

# **CARCINOMA MAMMARIO:**

**QUALI NOVITA' PER IL 2023?**

"Saper leggere" uno studio clinico per migliorare la pratica clinica

**24-25 Marzo 2023**

Ospedaletto di Pescantina (VR)  
Centro Congressi Park Hotel Villa Quaranta

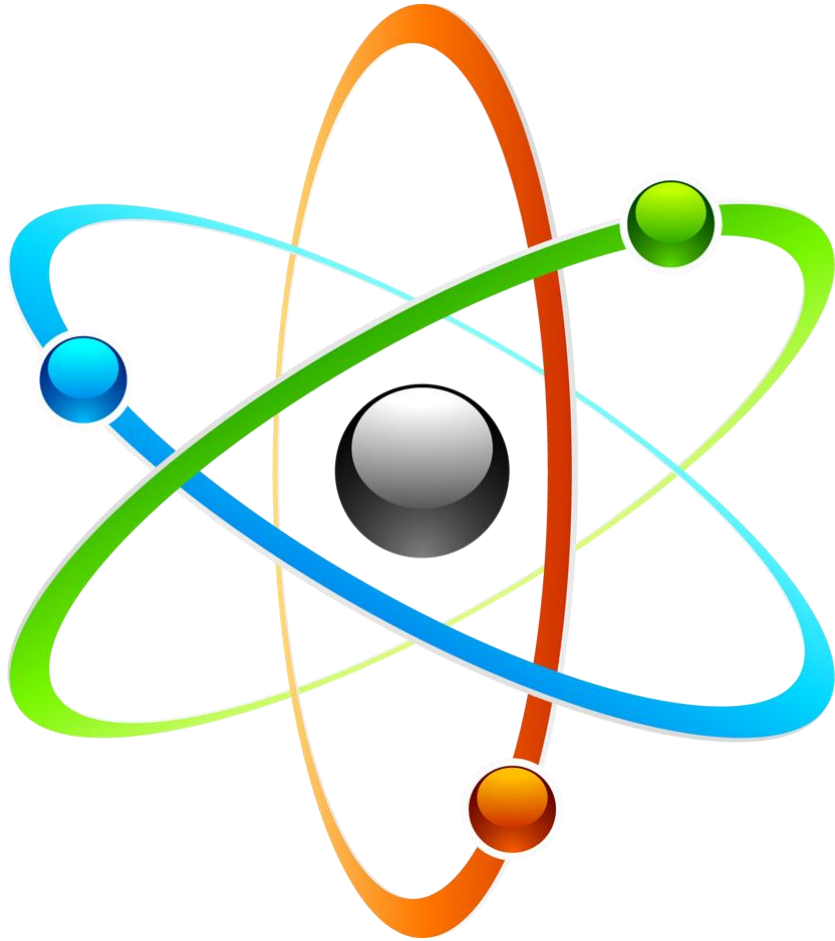
Coordinatori scientifici:  
Stefania Gori  
Giovanni L. Pappagallo



*Radionuclidi e carcinoma  
mammario*

**“ L’oncologo: quali  
applicazioni nella ricerca  
e nella clinica? ”**

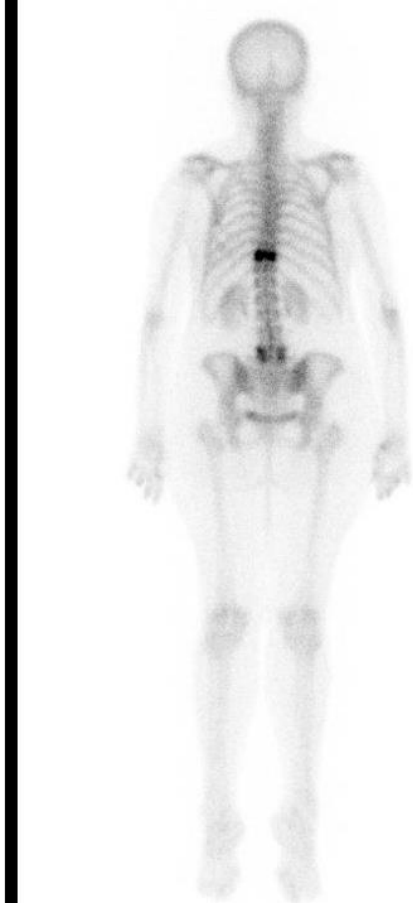
*Linda Cucciniello*



A radionuclide is an **unstable** form of a chemical element that **releases radiation** as it breaks down and becomes more stable.



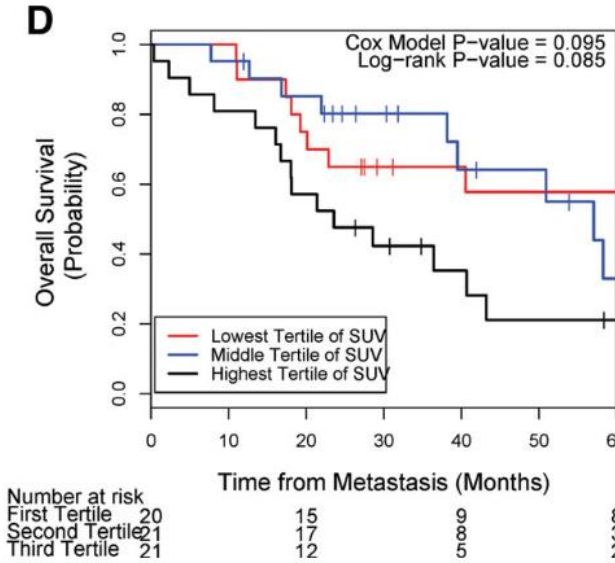
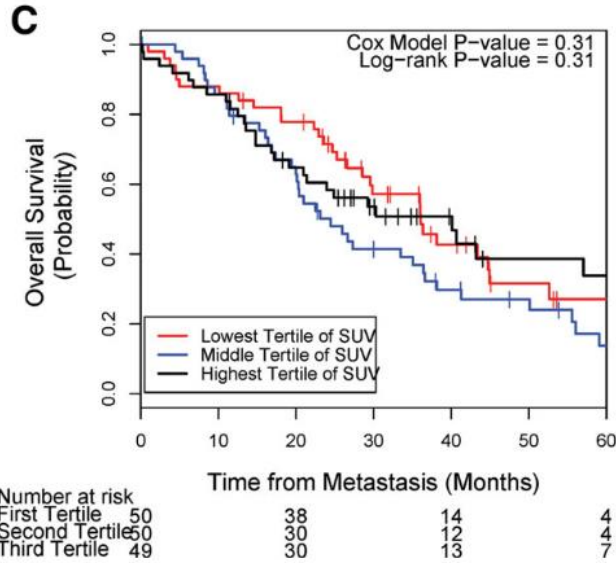
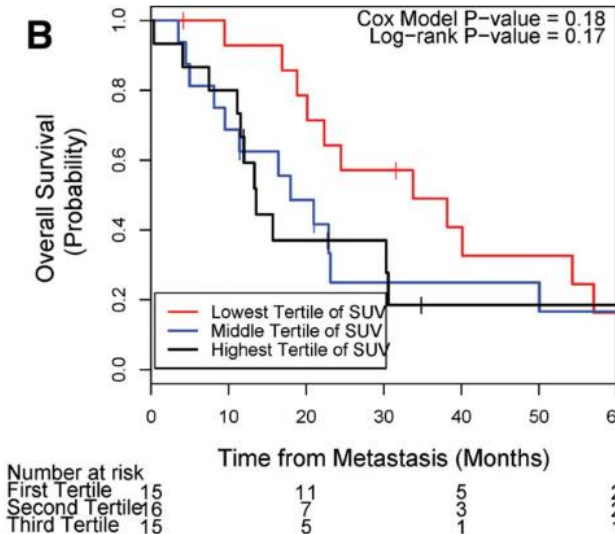
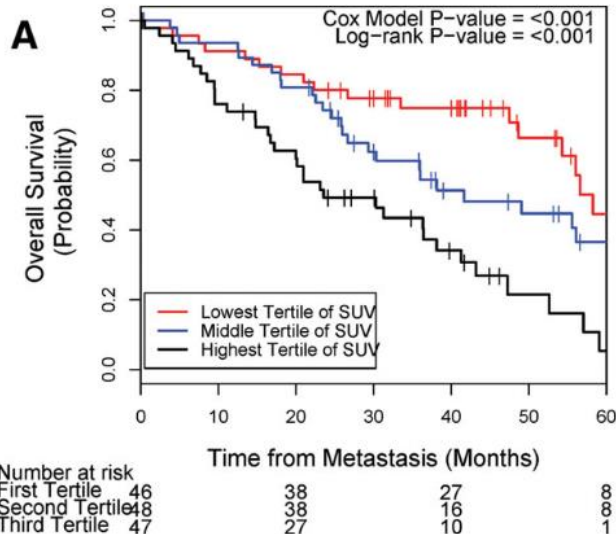
# Bone scan for staging and monitoring of bone metastases



