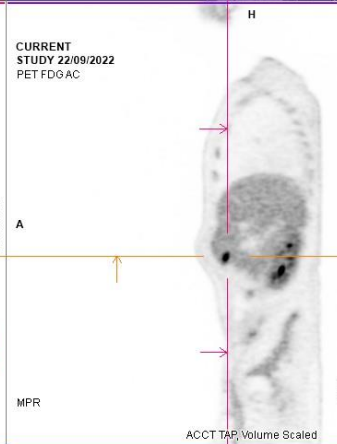
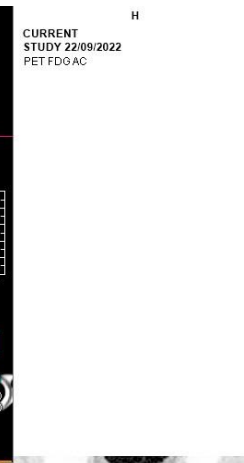
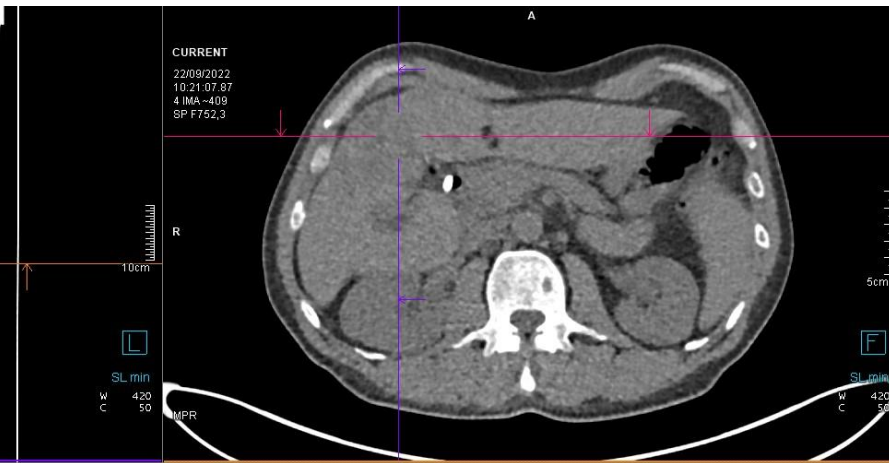
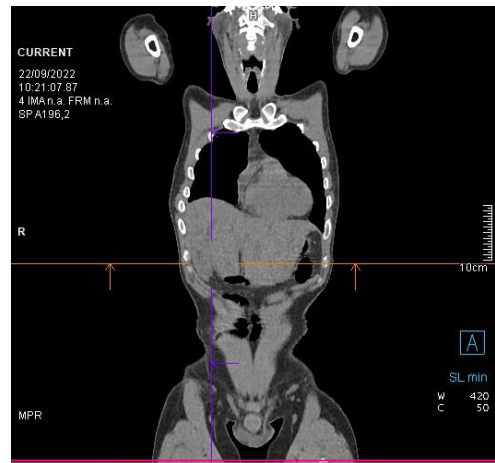
N staging



