

# Theranostics in Prostate Cancer

Xinglei Shen MD MS

Multi-disciplinary Oncology Review

April 5 2025

# Disclosures

- Artera (research support)
- Pfizer/Sumitomo (research support)

# Overview

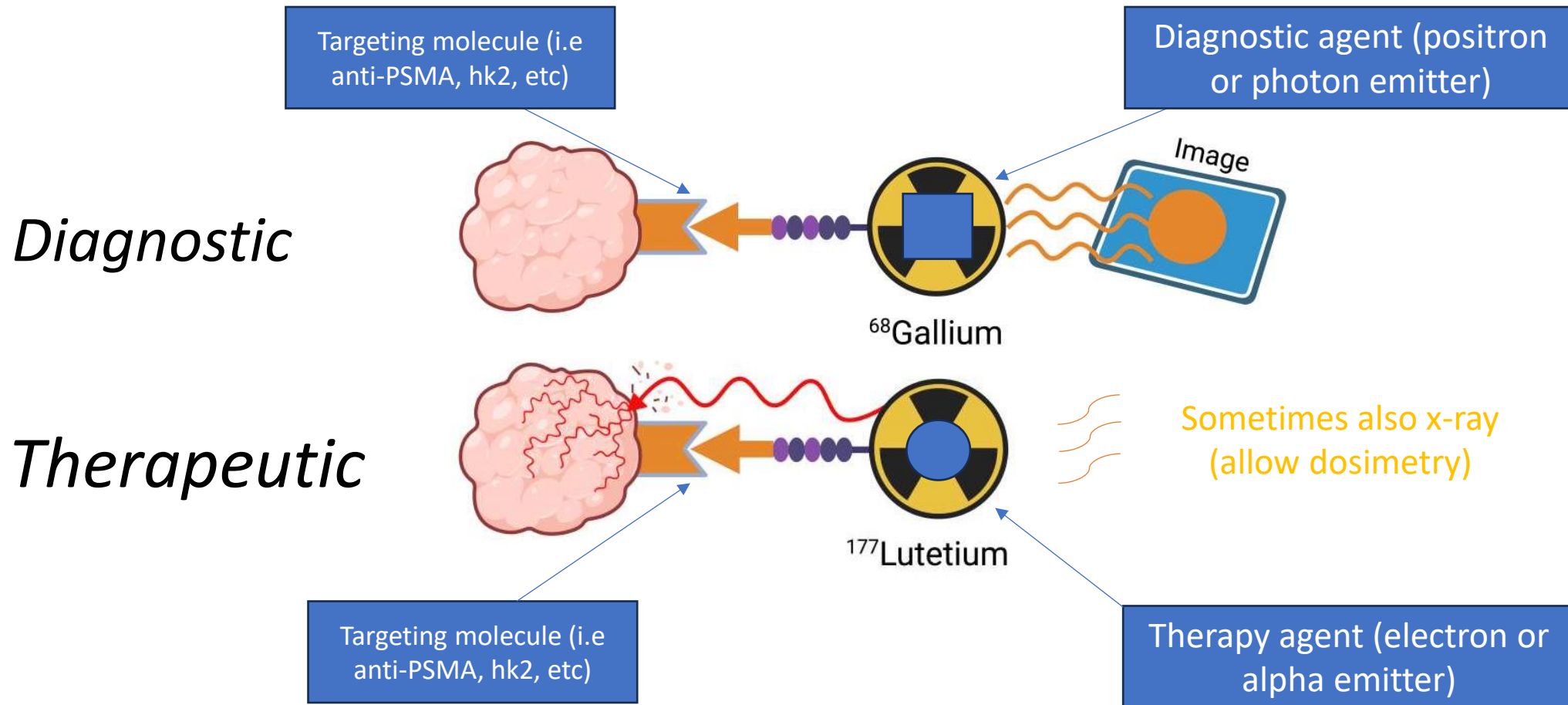
- Background on what is theranostics
- Groundbreaking trials in theranostics for prostate cancer
  - VISION
  - PSMAFore
- Future directions of theranostics in prostate cancer

# See what you treat and treat what you see



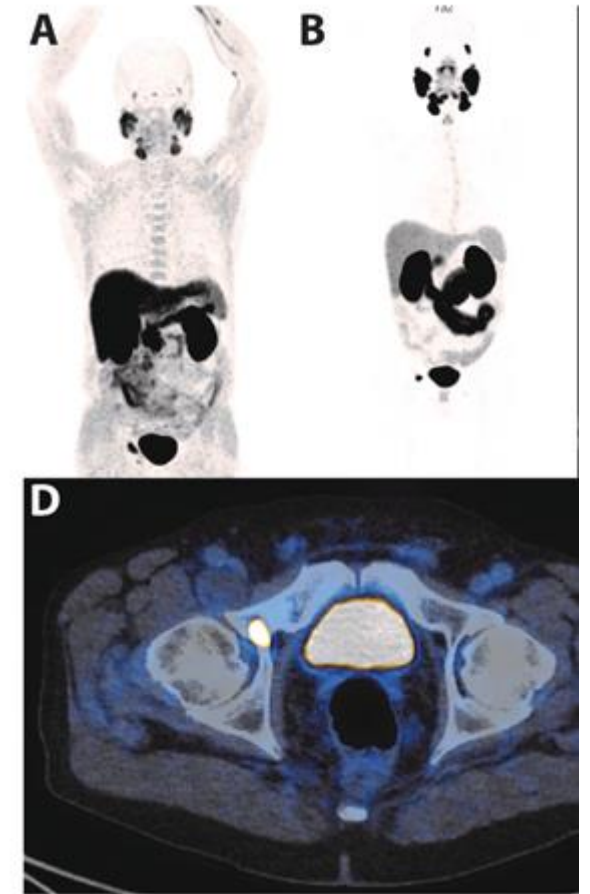
- Two pronged approach to cancer management
  - See the target: diagnostic imaging
  - Treat the target: therapeutic agent
- Therapeutic portion generally **targeted radiopharmaceutical** agents for treatment of cancers
  - Distinct from non-specific radionuclides like Xofigo or Samarium
  - Also known as radioligand therapy

# Two components of theranostic treatment



# PSMA is an ideal target in prostate cancer

- Prostate specific membrane antigen aka glutamate carboxypeptidase II
  - transmembrane glycoprotein
  - Function not clear – prevents the degradation of neurotransmitters
- Tissue expression
  - Prostate cancer (but not normal prostate) – about 90%
  - Salivary glands
  - Liver
  - Jejunal brush border
  - Ganglia of CNS
  - Kidney