**bone metastases from breast cancer  
baseline bone scan (June 2022)**

**same patient, bone scan after 6 months of letrozole + CDK4/6i  
(December 2022)**

# 18F-FDG PET/CT scan for staging and monitoring



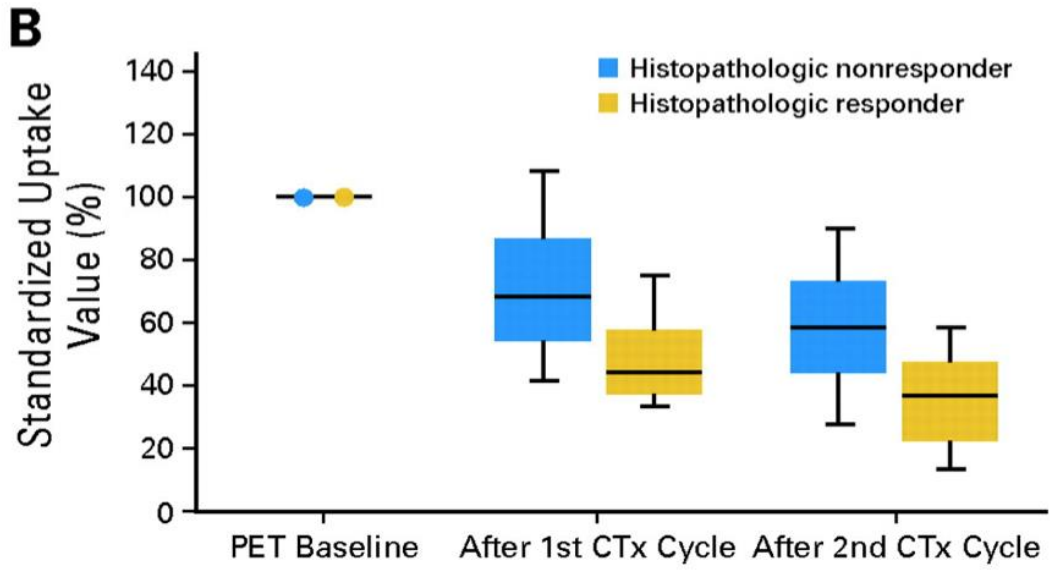
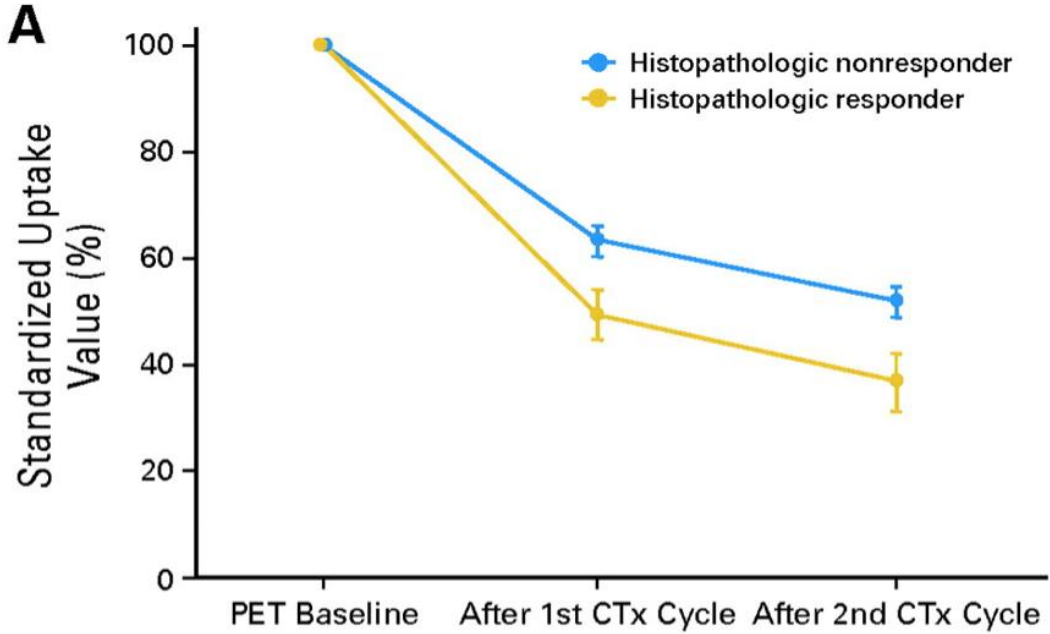
## PROs of 18F-FDG PET/TC imaging

- prognostic role with higher baseline tumor uptake associated with worse clinical outcomes
- early predictor of neoadjuvant CT response
- high sensitivity for extra-nodal and distant metastases
- high accuracy for lytic bone lesions

Morris PG et al. Cancer 2012;118:5454-62.  
Edmonds CE et al. Cancer Imaging 2022;22:31.