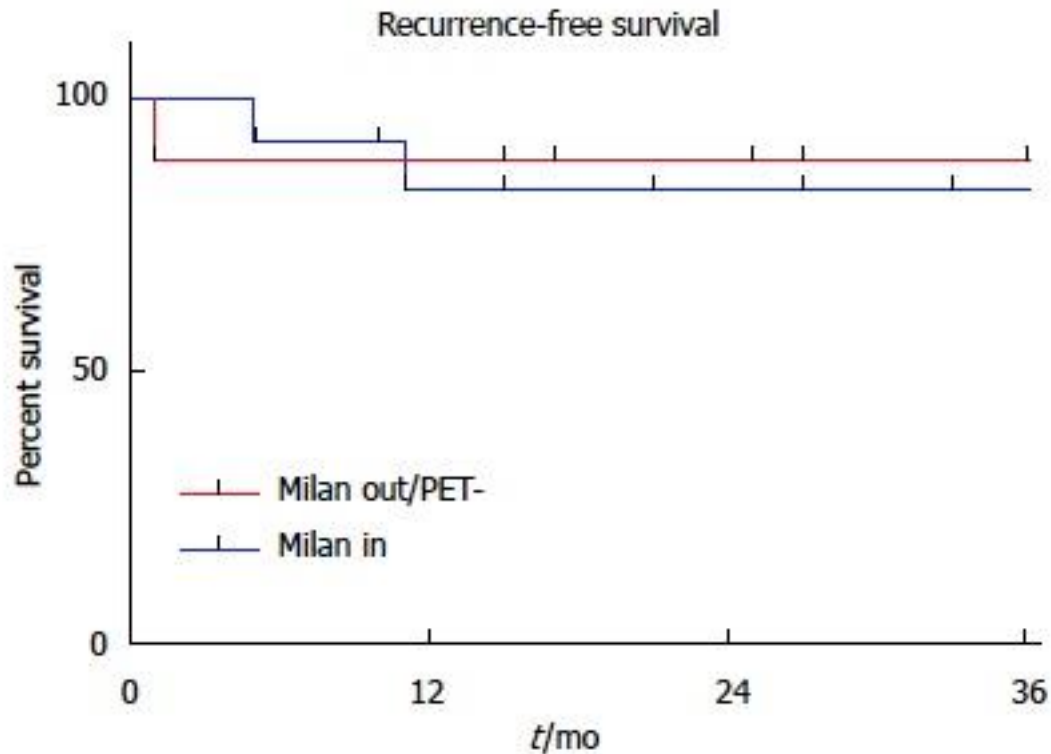
MRI



[¹⁸F]FDG PET/CT



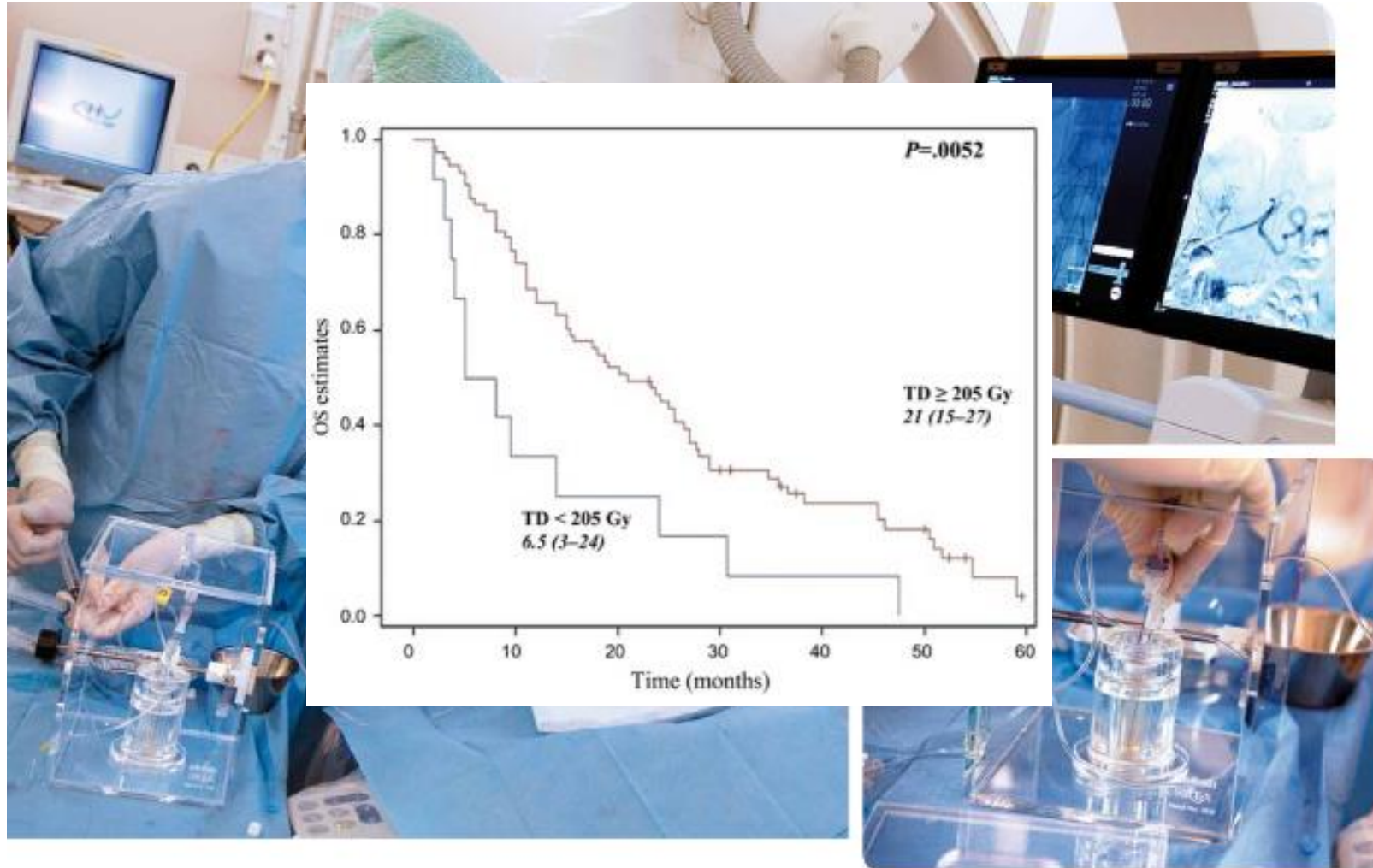
[¹⁸F]FDG PET/CT in HCC: poor sensitivity but prognostic value prior to transplant (?)