From Fankhauser et al. W  
Journal of Urology. 2019

# PSMA Imaging in prostate cancer

- FDA Approved PSMA imaging products:
  - Ga-68-PSMA-11 (aka Locametz)
  - F-18-DCFPyL (aka Pylarify)
  - F-18-Flotufolastat (aka Posluma)
  - Cu-64-PSMA products in development
- Overall excellent specificity (>90%) and moderate sensitivity (60%)
  - Higher sensitivity and specificity than conventional imaging (bone scan and CT/MRI)
  - **Standard of care** for staging high risk patients, restaging recurrence
- Beware of false positives:
  - Ureter (mistaken for nodes)
  - Nerve ganglia (mistaken for nodes)
  - Benign bone lesions (fracture, pagets, etc) (mistaken for bone mets)
  - Other cancers (kidney, lung, liver etc)

# Therapeutic ionizing radiation in radioligands

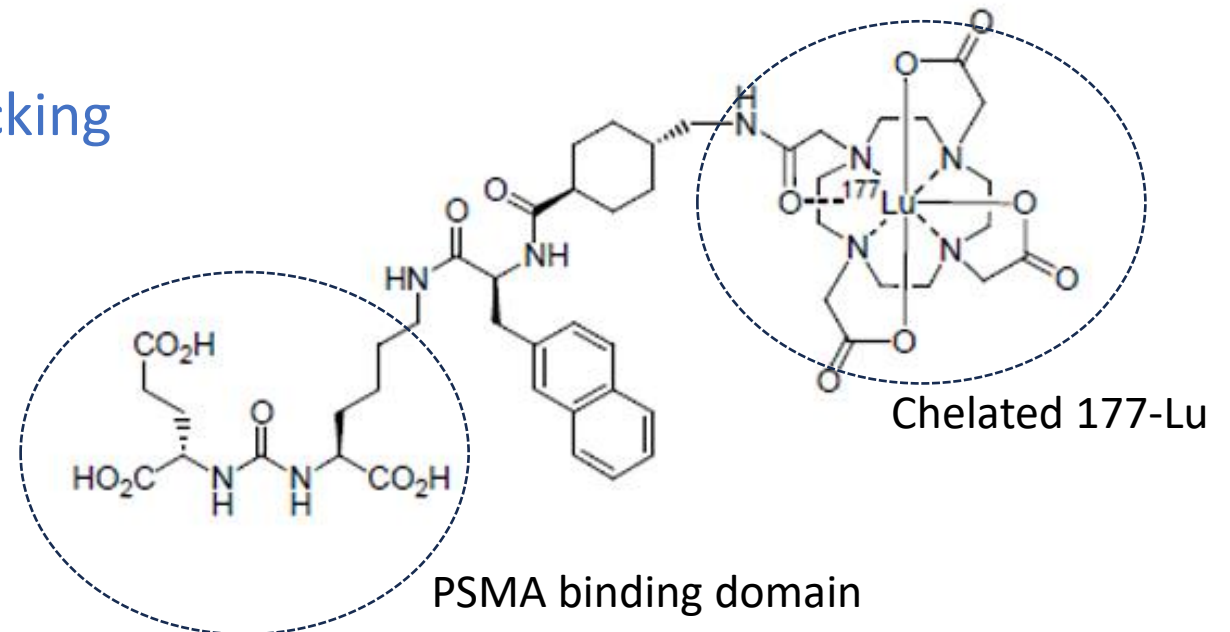
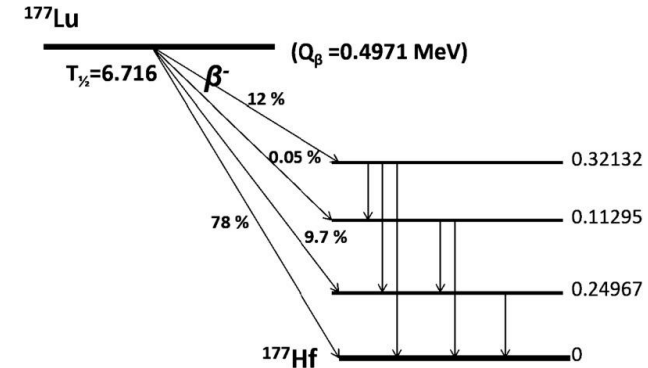
Radioactive “payload” delivers ionizing radiation to imaging targets

General types of ionizing radiation:

- Alpha particle (helium nucleus): High linear energy transfer, very short range (0.1 mm in tissue) – size of cells about 0.02-0.03 mm.
- Beta particle (electron): Moderate linear energy transfer, moderate range (2-3 mm in tissue)
- Gamma radiation (photon): Moderate linear energy transfer, long range. This is produced in conjunction with alpha or beta decay. Range = many cm
- X-ray = man made gamma radiation

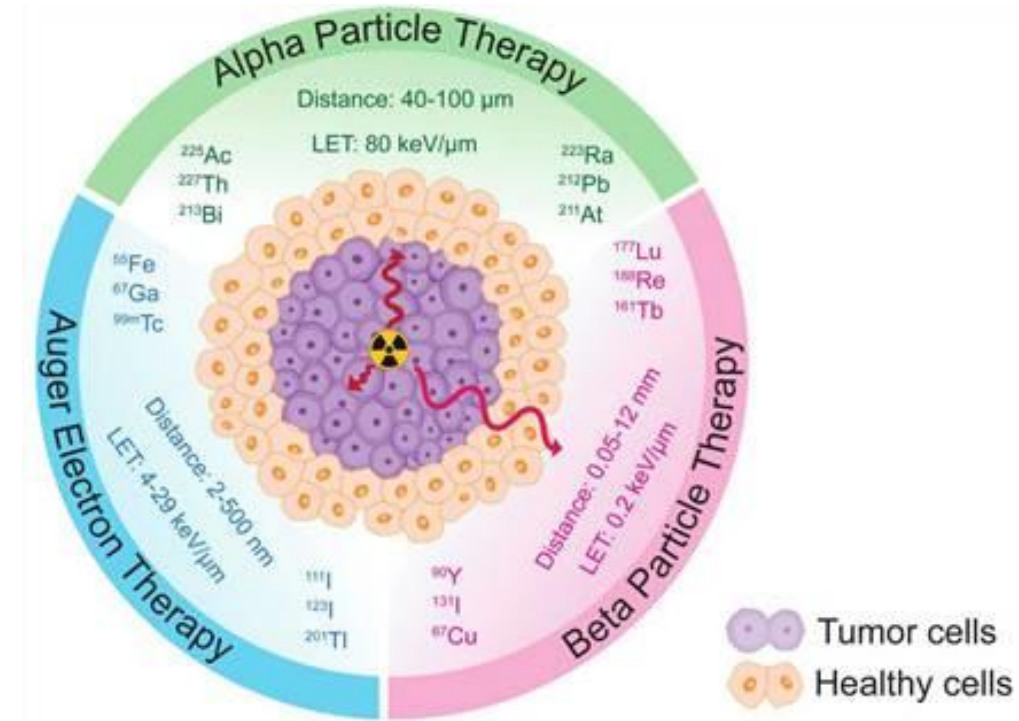
# Targeting PSMA: $^{177}\text{Lu}$ -PSMA-617 (Pluvicto)