# 18F-FDG PET/CT scan for staging and monitoring



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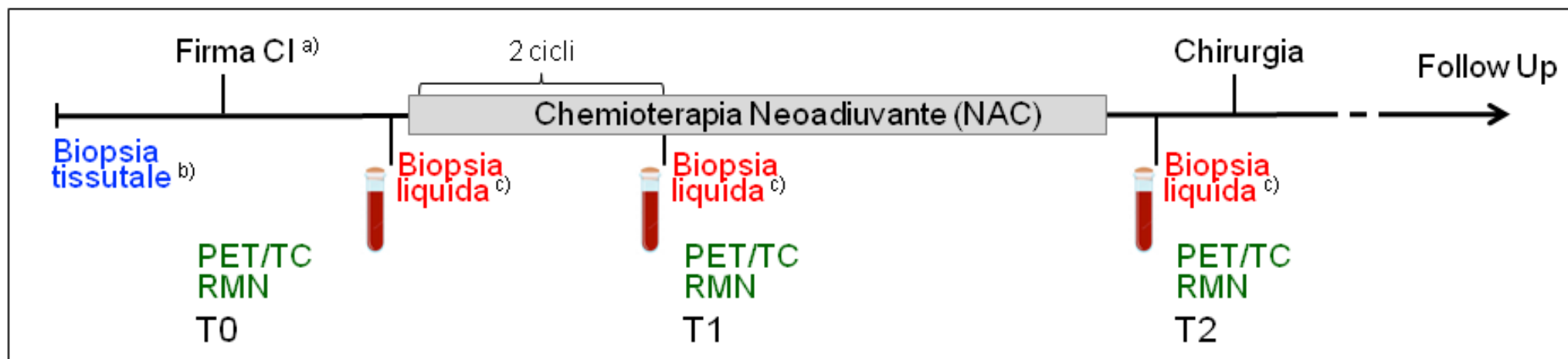
Schwarz-Dose J et al. J Clin Oncol 2009;27:535-41.  
Edmonds CE et al. Cancer Imaging 2022;22:31.



Utilizzo di **TE**cniche **IN**novative e **microIN**vasive per l'identificazione precoce delle pazienti con **tumore mammario** che beneficiano di **chemioT**erapia **Neoadiuvante**

### Eleggibilità:

Donne con sospetto o diagnosi di carcinoma mammario **T>2 cm** o **T1.5-2 cm** e **N+** candidate a chemioterapia Neoadiuvante (NAC) indipendentemente dal profilo biologico e dal tipo di NAC

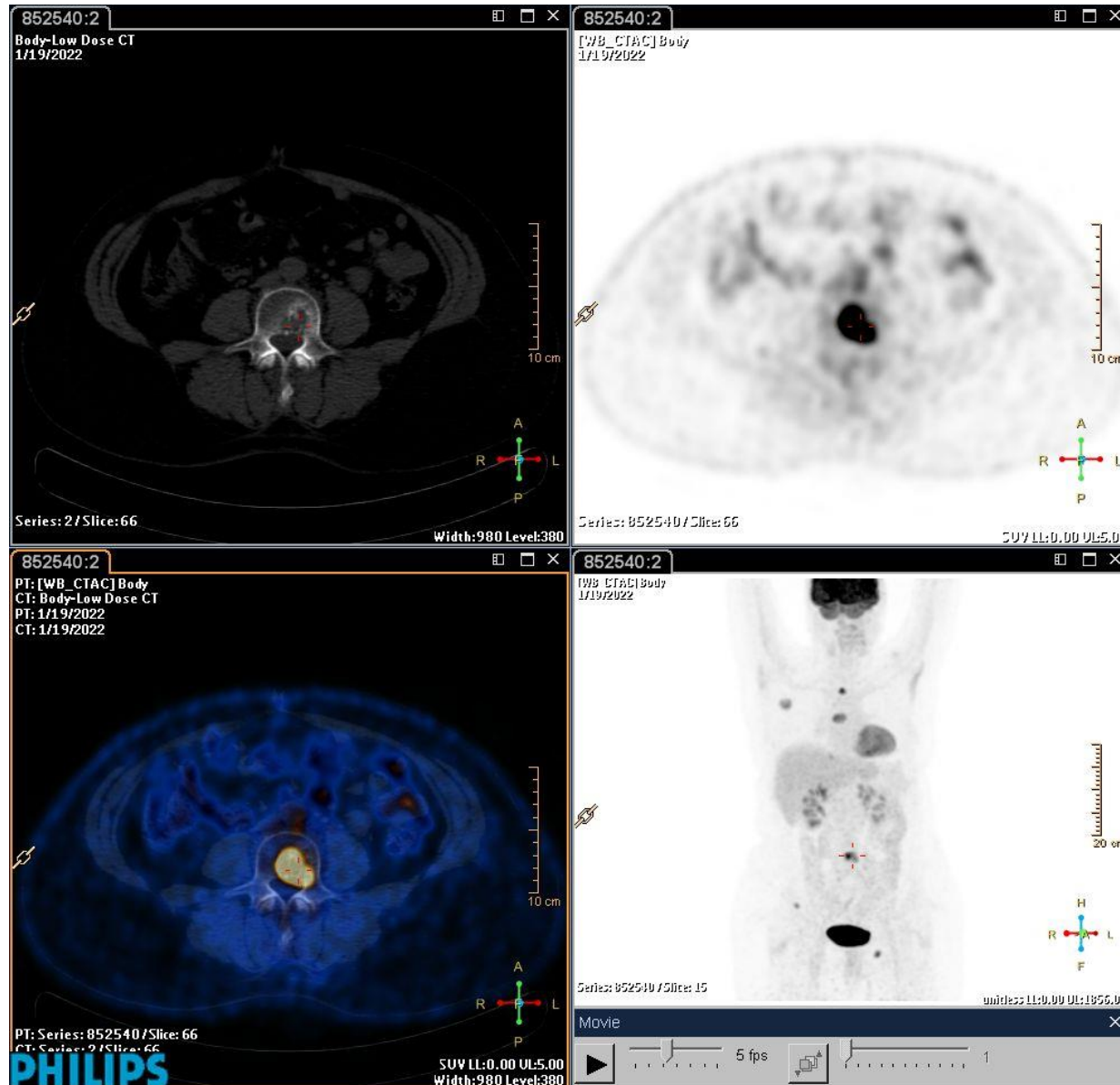


a) Firma CI: prima della biopsia tissutale CI Biobanca; prima della biopsia liquida CI Studio INTENT

b) **Biopsia tissutale**: alla diagnosi o al posizionamento del repere

c) **Biopsia liquida**: 5 provette EDTA + 1 provetta bianca + 1 provetta verde da 4.9 ml

# 18F-FDG PET/CT scan for staging and monitoring



## PROs of 18F-FDG PET/TC imaging

- prognostic role with higher baseline tumor uptake associated with worse clinical outcomes
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# The need for novel diagnostic markers

