



Pien de Haas en John de Klerk
nucleair geneeskundigen Meander Medisch Centrum Amersfoort

2e Mammacongres 28 januari 2011 Harderwijk

Siemens Biograph true point PET/CT 40 slice



Sinds oktober 2007

Sinds 21 januari 2011



The evolving role of PET/CT in breast cancer

Groheux et al Nuclear medicine communications 2010



Normale FDG-PET scan

PET/CT at initial **staging** in large and/or locally advanced breast cancer

PET/CT in detection of breast tumor **recurrence**

PET/CT in **response** assessment

Situations in which PET/CT is **not** indicated

*Personalized
medicine*



Significante correlatie tussen FDG opname / histologische en biologische parameters / slechtere prognose

ductal carcinoma > lobular carcinoma

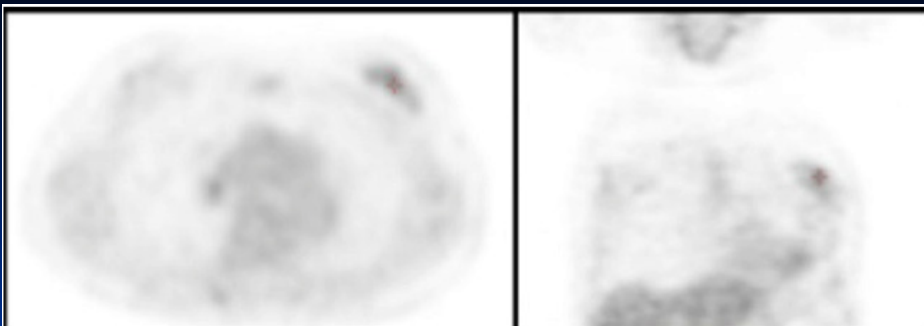
- hoge tumor gradering
- tumor proliferatie index (Ki67 expression)
- hormoon receptor negatief
- triple - negatief (ER- , PR- , geen overexpressie HER2)
- P53 mutatie
- Metaplasie

Geen correlatie tussen FDG opname en HER2 expressie (c-erbB2)

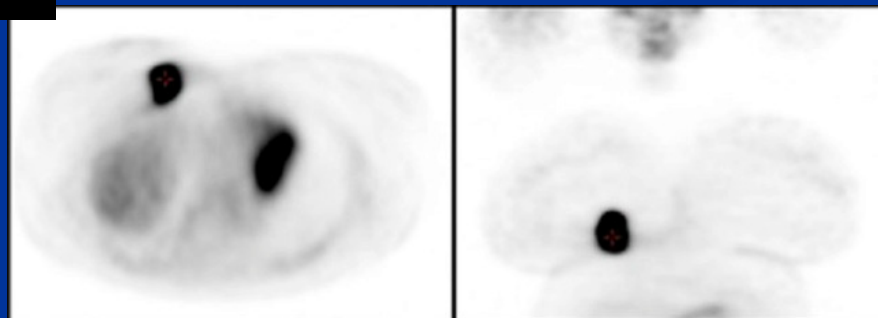
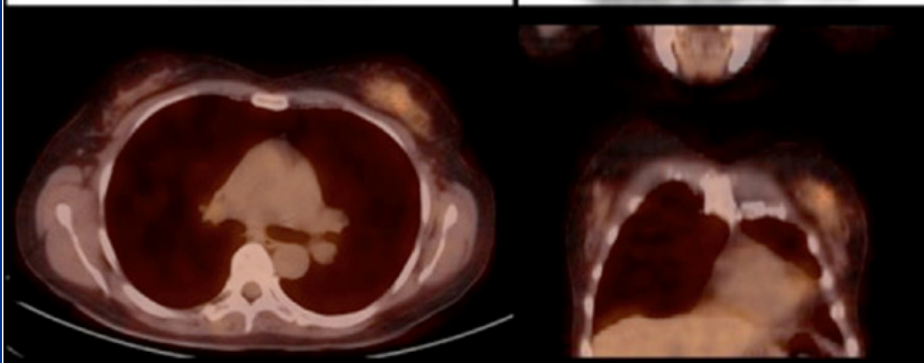
Correlation of high 18-FDG uptake to clinical, pathological and biological prognostic factors in breast cancer

Groheux e.a.
EJNM July 2010

Hoger risico afstandsmetastasen, baseline PET/CT gerechtvaardigd?