- FDA approved radioligand for prostate cancer
- PSMA binding domain
- Linked to Lutetium-177
  - **Beta emitter**
  - Also gamma emission – allows tracking of distribution on SPECT after treatment



# Properties of selected isotopes

Isotope	Decay/Energy	Range	Half-life
Radium-223	<b>Alpha</b> /5-7.5MeV Beta/0.45 – 0.49 MeV Gamma/0.01-1.27 MeV	0.04-0.1 mm	11.4 days
Lutetium-177	<b>Beta</b> /0.17-0.50 MeV Gamma/ 0.07-0.32 MeV	2 mm	6.6 days
Actinium-225	<b>Alpha</b> / 5.8-7.1 MeV Beta/ 1.4 – 8.4 MeV Gamma/0.2-0.44 MeV	0.04-0.1 mm	9.9 days



# Current Data for Theranostics in Prostate Cancer

# Landscape of treatment for prostate cancer

Natural history of prostate cancer

Non-metastatic	Non-metastatic recurrence	Hormone Sensitive Metastatic	Metastatic castrate resistant
Surgery	Radiation +/- ADT	Radiation*	Abiraterone Enzalutamide Apalutamide
Radiation +/- ADT +/- abiraterone	ADT ADT + enzalutamide ADT + apalutamide	ADT + abiraterone ADT + enzalutamide ADT + apalutamide ADT + docetaxel + darolutamide ADT + docetaxel + abiraterone	Docetaxel Cabazitaxel Sipuleucel-T Radium-223 <b>177-Lutetium-PSMA-617</b> Olaprib Rucaparib
<div style="border: 2px solid red; border-radius: 50%; padding: 5px; display: inline-block;"> <p>Now either pre- or post-chemotherapy!</p> </div>			
*very selected cases – added to other therapy or alone			

## Lutetium-177–PSMA-617 for Metastatic Castration-Resistant Prostate Cancer

O. Sartor, J. de Bono, K.N. Chi, K. Fizazi, K. Herrmann, K. Rahbar, S.T. Tagawa, L.T. Nordquist, N. Vaishampayan, G. El-Haddad, C.H. Park, T.M. Beer, A. Armour, W.J. Pérez-Contreras, M. DeSilvio, E. Kpamegan, G. Gericke, R.A. Messmann, M.J. Morris, and B.J. Krause, for the VISION Investigators\*

NEJM 2021

# VISION trial

- Patient population:
  - Castrate resistant metastatic prostate cancer
  - Progressed after taxane and novel hormonal therapy
  - PSMA avid lesion by Ga-68-PSMA-11
- N = 831
- Randomized (2:1)
  - Lu-177-PSMA-617 q6 weeks x 4-6 cycles vs
  - Standard of care (except chemotherapy, Ra-223, immunotherapy or investigational drugs such as PARPi)
- Co-primary endpoints
  - Imaging based PFS
  - Overall survival

# VISION Trial Patient Characteristics

**Table 1. Characteristics of the Patients at Baseline, According to Analysis Set.\***

Characteristic	Analysis Set for Imaging-Based Progression-free Survival (N=581)		All Patients Who Underwent Randomization (N=831)	
	<sup>177</sup> Lu-PSMA-617 plus Standard Care (N=385)	Standard Care Alone (N=196)	<sup>177</sup> Lu-PSMA-617 plus Standard Care (N=551)	Standard Care Alone (N=280)
Median age (range) — yr	71.0 (52–94)	72.0 (51–89)	70.0 (48–94)	71.5 (40–89)
ECOG performance-status score of 0 or 1 — no. (%)†	352 (91.4)	179 (91.3)	510 (92.6)	258 (92.1)
Site of disease — no. (%)				
Lung	35 (9.1)	20 (10.2)	49 (8.9)	28 (10.0)
Liver	47 (12.2)	26 (13.3)	63 (11.4)	38 (13.6)
Lymph node	193 (50.1)	99 (50.5)	274 (49.7)	141 (50.4)
Bone	351 (91.2)	179 (91.3)	504 (91.5)	256 (91.4)
Median PSA level (range) — ng/ml	93.2 (0–6988)	90.7 (0–6600)	77.5 (0–6988)	74.6 (0–8995)
Median alkaline phosphatase level (range) — IU/liter‡	108.0 (26–2524)	96.0 (34–1355)	105.0 (17–2524)	94.5 (28–1355)
Median LDH (range) — IU/liter‡	230.5 (119–5387)	232.0 (105–2693)	221.0 (88–5387)	224.0 (105–2693)
Median time since diagnosis (range) — yr	7.3 (0.9–28.9)	7.0 (0.7–26.2)	7.4 (0.9–28.9)	7.4 (0.7–26.2)
Gleason score at diagnosis — no. (%)§				
8–10	226 (58.7)	118 (60.2)	324 (58.8)	170 (60.7)
Unknown	28 (7.3)	19 (9.7)	42 (7.6)	24 (8.6)
Previous prostatectomy — no. (%)¶	159 (41.3)	82 (41.8)	240 (43.6)	130 (46.4)
Previous androgen-receptor-pathway inhibitor — no. (%)				
One regimen	213 (55.3)	98 (50.0)	298 (54.1)	128 (45.7)
Two regimens	150 (39.0)	86 (43.9)	213 (38.7)	128 (45.7)
More than two regimens	22 (5.7)	12 (6.1)	40 (7.3)	24 (8.6)
Previous taxane therapy — no. (%)**				
One regimen	207 (53.8)	102 (52.0)	325 (59.0)	156 (55.7)
Two regimens	173 (44.9)	92 (46.9)	220 (39.9)	122 (43.6)
Docetaxel	377 (97.9)	191 (97.4)	534 (96.9)	273 (97.5)
Cabazitaxel	161 (41.8)	84 (42.9)	209 (37.9)	107 (38.2)

Note on PSMA Imaging: 95% of patients who underwent PSMA scans had positive scan findings