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**Tissue biopsy is the gold standard for BC diagnosis**

## **PROs:**

- allows histological diagnosis
- allows metastasis characterization

## **CONs:**

- it is invasive
- it does not allow early detection
- it doesn't allow longitudinal monitoring

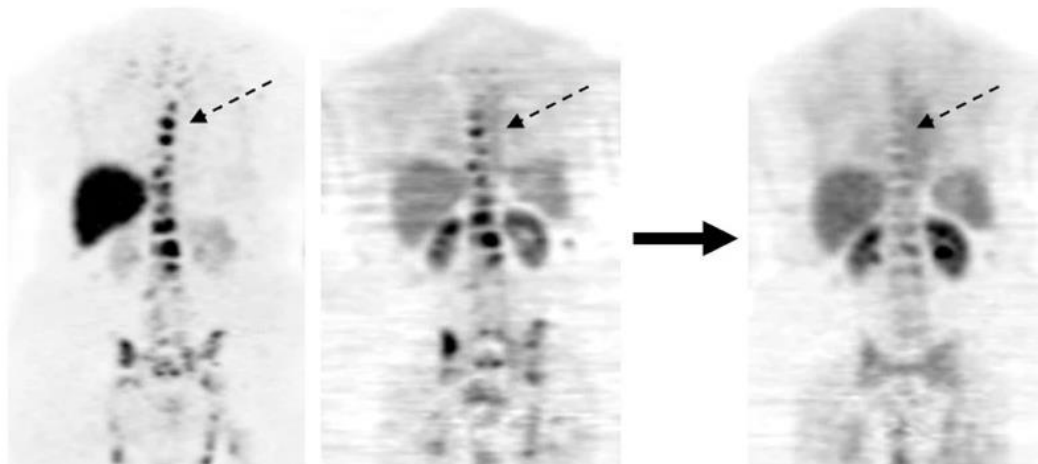


**LIQUID BIOPSY**

**NOVEL IMAGING TECHNIQUES**

# Luminal-like BC

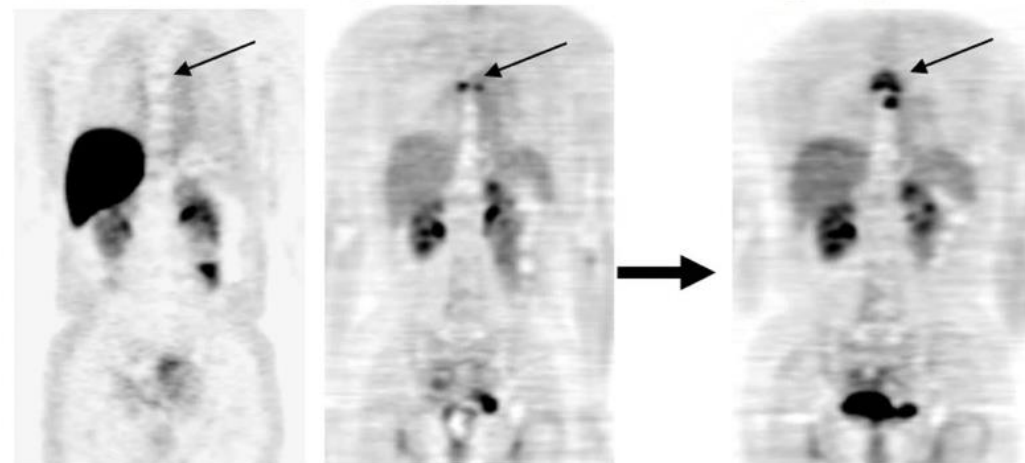
**Pre-Treatment**      **Post-Treatment**



$[^{18}\text{F}]\text{FES}$

$[^{18}\text{F}]\text{FDG}$

$[^{18}\text{F}]\text{FDG}$



$[^{18}\text{F}]\text{FES}$

$[^{18}\text{F}]\text{FDG}$

$[^{18}\text{F}]\text{FDG}$

**Patient A**

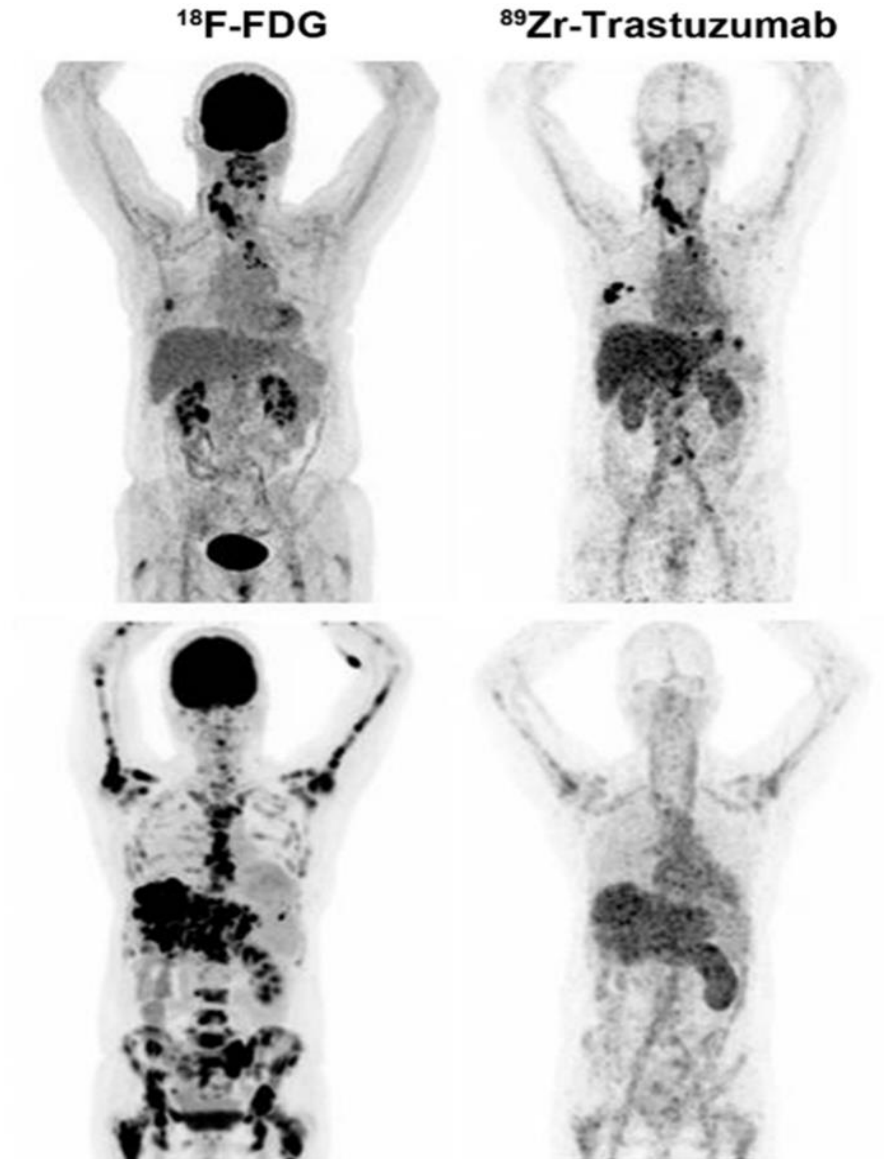
**Patient B**

**PROs of PET/TC  
with  $[^{18}\text{F}]\text{16}\alpha\text{-fluoroestradiol}$**

- noninvasiveness
- ability to evaluate ER status throughout the entire disease burden
- ER status serial evolution
- ability to predict the response to ET