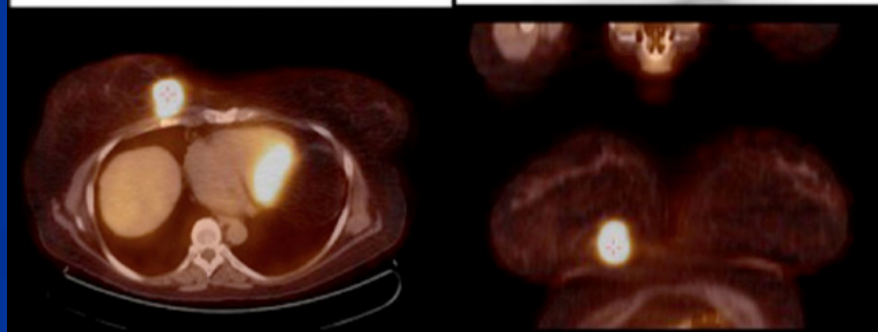


E +, P+, her2neu -



Triple

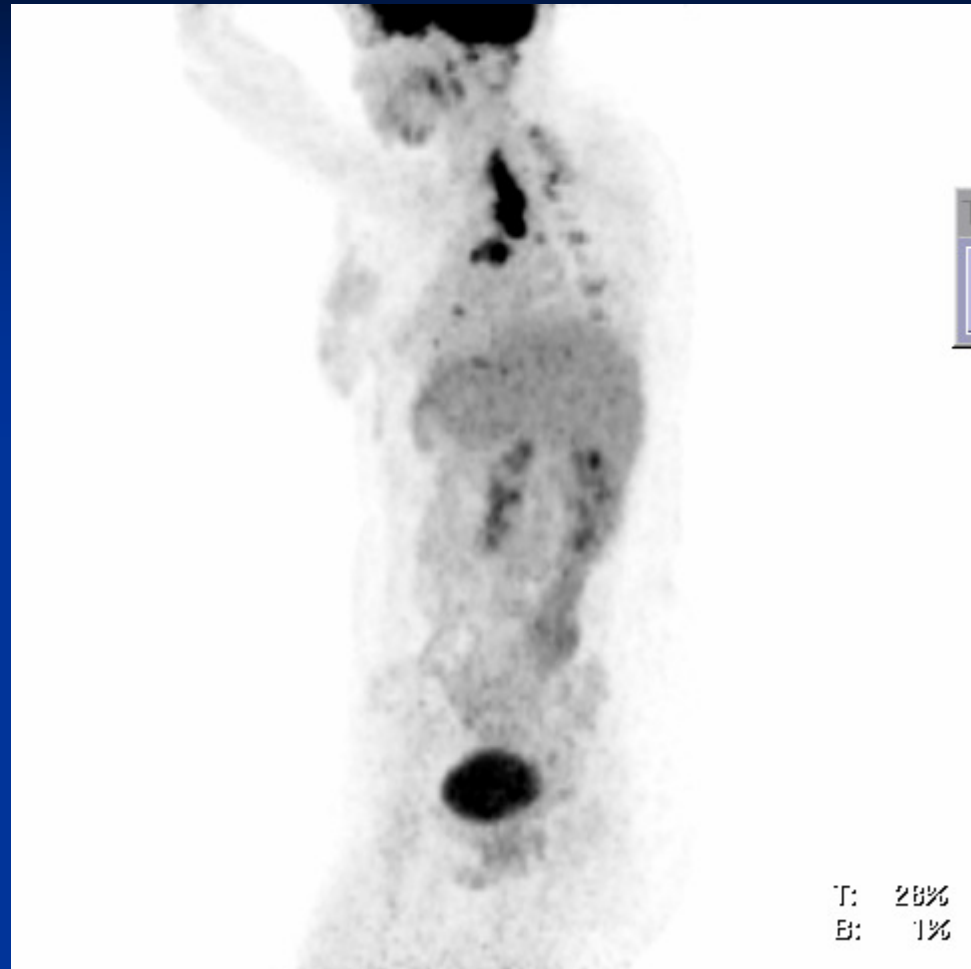
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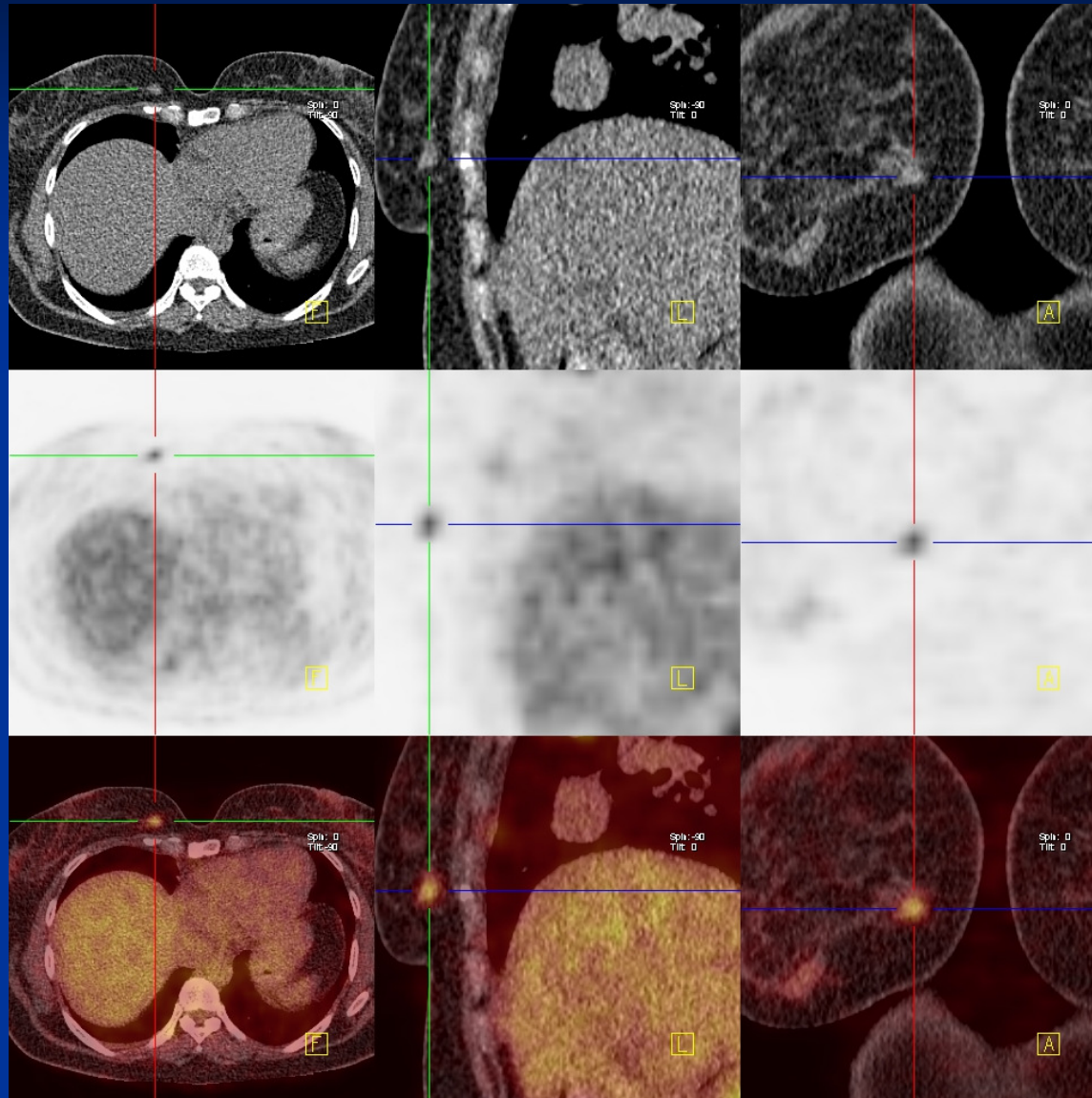
Vrouw, 39 jaar

**Klieren in hals en
mediastinum**

**Onbekende primaire
tumor**



Diagnose: Borstkanker



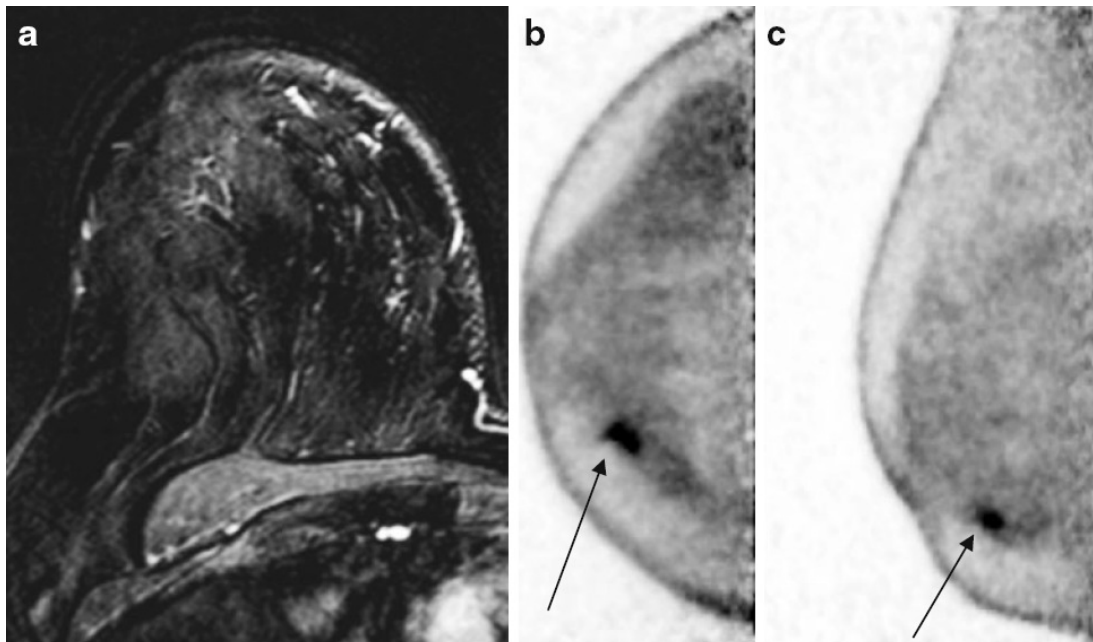
FDG-PET is niet geïndiceerd

Kleine tumoren: lage sensitiviteit bij $< 0,4$ cm tumoren

- Heeft een matige spatiële resolutie
- Is niet goed in het bepalen van contouren
- Ziet geen microscopische uitbreiding / ingroei

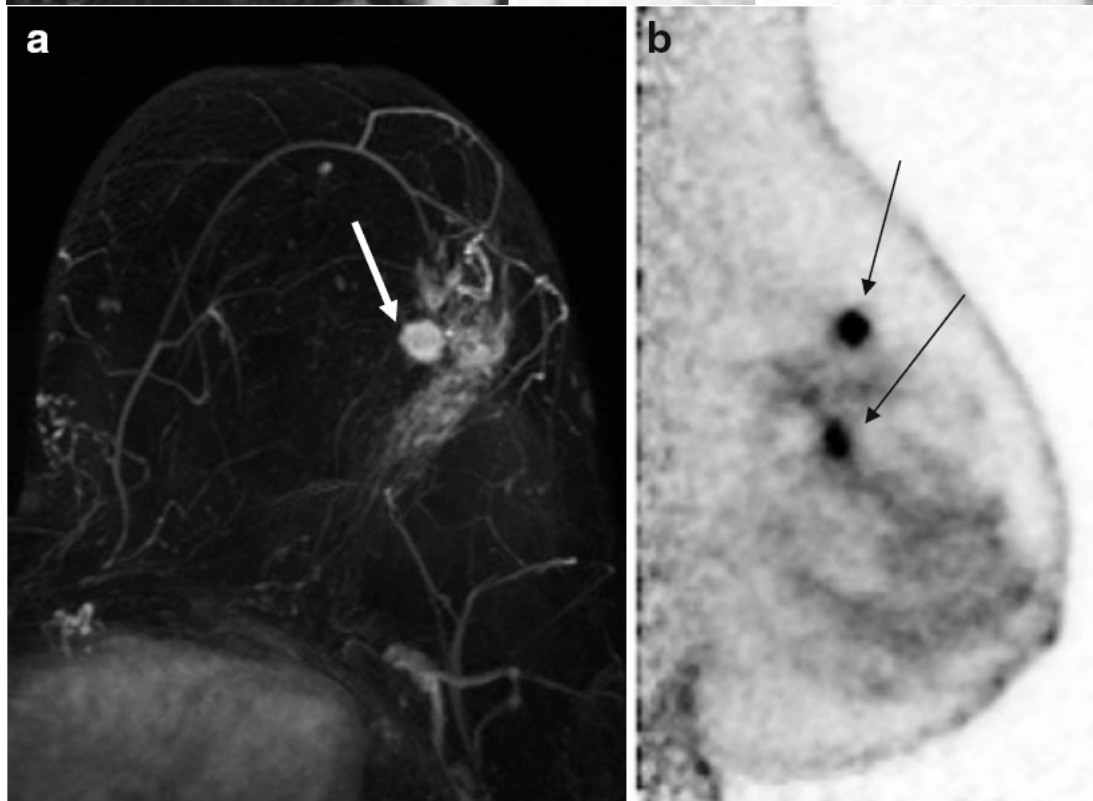
Niet bijdragend !