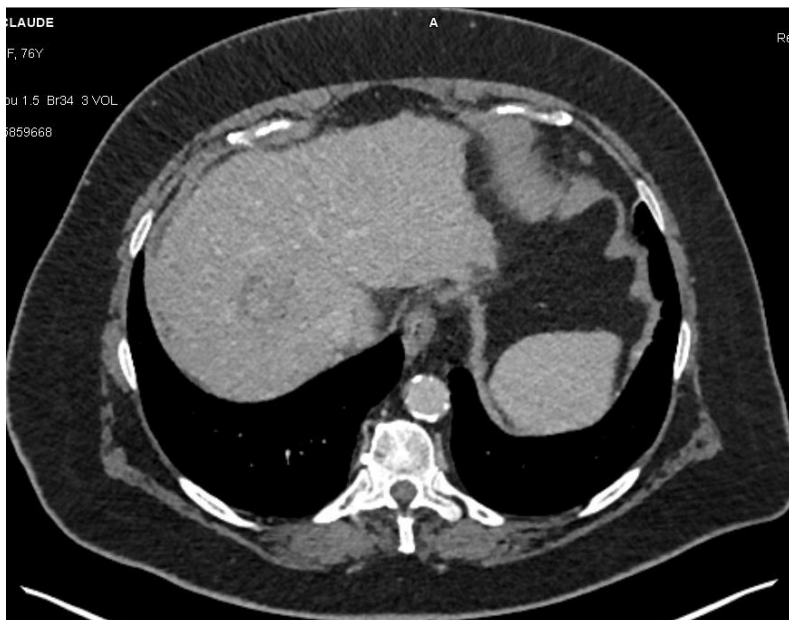
Prognostic value of ¹⁸F-FDG PET/CT in liver transplantation for hepatocarcinoma

Olivier Detry, Laurence Govaerts, Arnaud Deroover, Morgan Vandermeulen, Nicolas Meurisse, Serge Malenga, Noella Bletard, Charles Mbendi, Anne Lamproye, Pierre Honoré, Paul Meunier, Jean Delwaide, Roland Hustinx