## PROs of PET/TC with $^{89}\text{Zr}$ -Trastuzumab

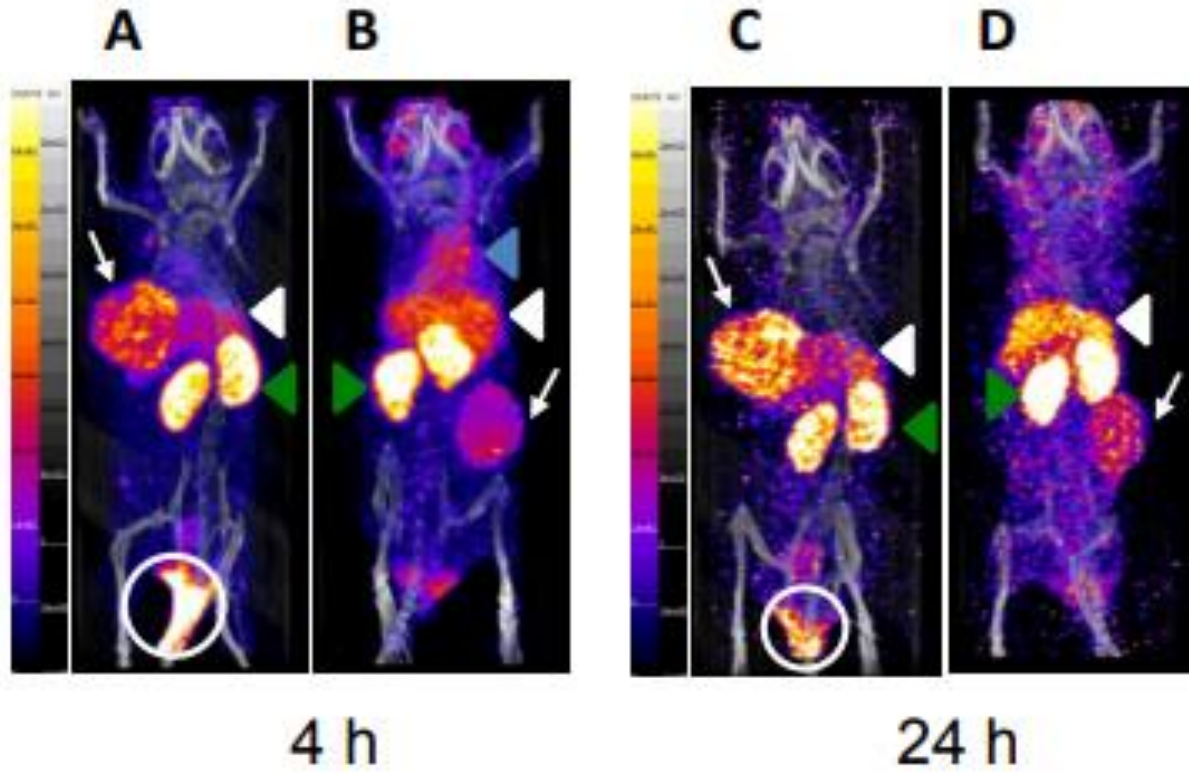
- noninvasiveness
- ability to evaluate HER2 status throughout the entire disease burden
- ability to evaluate intracranial lesions
- HER2 status serial evolution



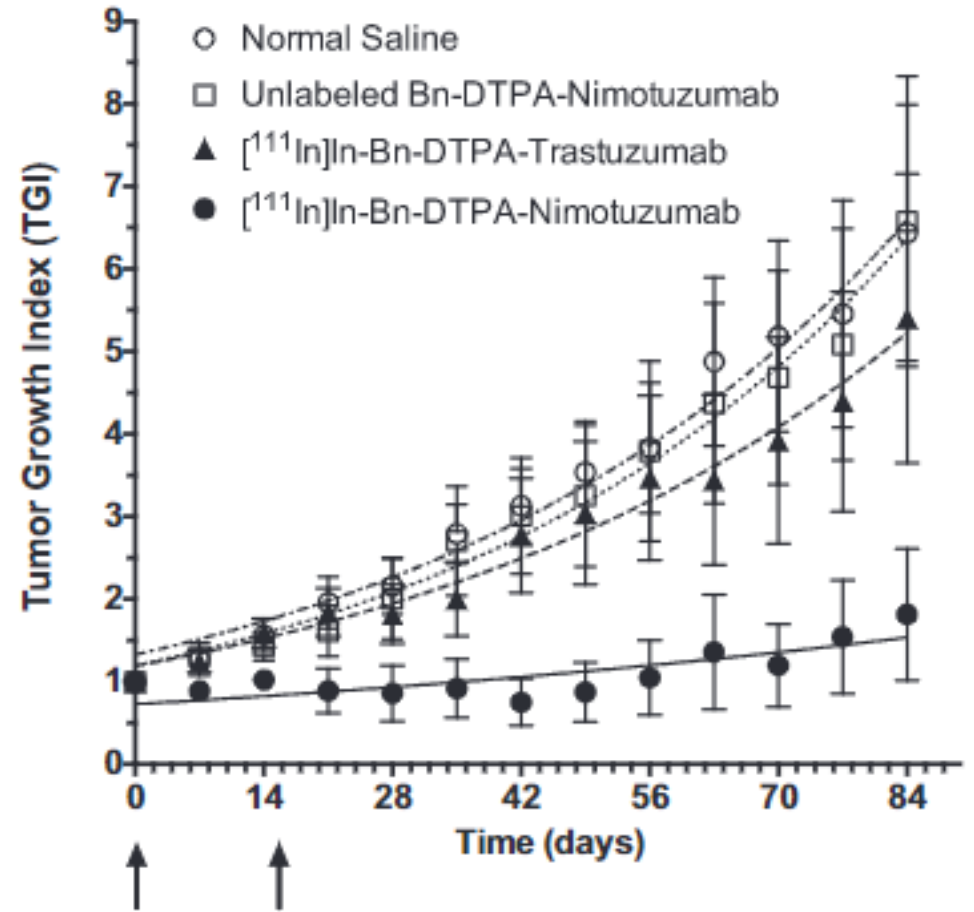
## Triple-negative breast cancer

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EGFR	$^{99m}\text{Tc}$ -PmFab-His6	SPECT/CT	Ku et al. (2019a)
CMKLR1	$^{68}\text{Ga}$ -DOTA-ADX-CG34	PET/MR	Erdmann et al. (2019)
HDAC	$^{64}\text{Cu}$ -HDACi	PET/CT	Meng et al. (2013)
MYC	$^{89}\text{Zr}$ -transferrin	PET	Henry et al. (2018)
TF	$^{64}\text{Cu}$ -NOTA-ALT-836-fab	PET	Shi et al. (2015)
CXCR4	$^{99m}\text{Tc}$ -HYNIC-siRNA1	SPECT	Fu et al. (2016)
MUC1	$^{99m}\text{Tc}$ -S1-apMUC1	SPECT	Pascual et al. (2017)