*High-sensitivity dedicated PET systemen for breast imaging
Positron emission mammography PEM*



Schilling et al. Eur J Nucl Med 2011

PEM vs MRI



Stereo Navigator: The First Commercially Available Breast PET-Guided Biopsy System

Filed under: [Radiology](#), [Surgery](#)



PEM vs MRI

Unexpected lesions ipsilateraal of contralateraal

PEM: sens 84%, spec 74 %

MRI: sens 98%, spec 48 %

PEM niet afhankelijk van hormoon status of dichtheid van de borst !

FDG-PET is niet geïndiceerd

Screening van axillaire lymfklieren voor initiële chirurgie van kleine tumoren

Niet gevoelig voor aantonen micrometastasen danwel kliermetastasen kleiner dan de spatiele resolutie van het systeem

Geen vervanging van SN procedure

Positieve axillaire klieren op FDG-PET

- Als N+ beschouwen
- Geen SN meer doen

PET/CT bij initiele stadiering bij “large and/or locally advanced breast cancer”

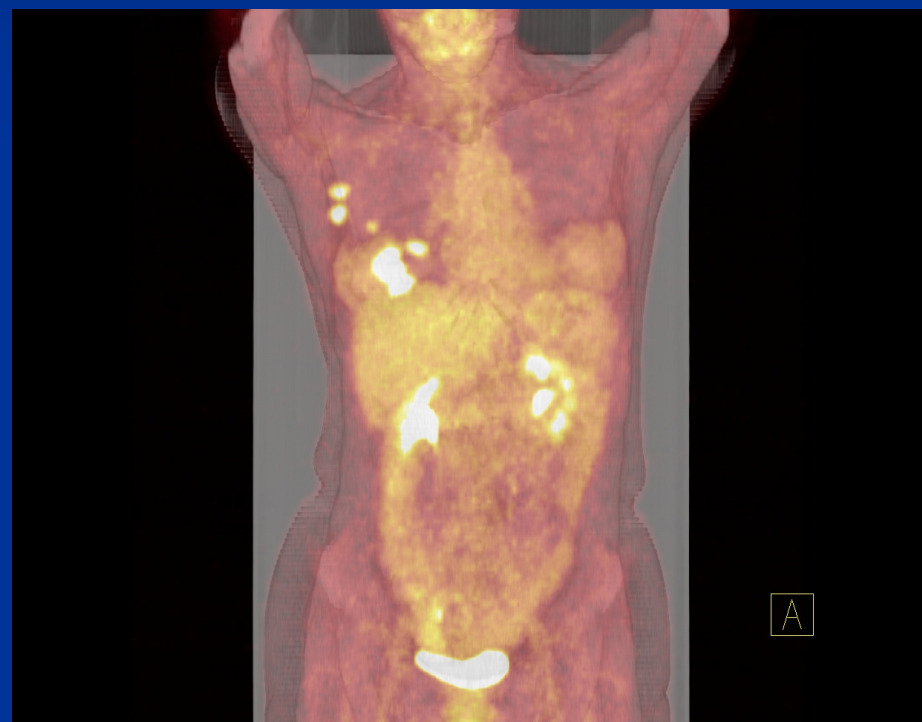
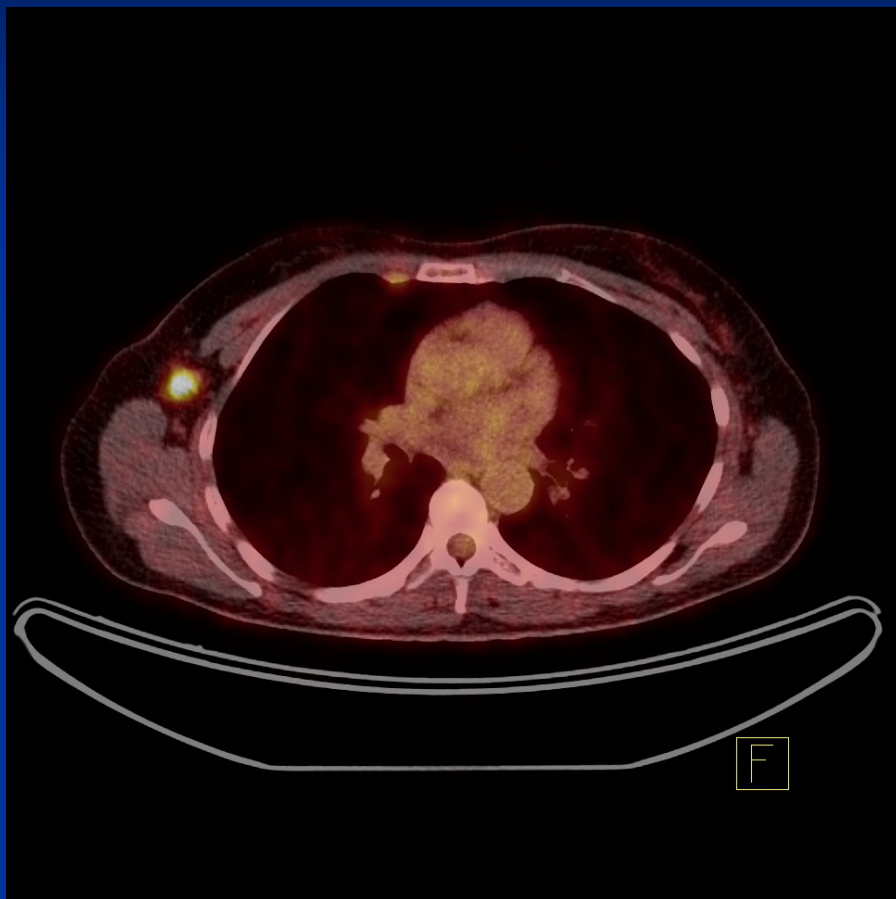
Locoregionale ziekte:

Positieve extra-axillaire klieren op FDG-PET

- Zo mogelijk bevestigen (echo/punctie)
- Anders als kliermetastasen beschouwen

EJC 2010 (groep van Vogel, AVL) in patients with stage 2-3 breast cancer

Conclusie: extra-axillaire Inn bij 1/3 v.d. patienten en verandering van RT in 12%





ELSEVIER

Available online at www.sciencedirect.com



EJSO 36 (2010) 387–392

EJSO

the Journal of Cancer Surgery

www.ejso.com

The role of FDG PET/CT in patients with locoregional breast cancer recurrence: A comparison to conventional imaging techniques

T.S. Aukema^{a,*}, E.J.Th. Rutgers^b, W.V. Vogel^a, H.J. Teertstra^c, H.S. Oldenburg^b,
M.T.F.D. Vrancken Peeters^b, J. Wesseling^d, N.S. Russell^e, R.A. Valdés Olmos^a

^a Department of Nuclear Medicine, The Netherlands Cancer Institute – Antoni van Leeuwenhoek Hospital, Plesmanlaan 121,
1066 CX Amsterdam, The Netherlands

^b Department of Surgery, The Netherlands Cancer Institute – Antoni van Leeuwenhoek Hospital, Plesmanlaan 121, 1066 CX Amsterdam, The Netherlands

^c Department of Radiology, The Netherlands Cancer Institute – Antoni van Leeuwenhoek Hospital, Plesmanlaan 121, 1066 CX Amsterdam, The Netherlands

^d Department of Pathology, The Netherlands Cancer Institute – Antoni van Leeuwenhoek Hospital, Plesmanlaan 121, 1066 CX Amsterdam, The Netherlands

^e Department of Radiotherapy, The Netherlands Cancer Institute – Antoni van Leeuwenhoek Hospital, Plesmanlaan 121,
1066 CX Amsterdam, The Netherlands