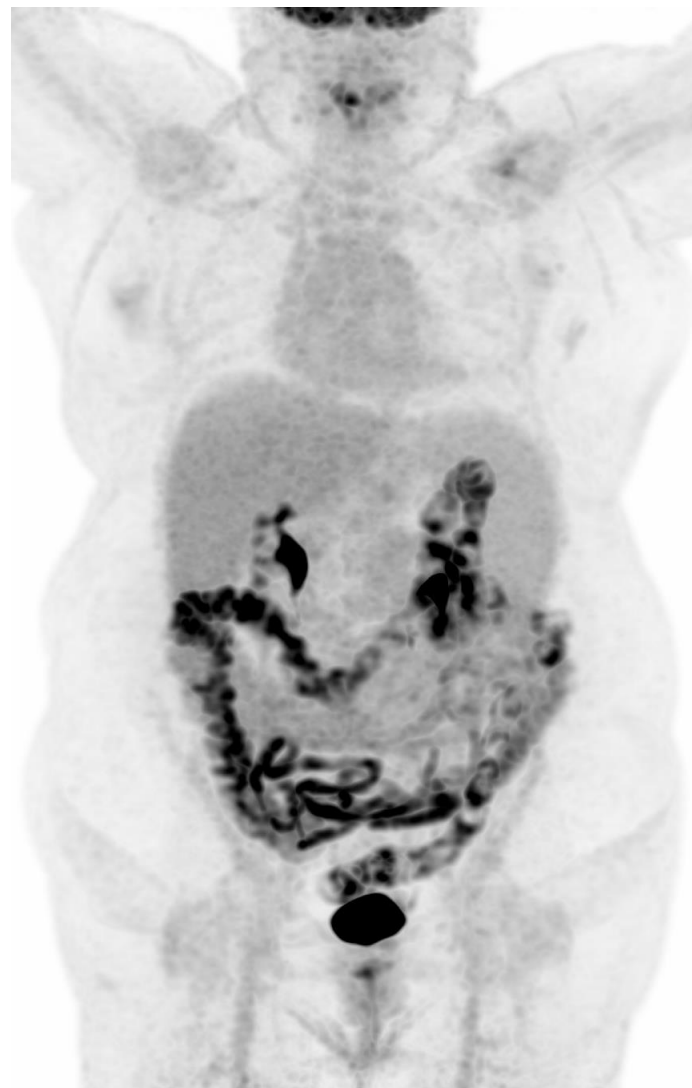
SIRT: Role of individual dosimetry

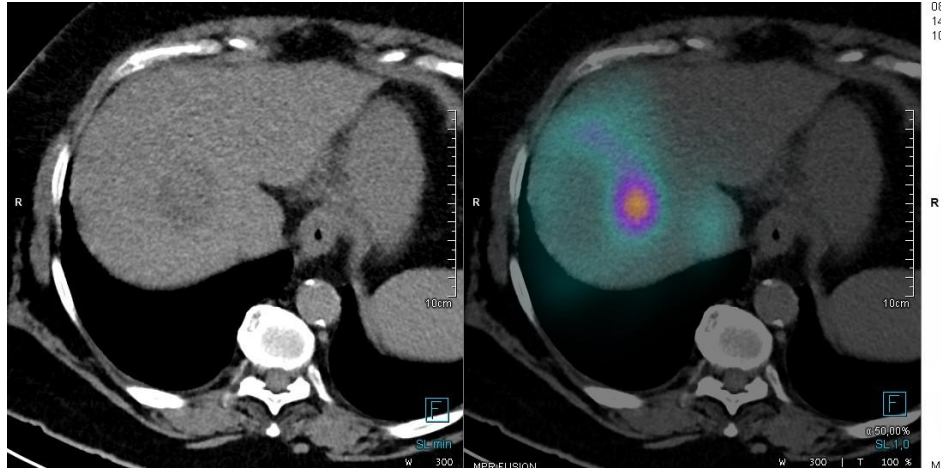


1. Garin E, Rolland Y, Pracht M, et al. High impact of macroaggregated albumin-based tumour dose on response and overall survival in hepatocellular carcinoma patients treated with ⁹⁰Y-loaded glass microsphere radioembolization. *Liver Int.* 2017 Jan;37(1):101-110.