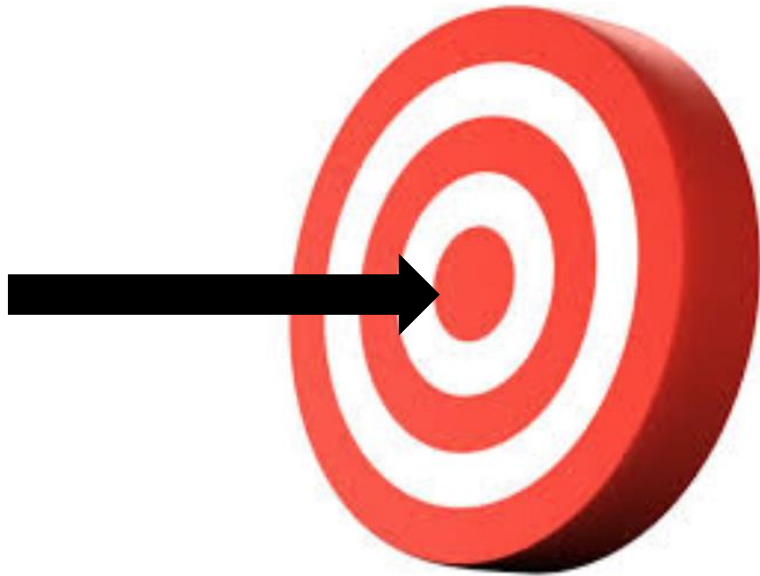
SPECT with  $^{99}\text{Tc-PmFab-His}_6$