Sens, spec, acc, ppv ,npv van FDG PET: 97, 92, 95, 94,
96%

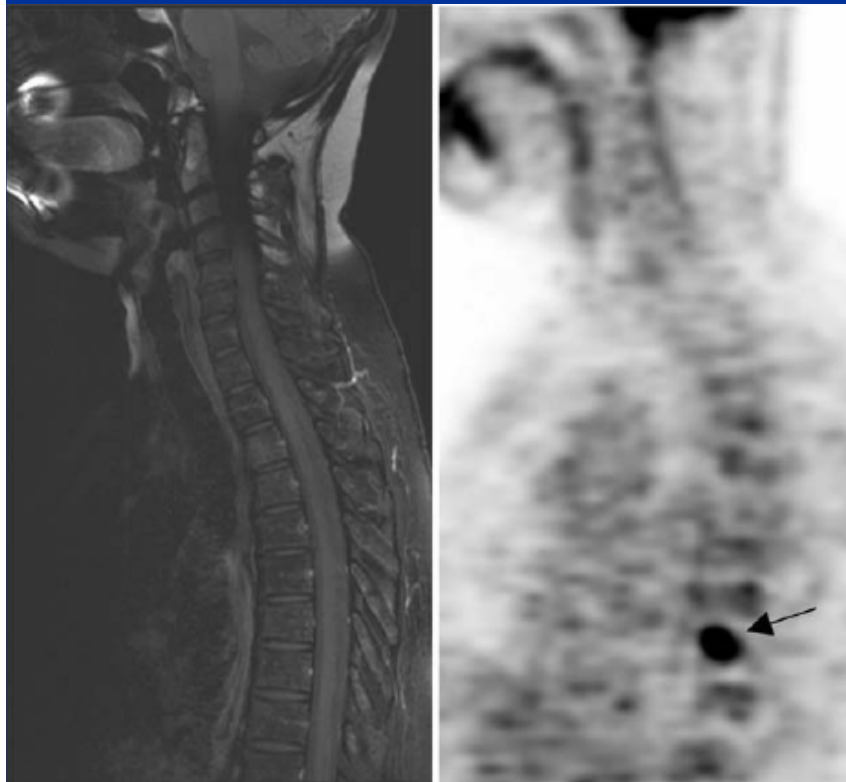
Verandering van behandeling in 48% !
(uitgebreide chirurgie vermeden in 36 %)

Recidief / afstandmetastasen

Breast Cancer Recurrence Diagnosis Suspected on Tumor Marker Rising

Value of Whole-Body 18FDG-PET/CT Imaging and Impact on Patient Management

Laurence Champion, MD¹; Etienne Brain, MD²; Anne-Laure Giraudet, MD¹; Elise Le Stanc, MD³; Myriam Wartski, MD¹; Véronique Edeline, MD¹; Olivier Madar, PD¹; Dominique Bellet, MD^{1,4}; Alain Pecking, MD¹; and Jean-Louis Alberini, MD^{1,5}



N=228, stijgend CA-15 and/or CEA

PET/CT vs conventionele beeldvorming

Sens: 95% 33%

Accuracy: 94% 48%

Verandering in behandeling: 54% !

Recidief / afstandmetastasen

Table 5. Impact of PET/CT Imaging on Therapy Changes

Therapeutic Modality Induced	Number of Patients (%)
Chemotherapy	48 (21.5%)
Endocrine therapy	21 (9%)
Modification of endocrine therapy	19 (8.5%)
Surgery	18 (8%)
Radiotherapy	17 (7.5%)
Total	123 (54%)

Breast Cancer

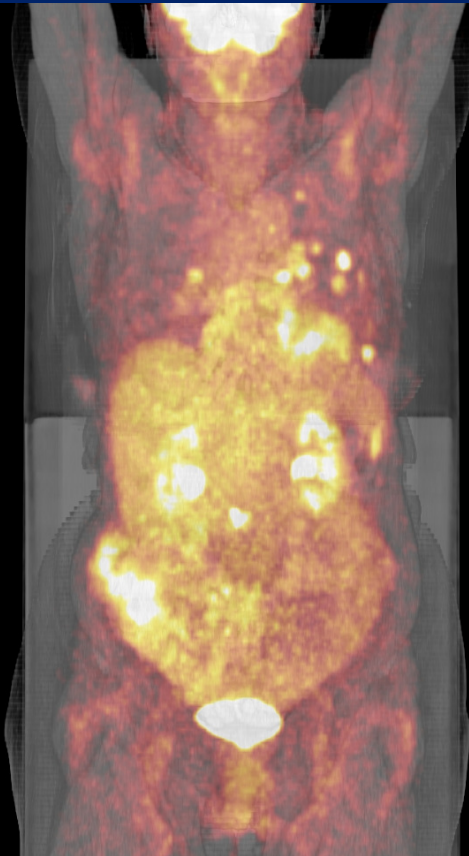
DOI 10.1007/s12282-009-0195-8

CASE REPORT

**Early distant relapse in early stage triple-negative breast cancer:
usefulness of FDG-PET for diagnosis of distant metastases**

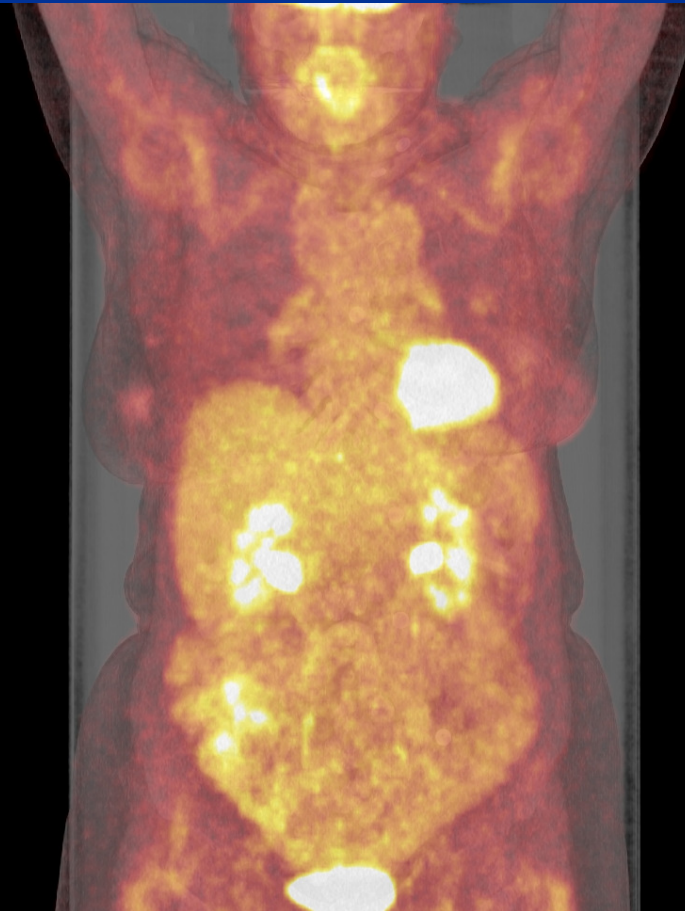
Response monitoring

Follow-up scan januari 2011



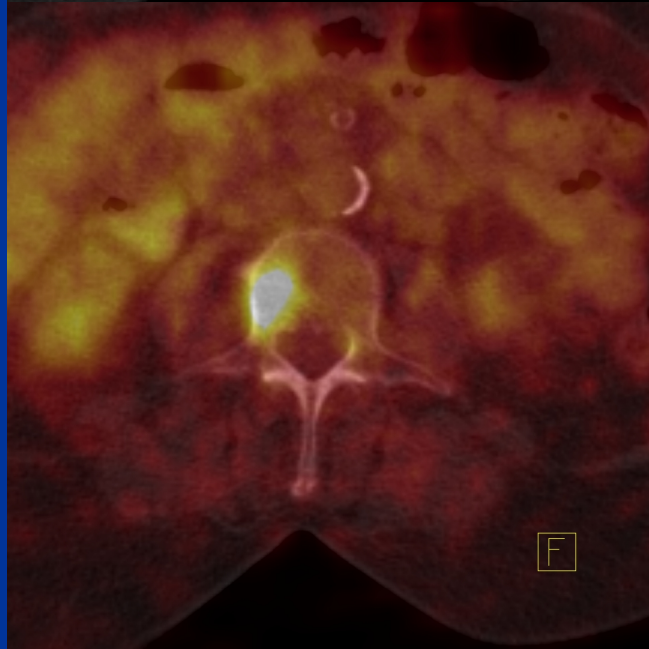
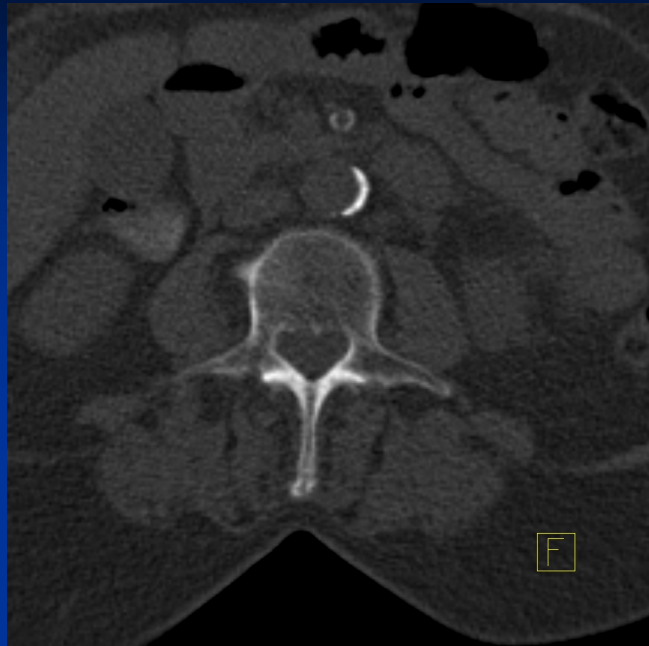
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Pre scan september 2010