These were fairly heavily pre-treated patients

Median PSA 75

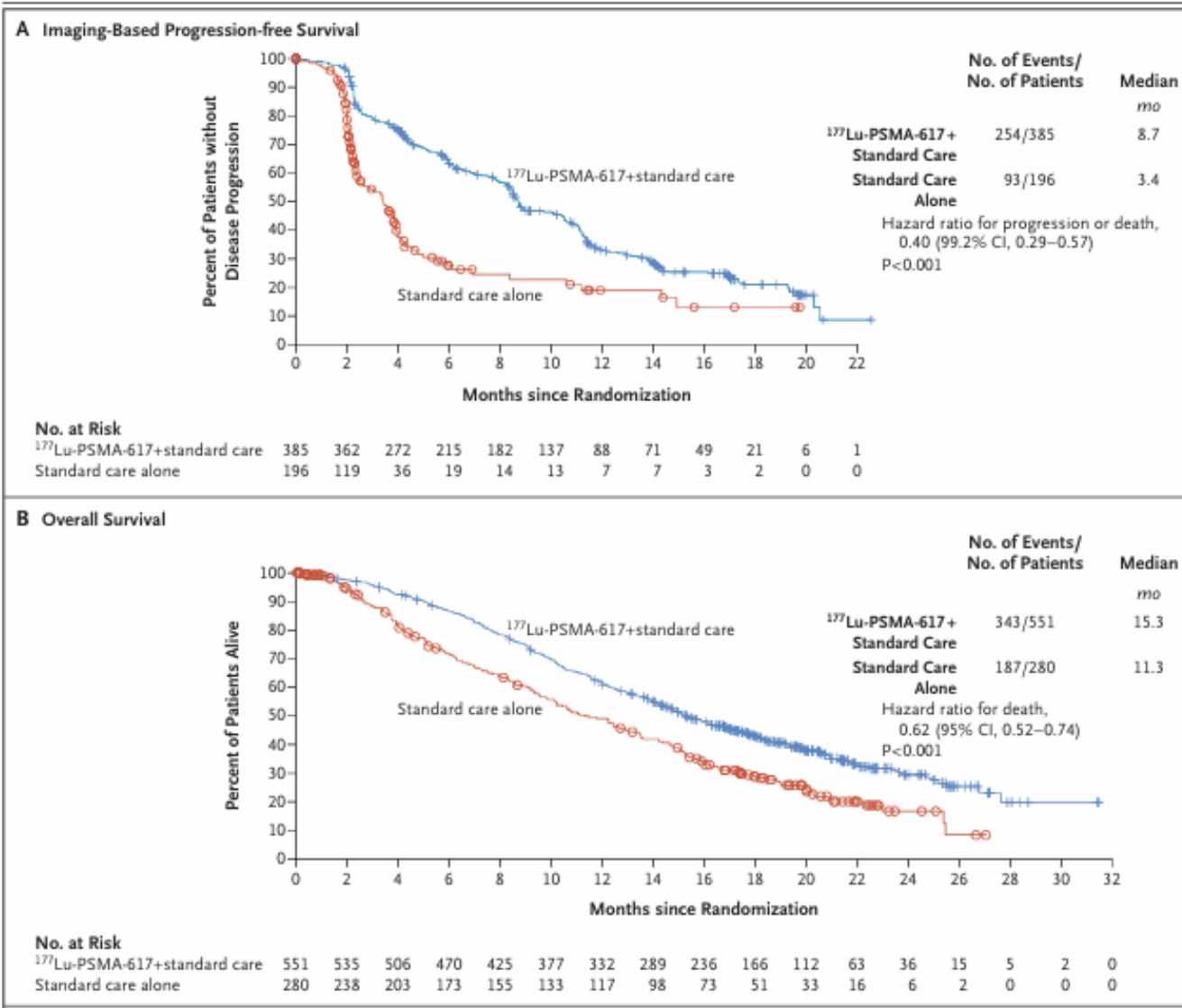
Median LDH 223

GS 8-10: 60%

Two or more ARPI: 50%

Two taxane regimens: 40%

# VISION Trial Outcomes



Time to Imaging Progression\*:  
3.4 mo vs 8.7 mo  
HR 0.4  
P < 0.001

\*Progression in bone scan/CT/MRI or death

Overall survival:  
11.3 mo vs 15.3 mo  
HR 0.62  
P < 0.001

# Major side effects from Pluvicto on VISION

- Fatigue
- Dry mouth
- Hematologic (low blood counts)
- Gastrointestinal
- Kidney injury
- Liver injury
  
- Grade 3+ events uncommon
- Discontinuation due to AE is uncommon 12%

**Table 2. Adverse Events.<sup>a,‡</sup>**

Event	<sup>177</sup> Lu-PSMA-617 plus Standard Care (N = 529)		Standard Care Alone (N = 205)	
	All Grades	Grade ≥3	All Grades	Grade ≥3
	<i>number of patients (percent)</i>			
Any adverse event	519 (98.1)	279 (52.7)	170 (82.9)	78 (38.0)
Adverse event that occurred in >12% of patients				
Fatigue	228 (43.1)	31 (5.9)	47 (22.9)	3 (1.5)
Dry mouth	205 (38.8)	0	1 (0.5)	0
Nausea	187 (35.3)	7 (1.3)	34 (16.6)	1 (0.5)
Anemia	168 (31.8)	68 (12.9)	27 (13.2)	10 (4.9)
Back pain	124 (23.4)	17 (3.2)	30 (14.6)	7 (3.4)
Arthralgia	118 (22.3)	6 (1.1)	26 (12.7)	1 (0.5)
Decreased appetite	112 (21.2)	10 (1.9)	30 (14.6)	1 (0.5)
Constipation	107 (20.2)	6 (1.1)	23 (11.2)	1 (0.5)
Diarrhea	100 (18.9)	4 (0.8)	6 (2.9)	1 (0.5)
Vomiting	100 (18.9)	5 (0.9)	13 (6.3)	1 (0.5)
Thrombocytopenia	91 (17.2)	42 (7.9)	9 (4.4)	2 (1.0)
Lymphopenia	75 (14.2)	41 (7.8)	8 (3.9)	1 (0.5)
Leukopenia	66 (12.5)	13 (2.5)	4 (2.0)	1 (0.5)
Adverse event that led to reduction in <sup>177</sup> Lu-PSMA-617 dose	30 (5.7)	10 (1.9)	NA	NA
Adverse event that led to interruption of <sup>177</sup> Lu-PSMA-617†	85 (16.1)	42 (7.9)	NA	NA
Adverse event that led to discontinuation of <sup>177</sup> Lu-PSMA-617†	63 (11.9)	37 (7.0)	NA	NA
Adverse event that led to death‡	19 (3.6)	19 (3.6)	6 (2.9)	6 (2.9)

# TheraP (ANZUP 1603) trial: Pluvicto vs cabazitaxel

- Patient population
  - mCRPC
  - Prior docetaxel
  - About 90% had prior ARPI
- N = 200
- Randomized (1:1)
  - Cabazitaxel ←
  - Pluvicto
- Primary endpoint: PSA50 response

[<sup>177</sup>Lu]Lu-PSMA-617 versus cabazitaxel in patients with metastatic castration-resistant prostate cancer (TheraP): a randomised, open-label, phase 2 trial