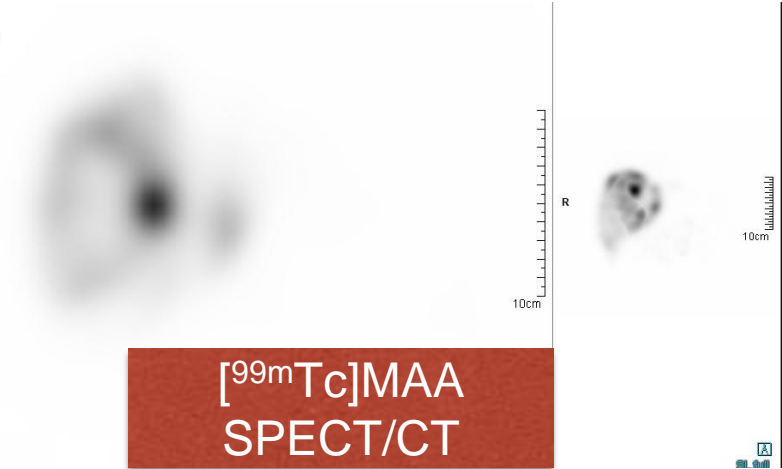


78 y-o female
Bifocal HCC

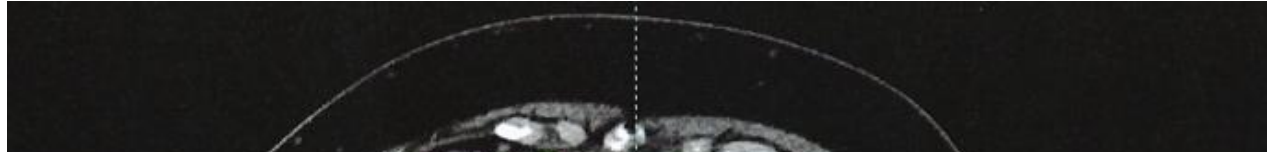




08/09/2022
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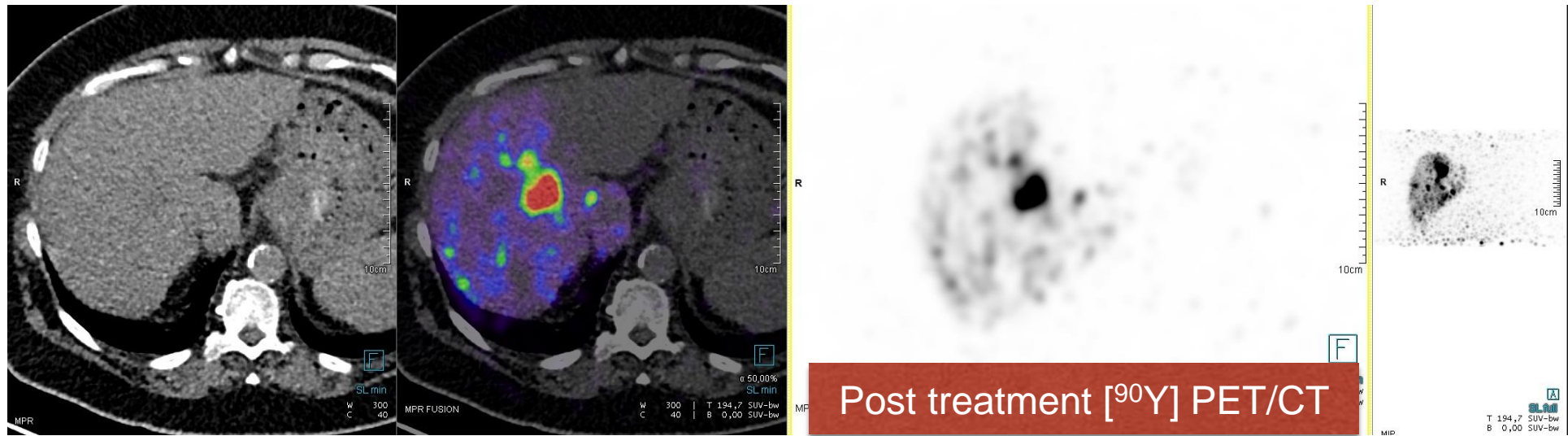