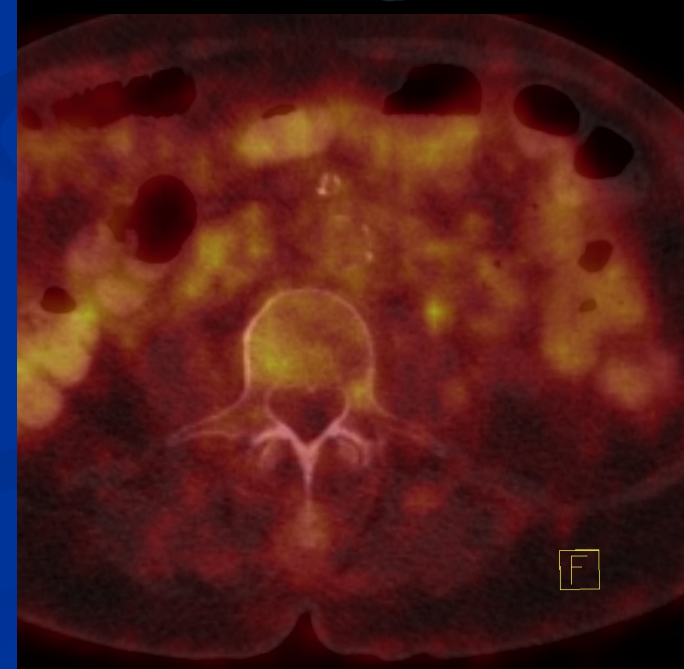
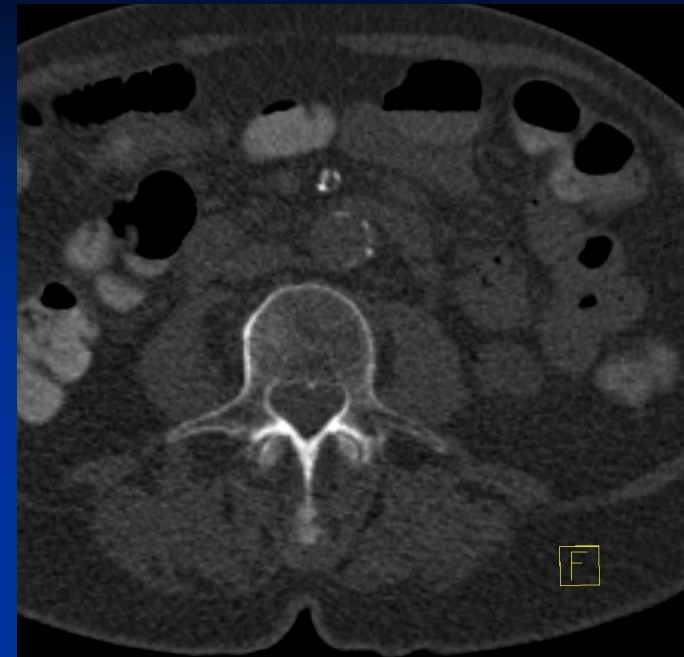


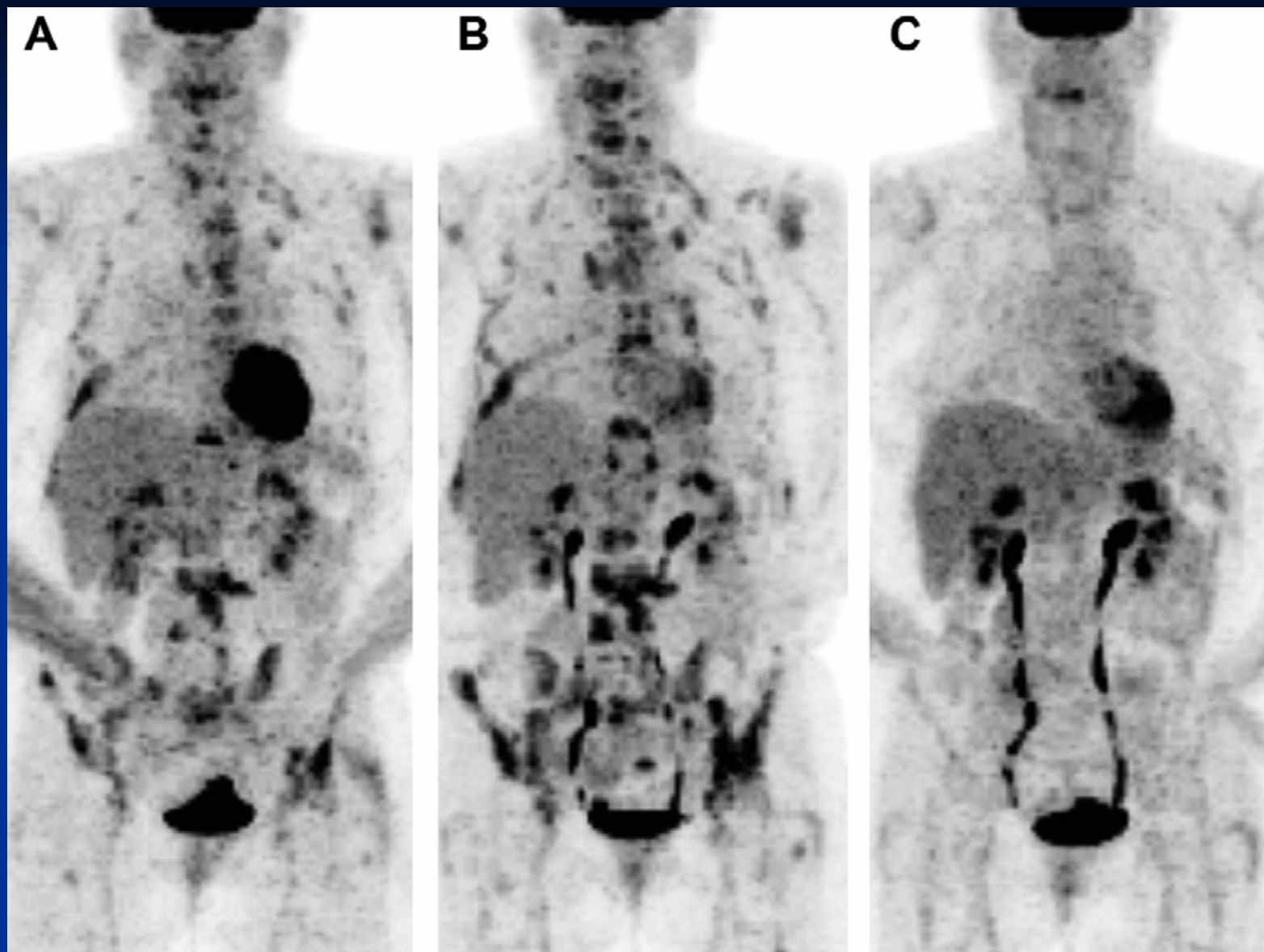
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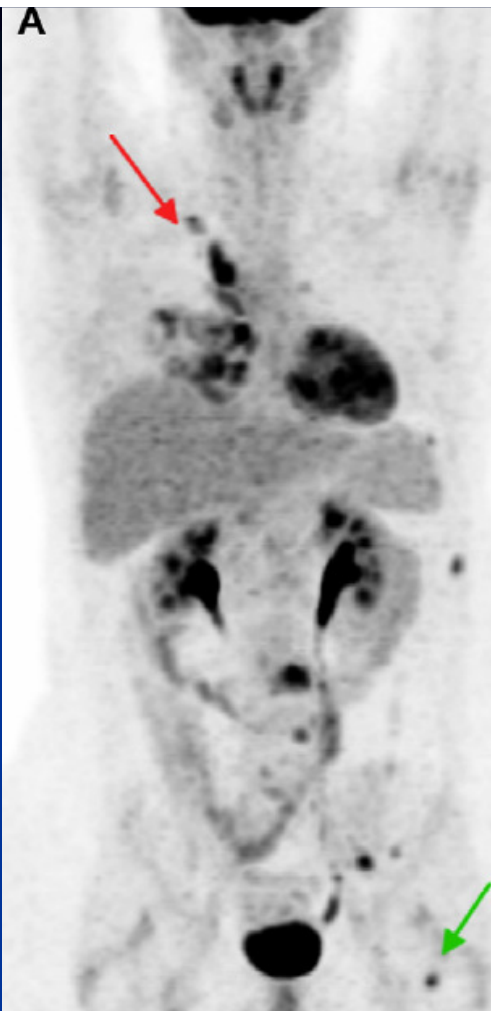
Pre scan september 2010