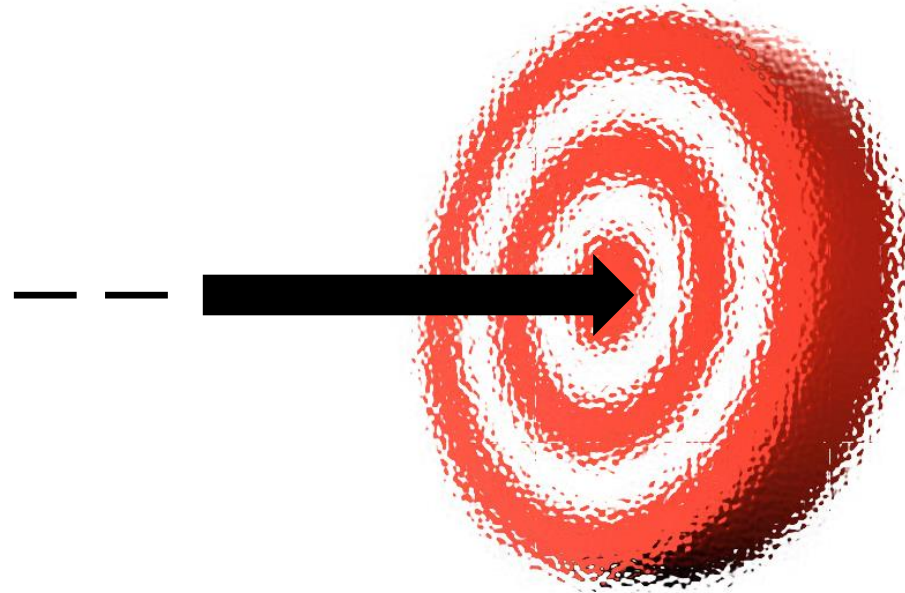
$^{111}\text{In}$ -Bn-DTPA-nimotuzumab



**To target**



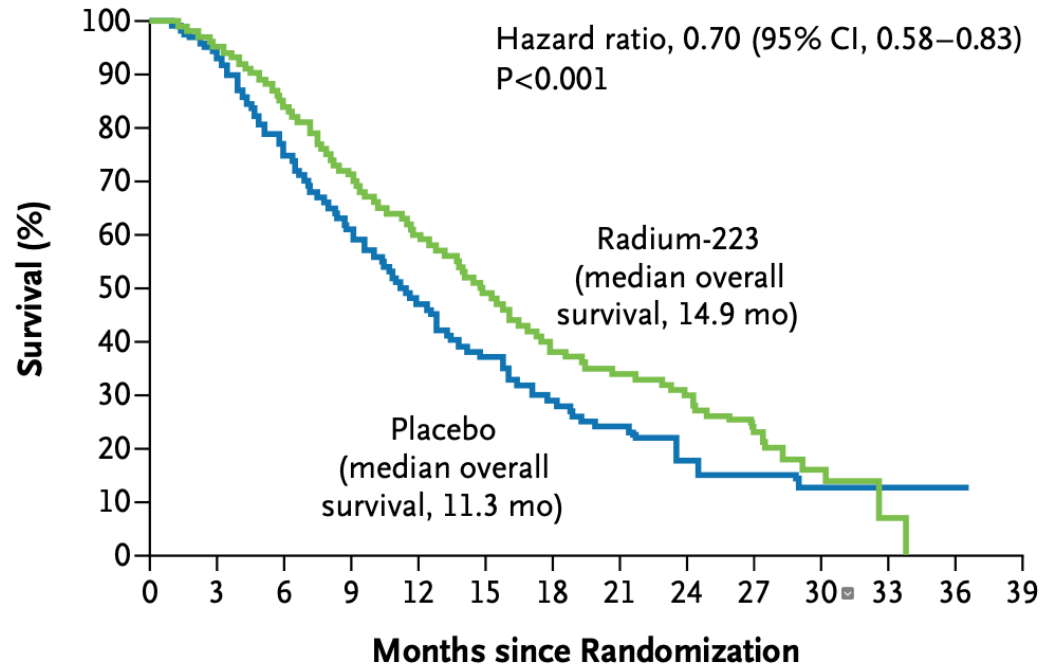
**To hit**



# Theranostics

# From diagnostics to theranostics: the reality of prostate cancer

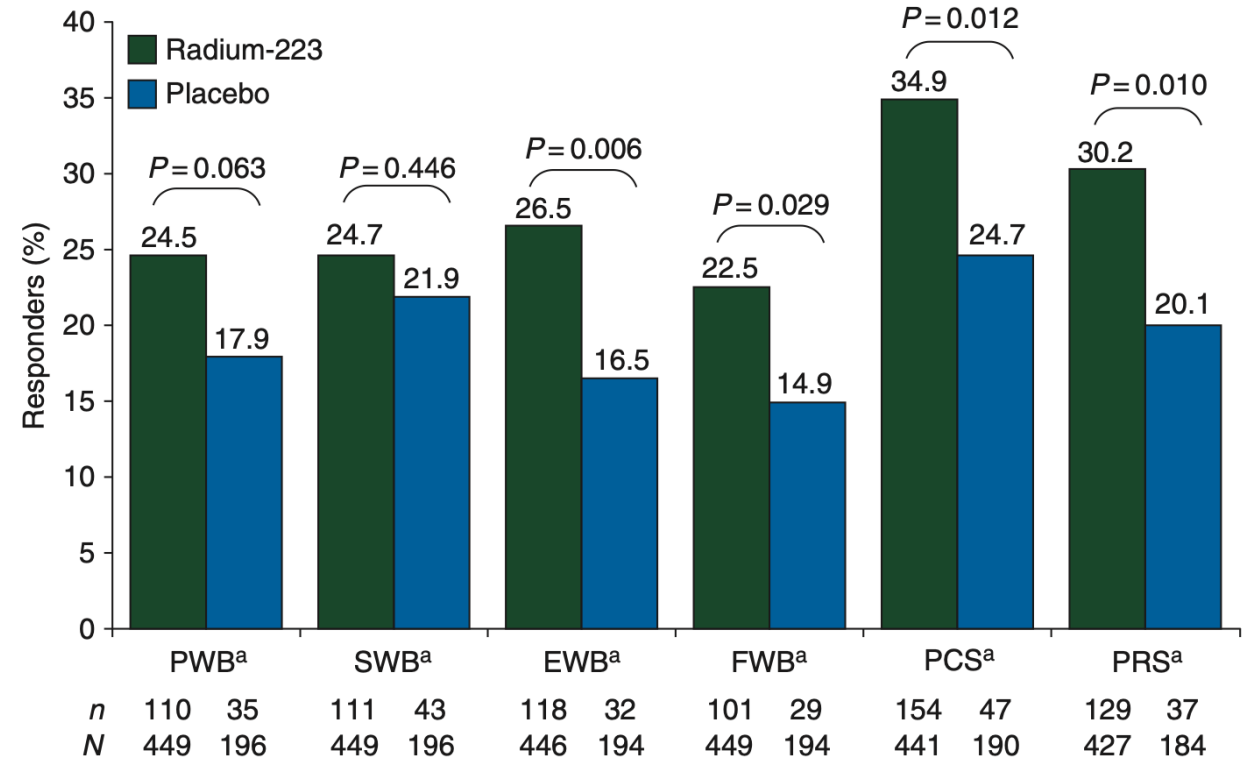
## ALSYMPCA TRIAL



### No. at Risk

Radium-223	614	578	504	369	274	178	105	60	41	18	7	1	0	0
Placebo	307	288	228	157	103	67	39	24	14	7	4	2	1	0

### OS curves



### QOL assessment through FACT-P

# From diagnostics to theranostics: the reality of prostate cancer



bone scan



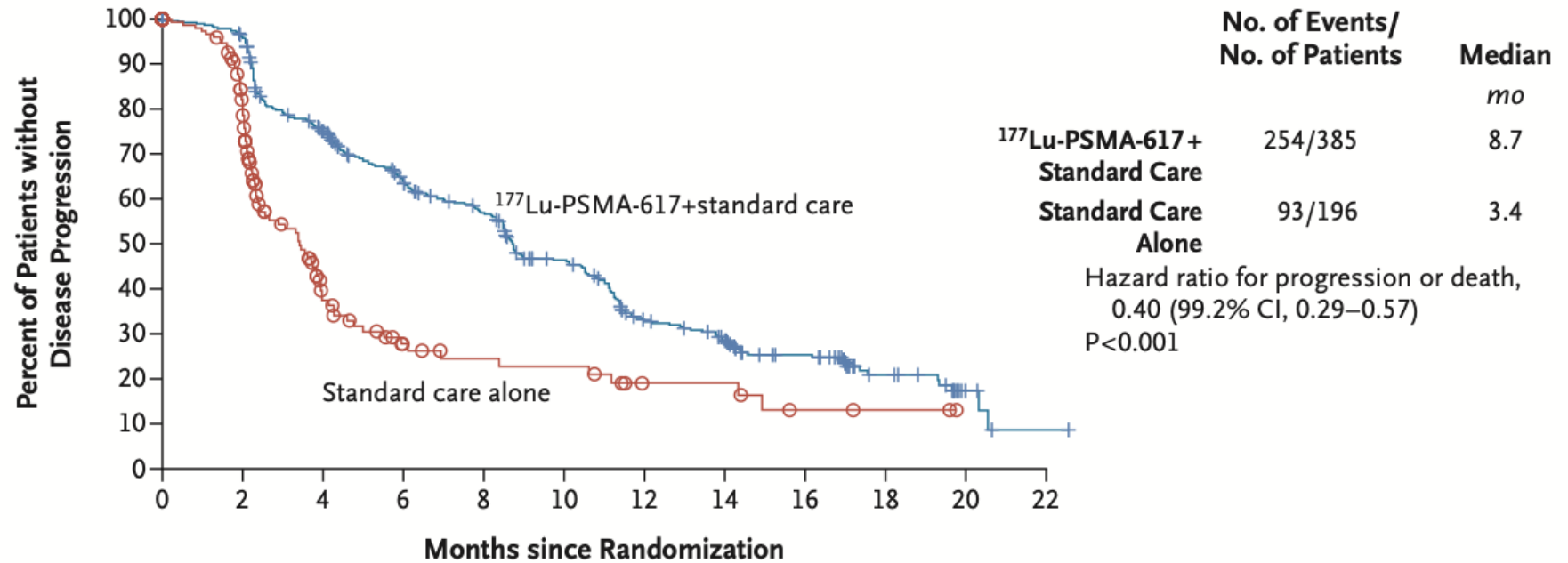
$^{11}\text{C}$ -Choline PET/CT



$^{68}\text{Ga}$ -PSMA PET/TC

# From diagnostics to theranostics: the reality of prostate cancer

## VISION TRIAL



### No. at Risk

<sup>177</sup> Lu-PSMA-617+standard care	385	362	272	215	182	137	88	71	49	21	6	1
Standard care alone	196	119	36	19	14	13	7	7	3	2	0	0