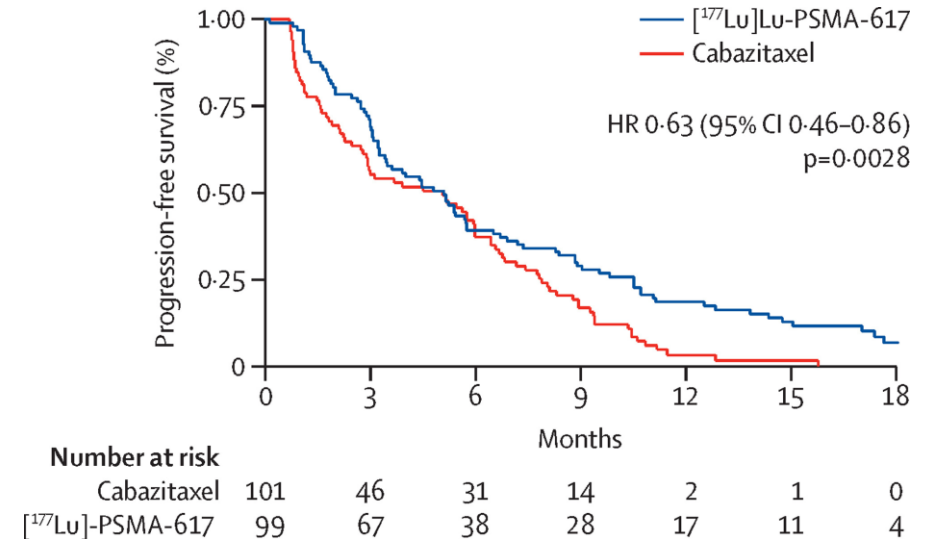
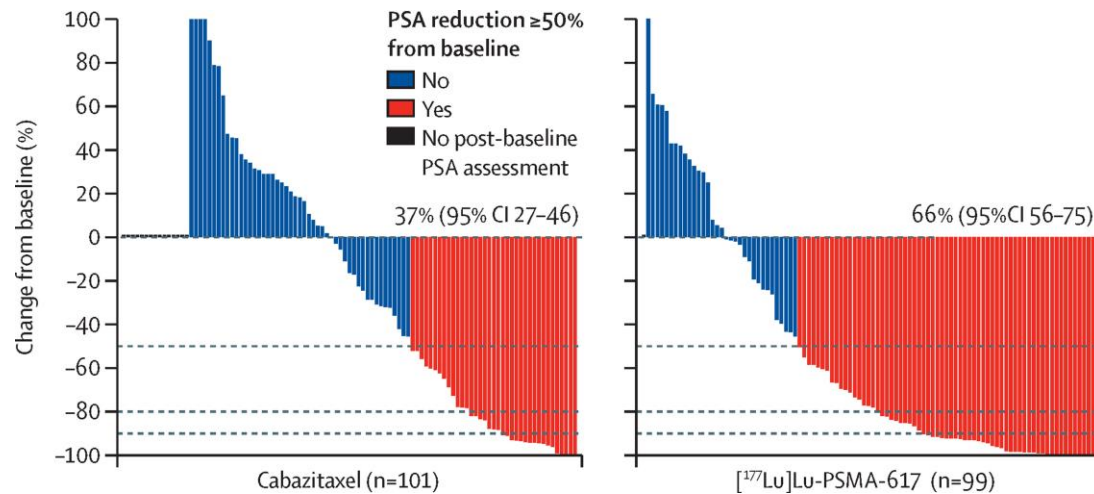
*Michael S Hofman, Louise Emmett, Shahneen Sandhu, Amir Iravani, Anthony M Joshua, Jeffrey C Goh, David A Pattison, Thean Hsiang Tan, Ian D Kirkwood, Siobhan Ng, Roslyn J Francis, Craig Gedye, Natalie K Rutherford, Andrew Weickhardt, Andrew M Scott, Sze-Ting Lee, Edmond M Kwan, Arun A Azad, Shakher Ramdave, Andrew D Redfern, William Macdonald, Alex Guminski, Edward Hsiao, Wei Chua, Peter Lin, Alison Y Zhang, Margaret M McJannett, Martin R Stockler, John A Violet\*, Scott G Williams, Andrew J Martin, Ian D Davis, for the TheraP Trial Investigators and the Australian and New Zealand Urogenital and Prostate Cancer Trials Group†*

Lancet Oncology 2021



Comparator is a more active agent than allowed on VISION trial

# Pluvicto has deeper response than cabazitaxel

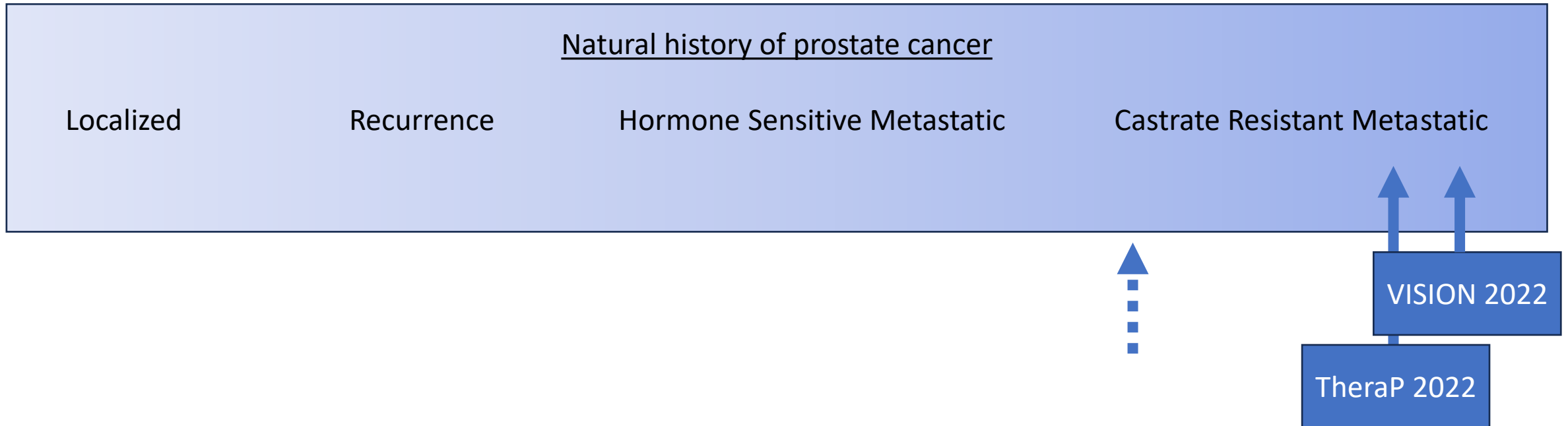


- Tumor control endpoints favor Pluvicto
  - Progression free survival HR 0.63 p= 0.0028
  - Radiographic PFS HR 0.64 p = 0.007
  - PSA PFS HR 0.60 p = 0.0017
  - PFS at 12 months: 19% vs 3%
  - ORR (RECIST measurable disease at baseline) 49% vs 24% p = 0.019
  - OS not reported (not mature)