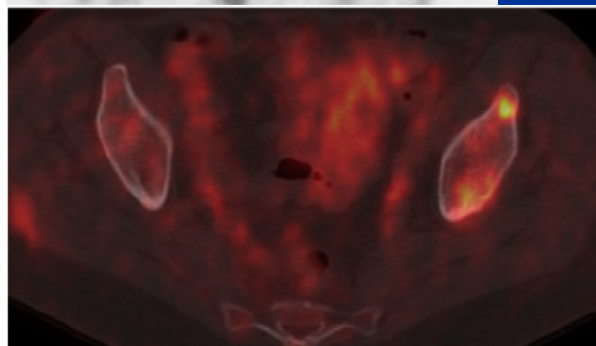
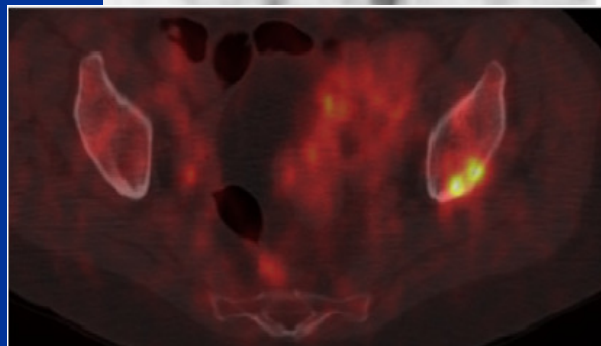
Follow-up scan jan 2011



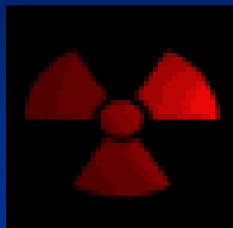




mixed response
na 3 mnd hormonale therapie



Personalized medicine



Het speerpunt Cancer focust zich de komende vijf jaar op borstkanker en maagdarmlieverkanker.

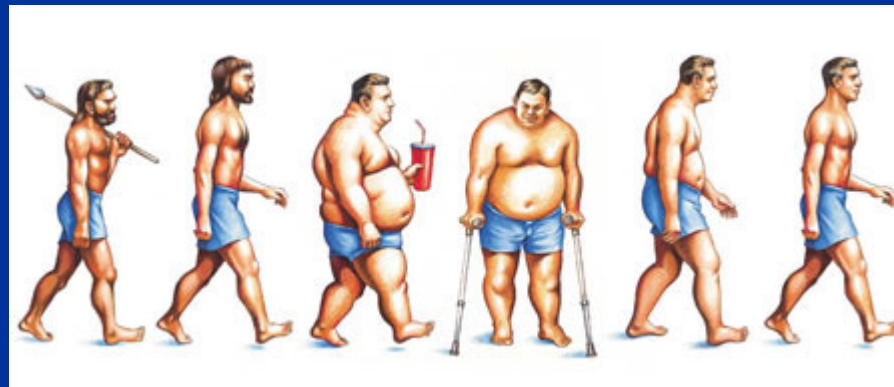
'Ik beloof dat wij in 2015 patiënten met kanker steeds gericht **individueel** kunnen behandelen en begeleiden en dat zij langer dan ooit verder kunnen met leven in plaats van ziek zijn.'



Prof. dr. Elsken van der Wall gaat samen met haar UMC Utrecht collega's het speerpunt Cancer invulling geven.

TOEKOMST VAN GENEESKUNDE

PERSONALIZED MEDICINE



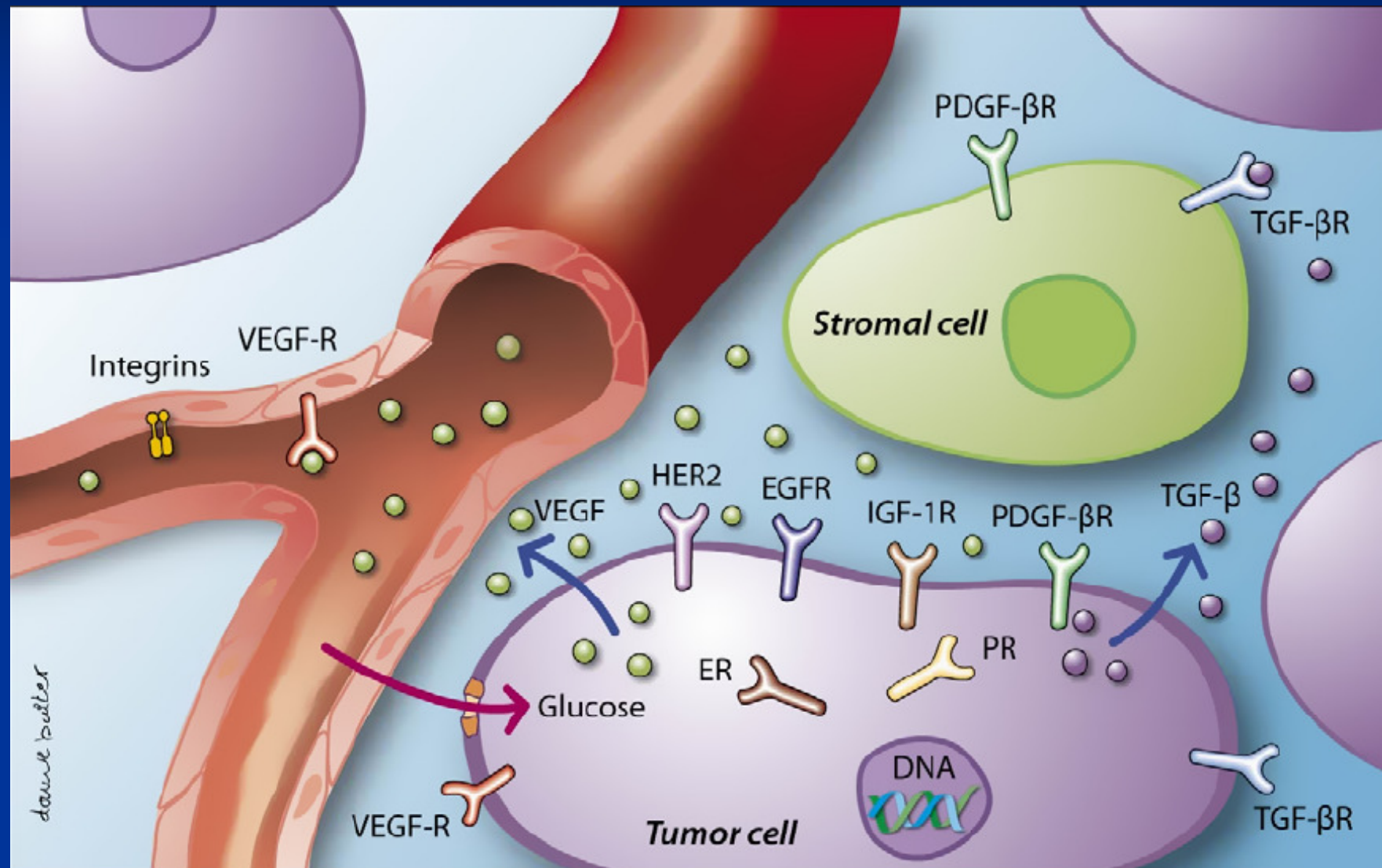
NUCLEAR MEDICINE = PERSONALIZED MEDICINE !!!!!