[^{99m}Tc]MAA
SPECT/CT

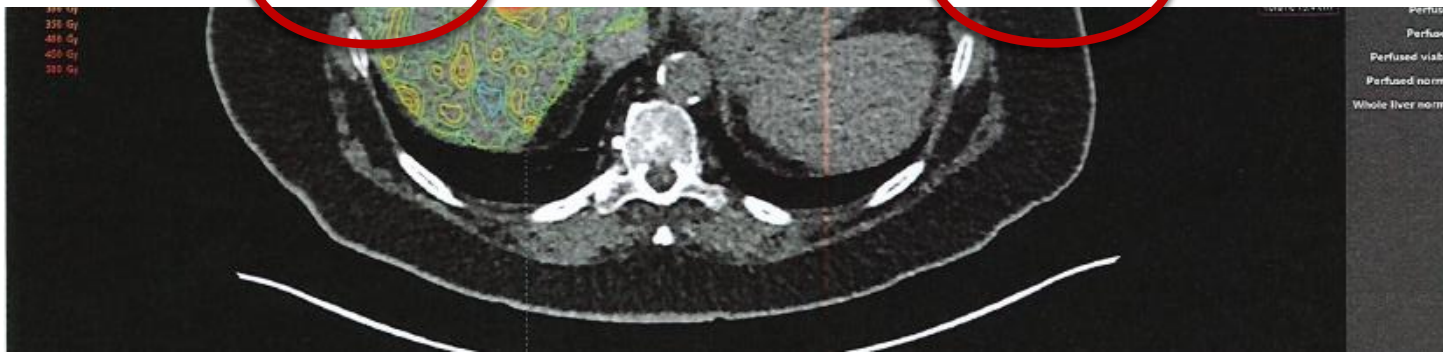


Required activity, GBq	Perfused fraction, %	Perfused tissue absorbed dose, Gy	Perfused tumor absorbed dose, Gy	Perfused viable tumor absorbed dose, Gy	Perfused normal tissue absorbed dose, Gy	Whole liver normal tissue absorbed dose, Gy	Lung absorbed dose, Gy
2.10	79.1	82.9	250.0		79.4	62.6	4.1





Perfused fraction, %	Perfused tissue absorbed dose, Gy	Perfused tumor absorbed dose, Gy	Perfused viable tumor absorbed dose, Gy	Perfused normal tissue absorbed dose, Gy	Whole liver normal tissue absorbed dose, Gy	Lung absorbed dose, Gy
66.1	107.0	581.4	97.0	63.9		4.9



Individual dosimetry is key in selecting the patients eligible to SIRT

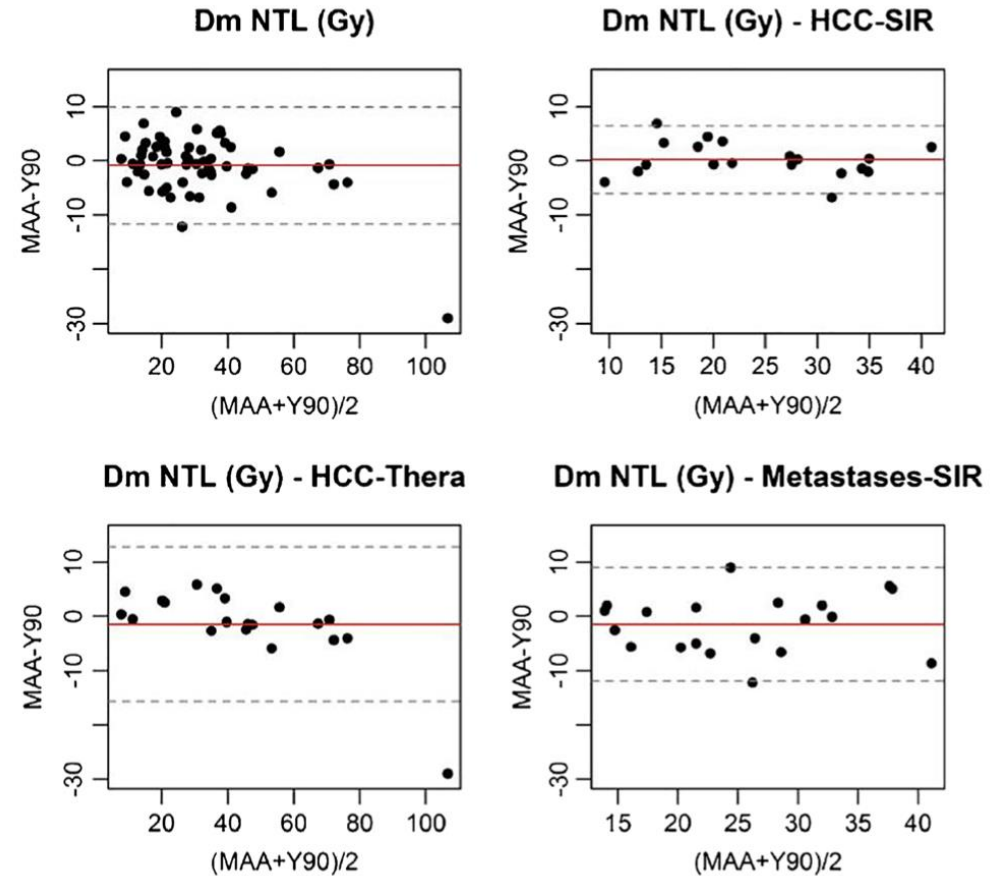
European Journal of Nuclear Medicine and Molecular Imaging (2020) 47:828–837
<https://doi.org/10.1007/s00259-019-04465-7>