8% exceptional responders – stopped Pluvicto early because post-treatment SPECT showed no uptake


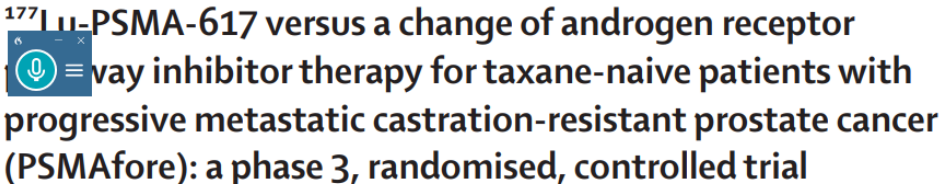
# Initial FDA approval March 2022

- Pluvicto approved for mCRPC
  - Progressed after prior ARPI and taxane based chemotherapy
  - PSMA avid lesion(s)



# PSMA Fore: Earlier in mCRPC space

- N = 468
- Key Eligibility:
  - mCRPC
  - Progression on 1 line of ARPI as most recent anti-cancer regimen
  - Eligible for ARPI switch
  - No chemotherapy for CRPC or mHSPC
- Randomized 1:1
  - 177Lu-PSMA-617
  - ARPI switch
- Primary endpoint: **rPFS**
- **Crossover allowed**
  - 134/163 who progressed on ARPI switch received Lu-177



*Michael J Morris\*, Daniel Castellano, Ken Herrmann, Johann S de Bono, Neal D Shore, Kim N Chi, Michael Crosby, Josep M Piulats, Aude Fléchon, Xiao X Wei, Hakim Mahammedi, Guilhem Roubaud, Hana Študentová, James Nagarajah, Begoña Mellado, Álvaro Montesa-Pino, Euloge Kpamegan, Samson Ghebremariam, Teri N Kreisl, Celine Wilke, Katja Lehnhoff, Oliver Sartor\*, Karim Fizazi\*, for the PSMAfore Investigators†*

Lancet 2024

## Selected patient characteristics

Prior anti-cancer regimens:

1: 20%

2: 50%

3+: 30%

Setting of last anti-cancer regimen:

Metastatic: 95%

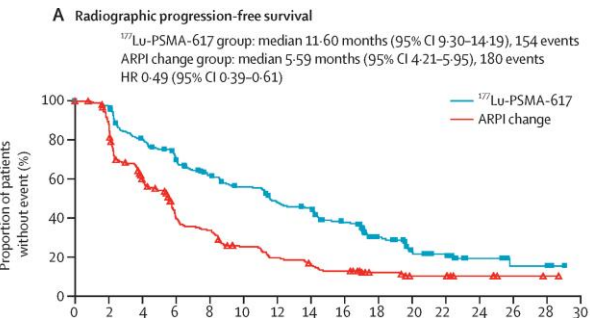
Prior ARPI setting:

CRPC: 81%

HSPC: 19%

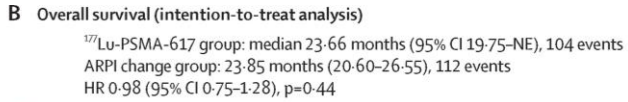
→ Mostly CRPC second line cohort

# PSMAFore: Pluvicto versus ARPI Switch

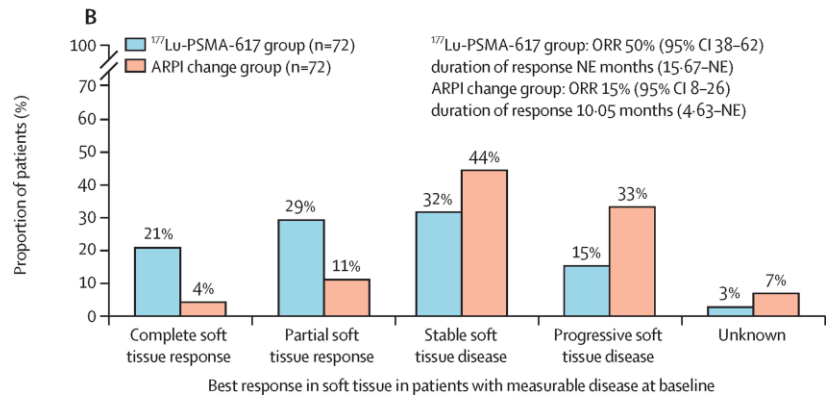
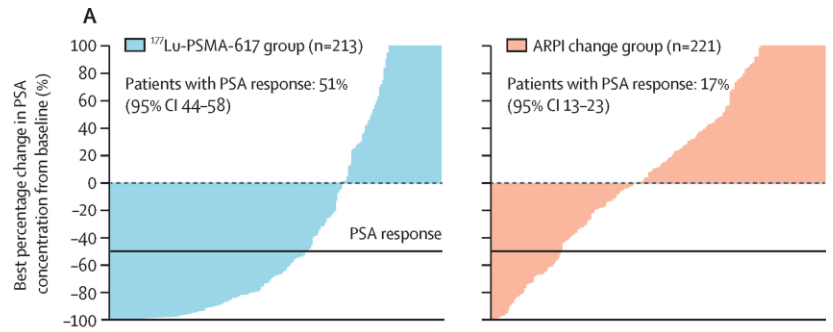


Number at risk (number censored)

<sup>177</sup> Lu-PSMA-617 group	234	217	175	152	126	111	94	86	67	39	25	20	8	4	4	0
	(0)	(12)	(5)	(3)	(6)	(3)	(2)	(1)	(6)	(16)	(6)	(3)	(10)	(3)	(0)	(4)
ARPI change group	234	197	126	79	65	45	35	28	22	14	9	9	5	2	1	0
	(0)	(14)	(7)	(9)	(0)	(4)	(0)	(1)	(0)	(7)	(3)	(0)	(4)	(3)	(1)	(1)



234	228	224	218	209	200	181	167	150	116	81	65	33	21	11	0	0
(0)	(4)	(1)	(1)	(0)	(2)	(3)	(0)	(3)	(19)	(25)	(12)	(28)	(12)	(10)	(10)	(0)
234	231	225	217	208	200	187	178	161	126	95	71	40	20	7	1	0
(0)	(1)	(1)	(2)	(1)	(1)	(1)	(0)	(1)	(17)	(20)	(17)	(27)	(16)	(10)	(6)	(1)