Treat with
alternative
drug or dose

Treat with
conventional
drug or dose

T.H. Oude Munnink^a, W.B. Nagengast^a, A.H. Brouwers^b, C.P. Schröder^a, G.A. Hospers^a, M.N. Lub-de Hooge^c,
E. van der Wall^d, P.J. van Diest^e, E.G.E. de Vries^{a,*}





FDG



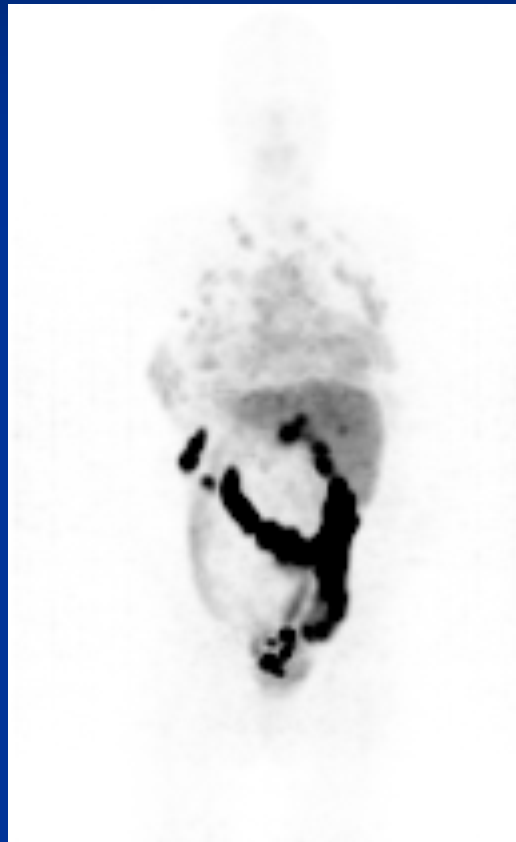
FLT



FES

Immuno PET

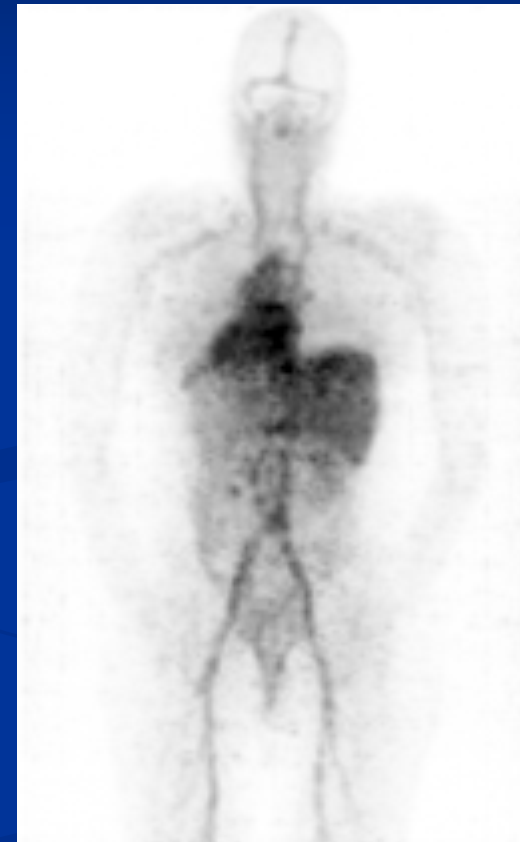
^{89}Zr -trastuzumab dose dependent biodistribution



10 mg ^{89}Zr -trastuzumab
3 days p.i.

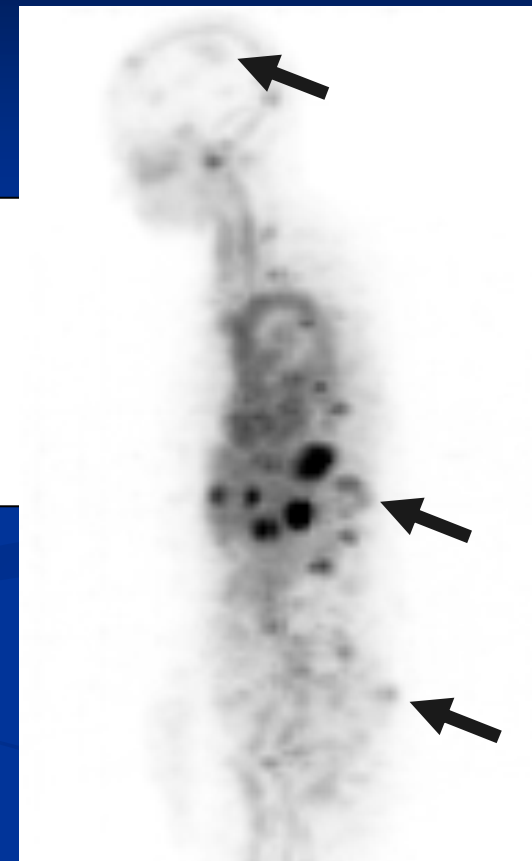
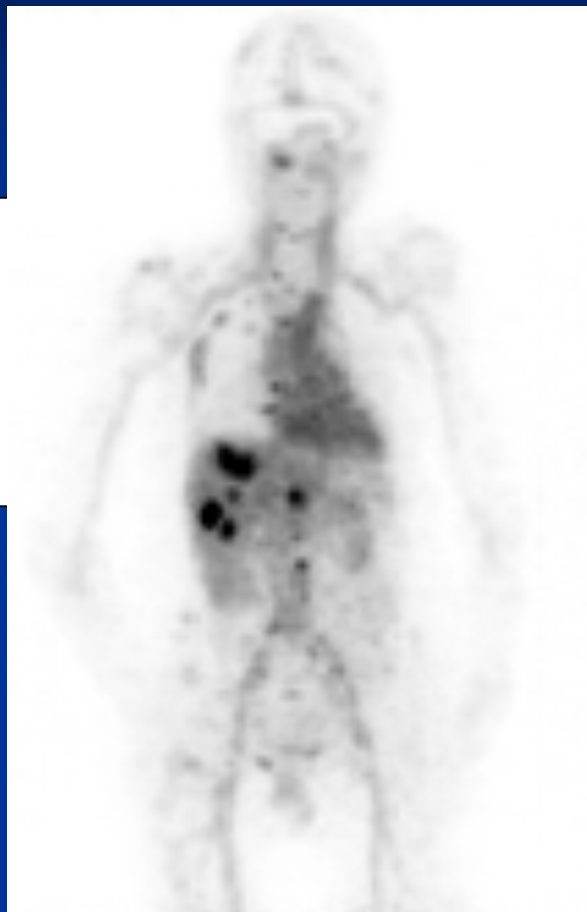
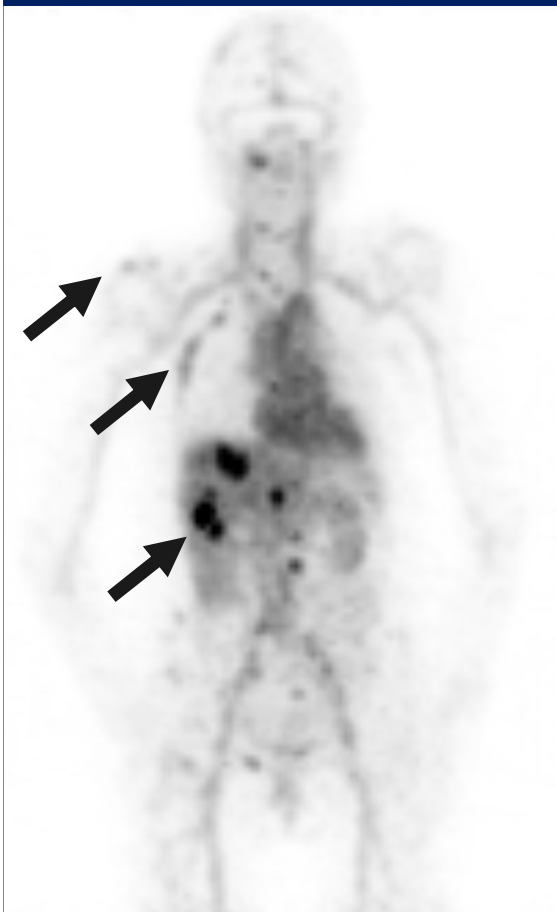


50 mg ^{89}Zr -trastuzumab
2 days p.i.