### PFS curves



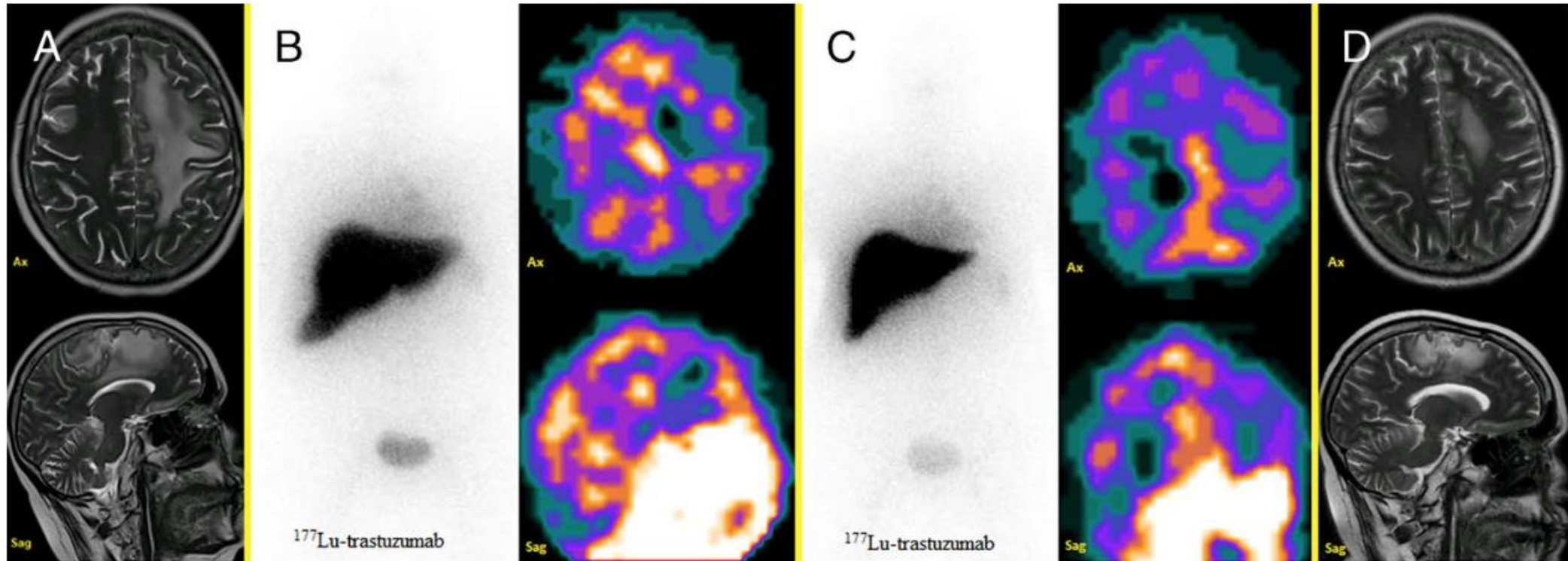
## From diagnostics to theranostics: a challenge for breast cancer

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no evidence from randomized trials yet...

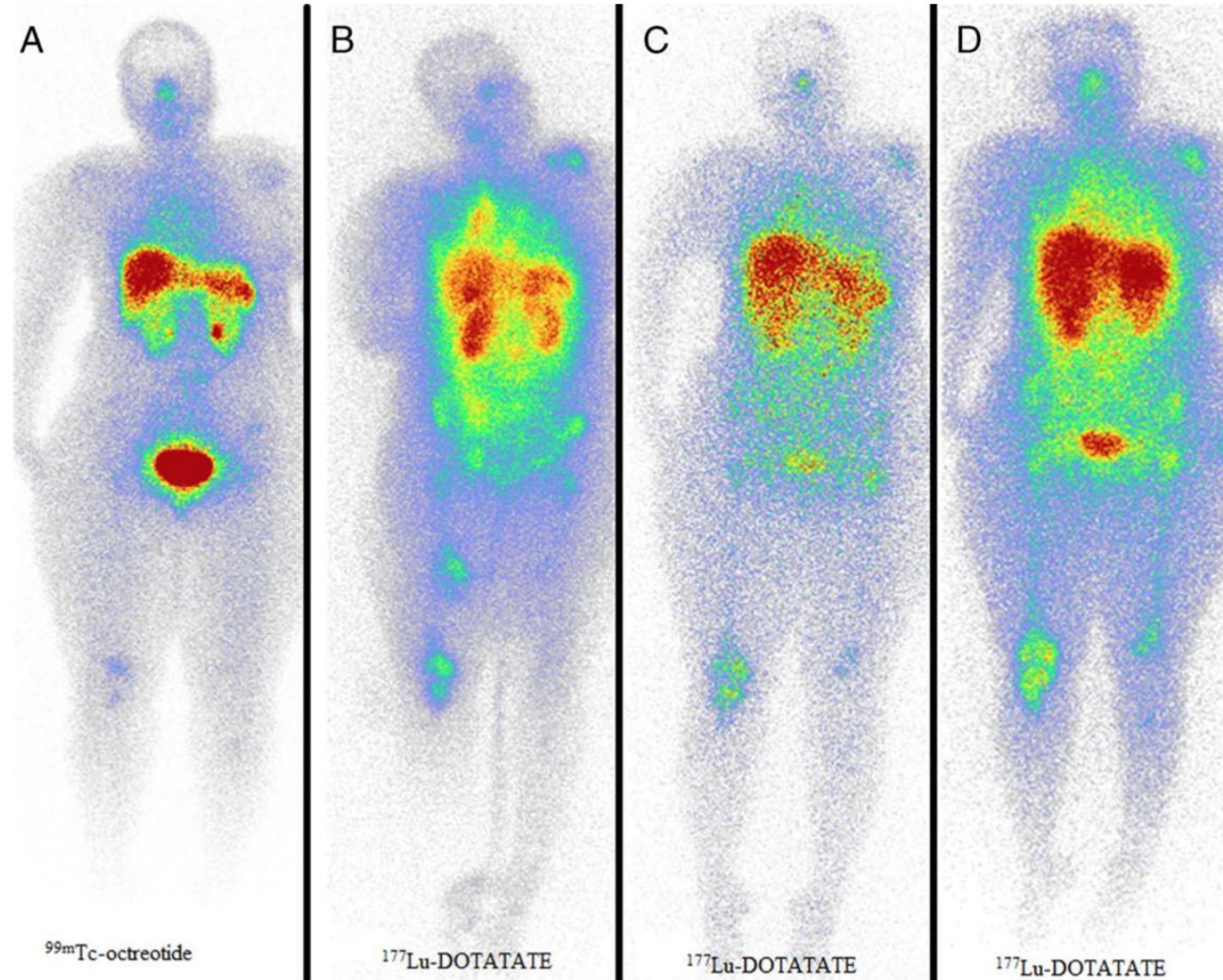
**... but positive signals from preclinical trials and single case reports**

# From diagnostics to theranostics: a challenge for breast cancer



$^{177}\text{Lu}$ -trastuzumab for treatment of HER2 positive BC

# From diagnostics to theranostics: a challenge for breast cancer



**$^{177}\text{Lu}$ -DOTATATE for treatment of BC  
expressing somatostatin receptors**



**Theranostics as a further step  
towards precision medicine**



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*Thank you for your attention ...*

*... and a special thanks to Dr. Gerratana  
and Dr. Bampo (Nuclear Medicine at CRO)  
for your contribution*