**Radiographic PFS:**  
 11.6 mo vs 5.6 mo (HR 0.49, p< 0.001)

**PSA50 response:**  
 51% vs 17%

**Time to 1<sup>st</sup> skeletal event:**  
 NE vs 18 mo (HR 0.41)

**PFS:** 6.7 mo vs 3.12 mo

**Second PFS:** 18 mo vs 15.31 mo (HR 0.86)

**OS:** 23.6 mo vs 23.9 mo (HR 0.98, p=0.44)

# ENZA-P trial: ARPI switch versus ARPI switch plus Pluvicto

- N = 162
- Key eligibility
  - mCRPC
  - No prior ARPI or docetaxel for mCRPC (ARPI and/or docetaxel allowed for HSPC)
  - Risk factors for “early progression”
  - **SUVmax > 15 at 1 site and >10 at all sites**
- Primary endpoint: Biochemical PFS
- Randomized 1:1
  - Enzalutamide
  - Enzalutamide + 177-Lu-PMSA-617 x **2 doses**
    - **Additional 2 doses** given if persistent PSMA PET uptake

Overall survival and quality of life with [<sup>177</sup>Lu]Lu-PSMA-617 plus enzalutamide versus enzalutamide alone in metastatic castration-resistant prostate cancer (ENZA-p): secondary outcomes from a multicentre, open-label, randomised, phase 2 trial

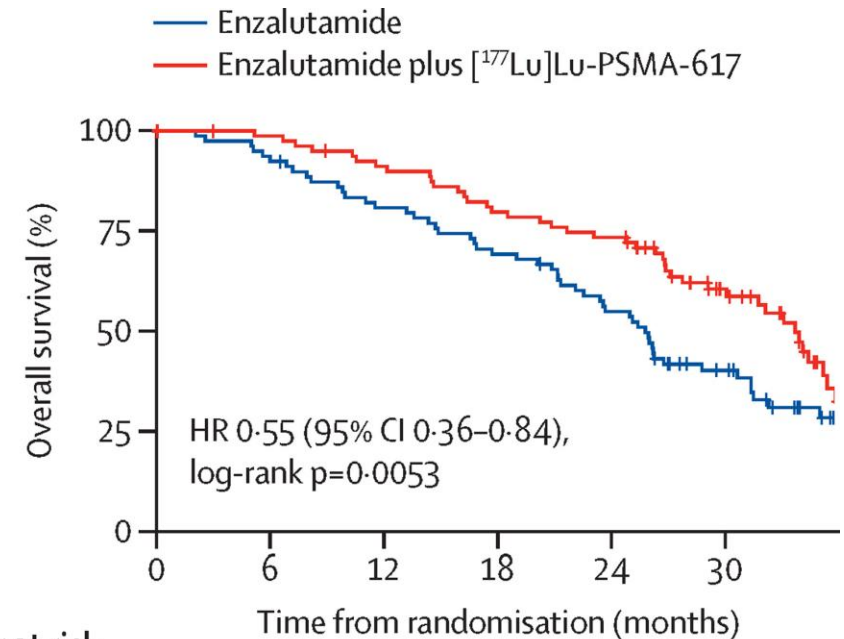
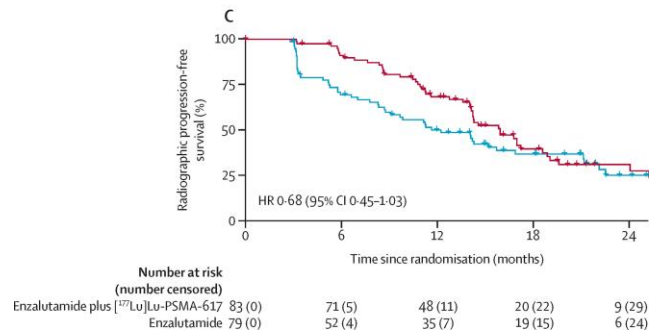
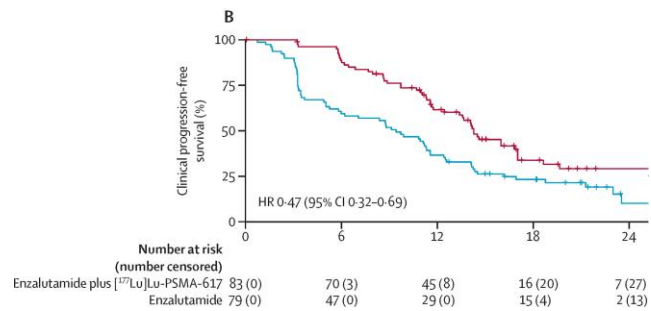
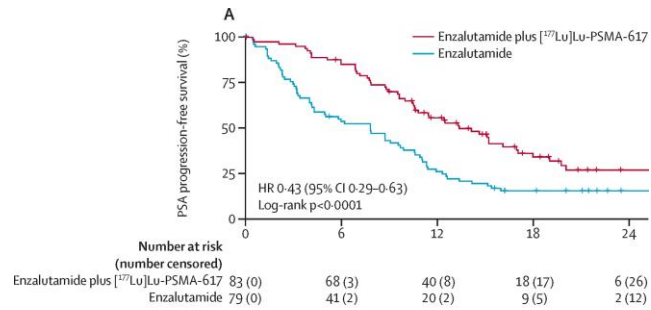
*Louise Emmett, Shalini Subramaniam, Megan Crumbaker, Anthony M Joshua, Shahneen Sandhu, Andrew Nguyen, Andrew Weickhardt, Sze-Ting Lee, Siobhan Ng, Roslyn J Francis, Jeffrey C Goh, David A Pattison, Thean Hsiang Tan, Ian D Kirkwood, Craig Gedye, Natalie K Rutherford, Aravind S Ravi Kumar, David Pook, Shakher Ramdave, David P Nadebaum, Mark Voskoboynik, Andrew D Redfern, William Macdonald, Laurence Krieger, Geoff Schembri, Wei Chua, Peter Lin, Lisa Horvath, Patricia Bastick, Patrick Butler, Alison Yan Zhang, Margaret McJannett, Hayley Thomas, Ailsa Langford, Michael S Hofman, Andrew James Martin, Ian D Davis\*, Martin R Stockler\*, for the ENZA-p Trial Investigators and the Australian and New Zealand Urogenital and Prostate Cancer Trials Group†*

Lancet Oncology 2025

55% with prior docetaxel  
13% with prior abiraterone

Response adapted approach to treatment  
11% stopped after 2 doses due to no residual PSMA positive disease

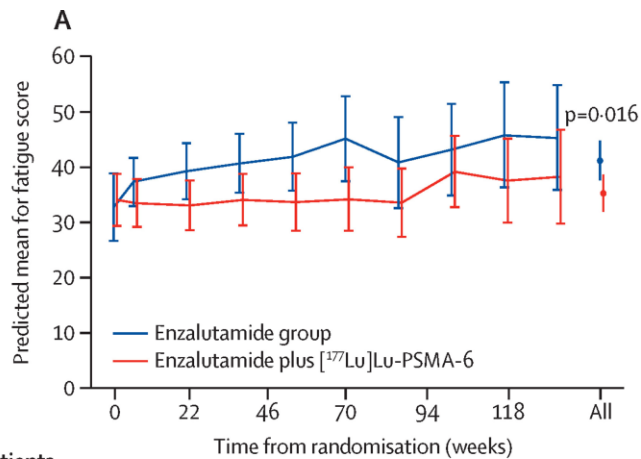
# ENZA-p trial: Primary endpoint and OS secondary endpoint