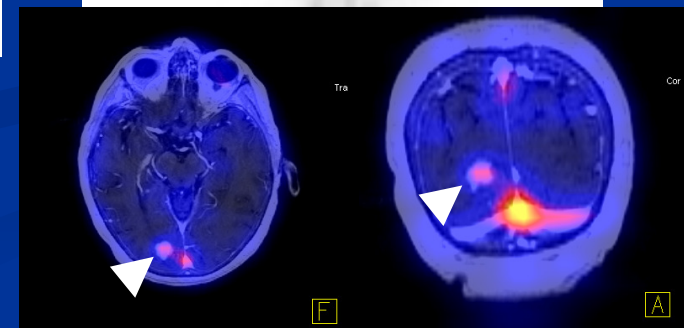


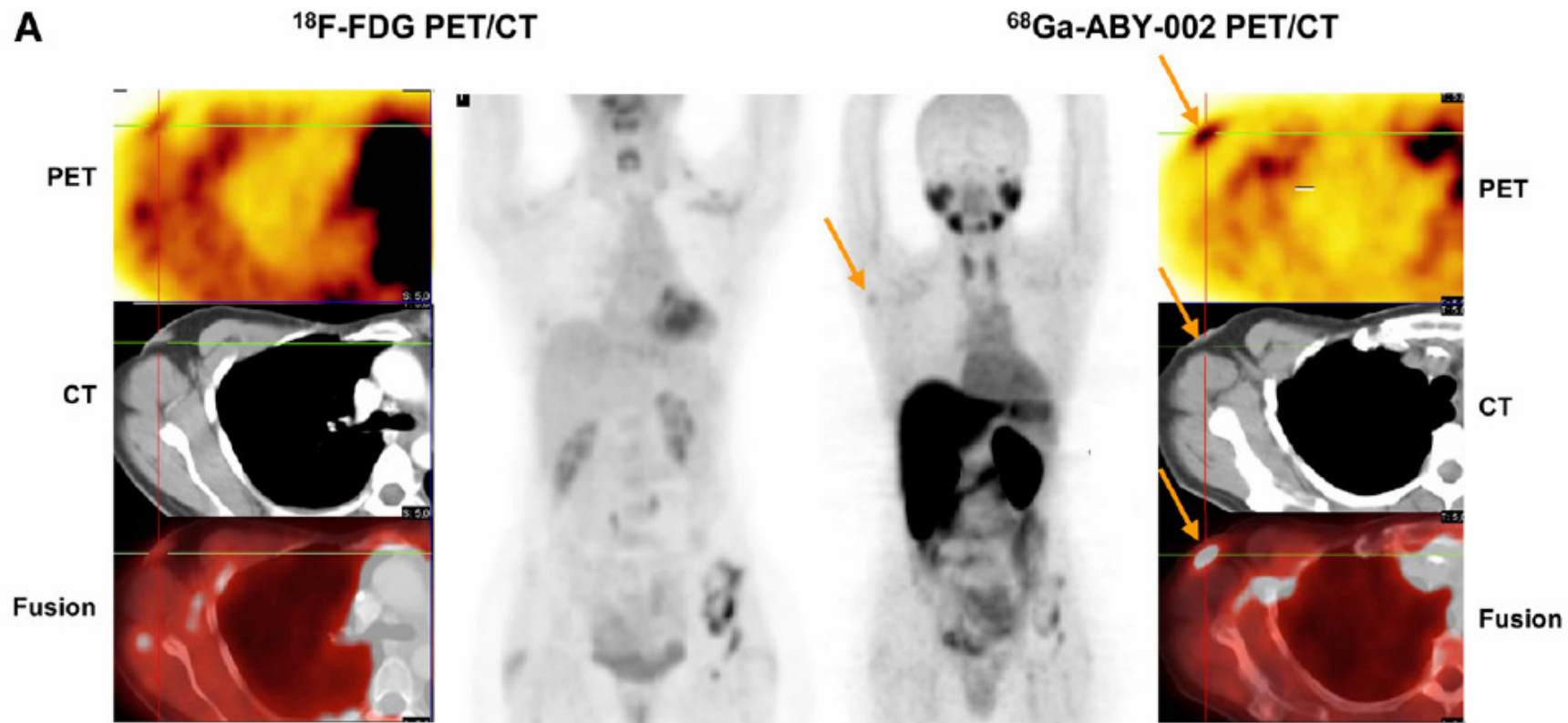
10 mg during trastuzumab
3 days p.i.

^{89}Zr -trastuzumab HER2-PET (liver, skeletal, brain metastases)



Day 4





Molecular Imaging of *HER2*-Expressing Malignant Tumors in Breast Cancer Patients Using Synthetic ^{111}In - or ^{68}Ga -Labeled Affibody Molecules

Richard P. Baum¹, Vikas Prasad¹, Dirk Müller¹, Christiane Schuchardt¹, Anna Orlova^{2,3}, Anders Wennborg², Vladimir Tolmachev^{2,3}, and Joachim Feldwisch^{2,3}

Mammacarcinoom

Vele variabelen: inter-en intravariabele respons bij patiënt

- genetische heterogeniteit van de tumor
- therapie kan genenexpressie veranderen

*PET Guided Therapy: patient management, avoiding over-
under treatment*

Primaire tumor: gevoelig voor herceptin, echter uitzaaiingen...

Herceptin: 40.000 euro per jaar per patient

*Nucleaire Geneeskunde: maakt het verschil !
(scan: circa 1000 euro)*

PET/CT bij mammacarcinoom

Conclusies

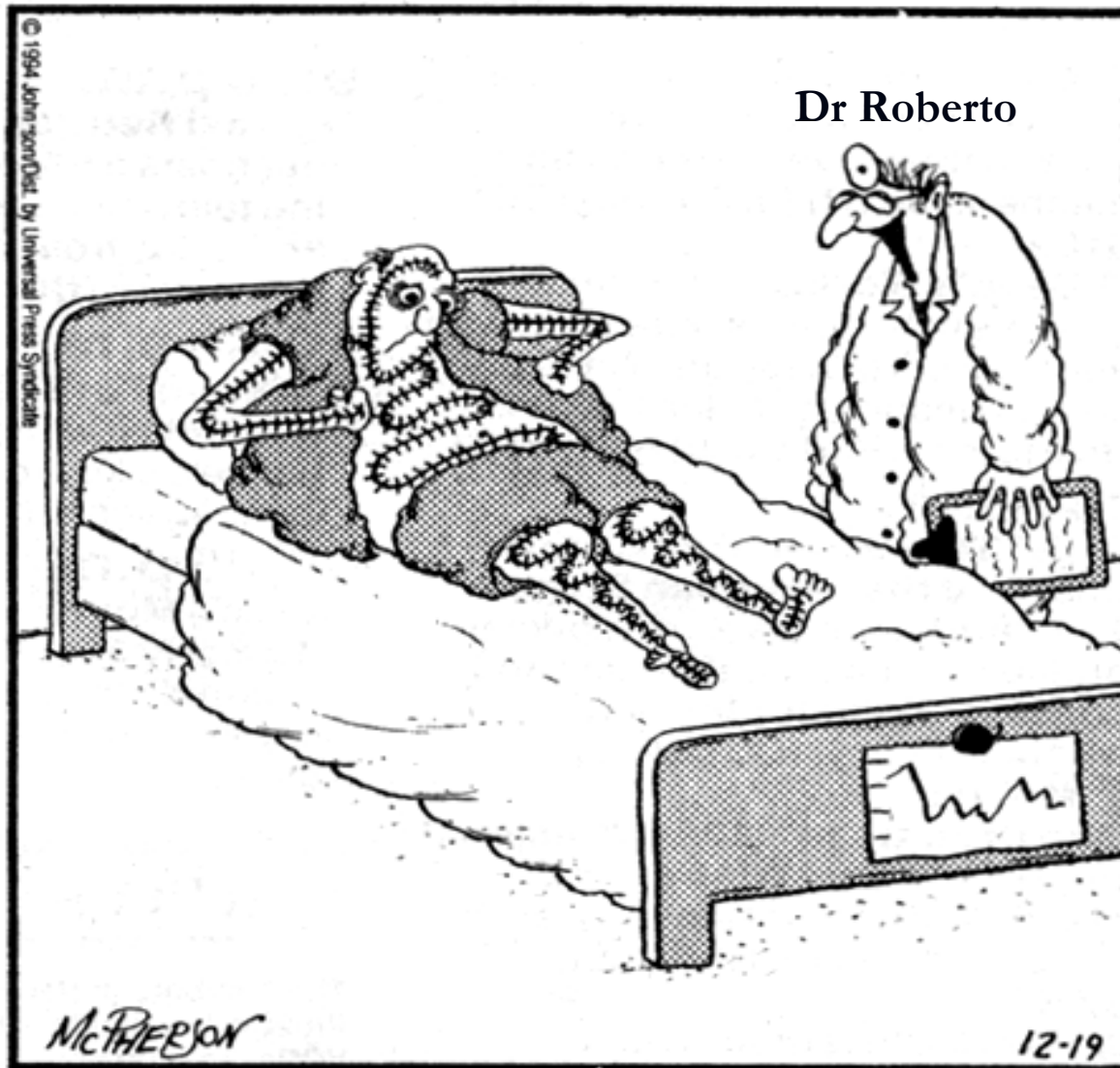
1. diagnostiek indien beschikbaar PEM bij onduidelijkheid
(b.v. twijfel aan MRI beelden)
2. (nog) niet bij primaire stadiering.
3. verdenking recidief/oplopende tumormarkers
4. therapie monitoring
5. personalized medicine



CLOSE TO HOME JOHN MCPHERSON

CLOSE TO HOME JOHN MCPHERSON

Dr Roberto



"Good news! The exploratory surgery turned up negative!"

**Nuclear
Medicine**

Radiology

Radiotherapy