ORIGINAL ARTICLE



Comparative dosimetry between ^{99m}Tc -MAA SPECT/CT and ^{90}Y PET/CT in primary and metastatic liver tumors

Alexandre Jadoul¹ • Claire Bernard¹ • Pierre Lovinfosse¹ • Laurent Gérard² • Henri Lilet¹ • Olivier Cornet² • Roland Hustinx¹



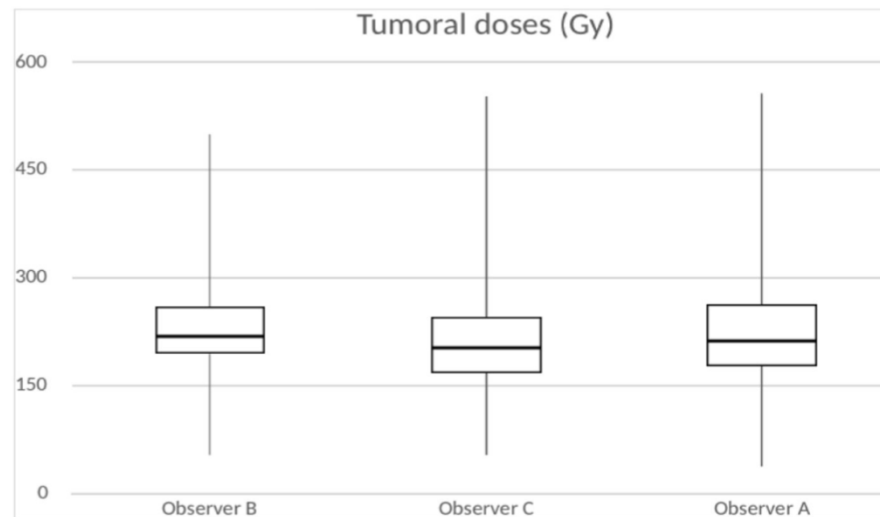
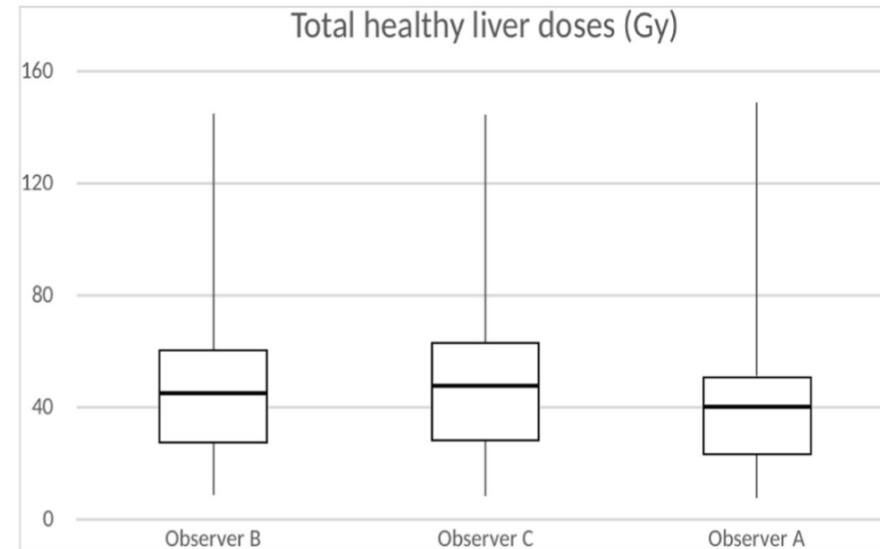
ORIGINAL RESEARCH

Open Access

Inter-observer variability of ^{90}Y PET/CT dosimetry in hepatocellular carcinoma after glass microspheres transarterial radioembolization



Nicolas Meyers^{1*}, Alexandre Jadoul¹, Claire Bernard¹, Jean Delwaide², Anne Lamproye², Olivier Detry³, Pierre Honoré³, Laurent Gerard⁴ and Roland Hustinx¹



Conclusions

- [¹⁸F]FDG PET/CT
 - High diagnostic performances in the management of liver metastases from most primaries
 - Whole-body evaluation, ± diagnostic CT
 - High sensitivity in cholangiocarcinomas
 - Prognostic value in HCC
- [⁶⁸Ga]DOTA-peptides for NETs
- Individual dosimetry in SIRT