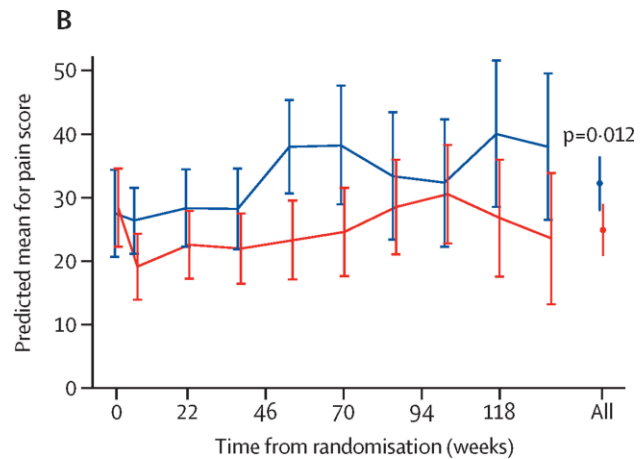
	0	6	12	18	24	30
<b>Number at risk (number censored)</b>						
Enzalutamide group	79 (0)	74 (0)	63 (1)	54 (1)	42 (2)	24 (9)
Enzalutamide plus <sup>177</sup> Lu-Lu-PSMA-617 group	83 (0)	79 (3)	72 (4)	63 (4)	58 (4)	33 (20)

# ENZA-P secondary endpoints

- Overall survival is improved!
- HRQOL also **improved** with additional of <sup>177</sup>Lu-PSMA-617



Patients	74	69	42	37	24	13	11	11	8	8
Enzalutamide group	74	68	61	54	37	27	22	20	13	10
Enzalutamide plus <sup>177</sup> Lu-PSMA-617 group	74	68	62	54	37	27	22	20	13	10



Enzalutamide group	74	69	42	37	24	13	11	11	8	8
Enzalutamide plus <sup>177</sup> Lu-PSMA-617 group	74	68	62	54	37	27	22	20	13	10

# Published trials of Lu-177-PSMA-617

	VISION (n = 831)	TheraP (n = 200)	PSMAFore (n=)	ENZA-p (n = 162)
Phase	III	IIR	IIR	IIR
Primary Endpoint	Overall survival Imaging PFS	PSA response	Radiographic PFS	PSA PFS
Patient population	mCRPC post-ARPI post-chemotherapy	mCRPC post-ARPI (mostly) post-chemotherapy (docetaxel only)	mCRPC post-ARPI pre-chemotherapy Mostly 2 <sup>nd</sup> line mCRPC	mCRPC First line mCRPC
Comparator to Pluvicto	ARPI switch	Cabazitaxel	ARPI switch	Enzalutamide vs Enzalutamide + Pluvicto
Outcomes	<b>Improved OS</b> Improved iPFS Improved ORR Improved PSA50 <b>Delayed HRQOL deterioration</b>	<b>Improved PFS</b> Improved ORR Improved PSA50 <i>OS not reported/not mature</i> <b>8% exceptional responder</b>	<b>Improved rPFS</b> Improved PSA50 Improve TTSE <i>OS no difference (cross over allowed)</i>	<b>Improved OS</b> Improved PSA PFS Improved rPFS <b>Improve HRQOL</b>  <b>11% exceptional responder</b>

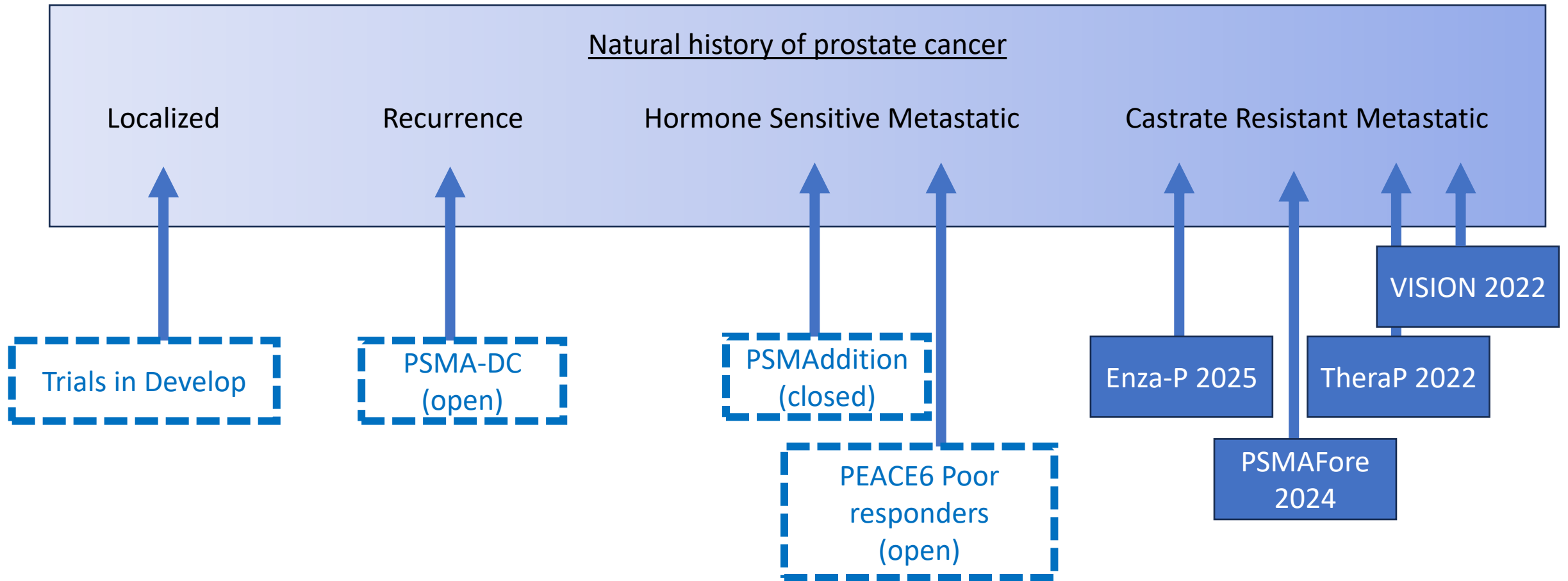
# FDA updated approval 3/2025

## -----INDICATIONS AND USAGE-----

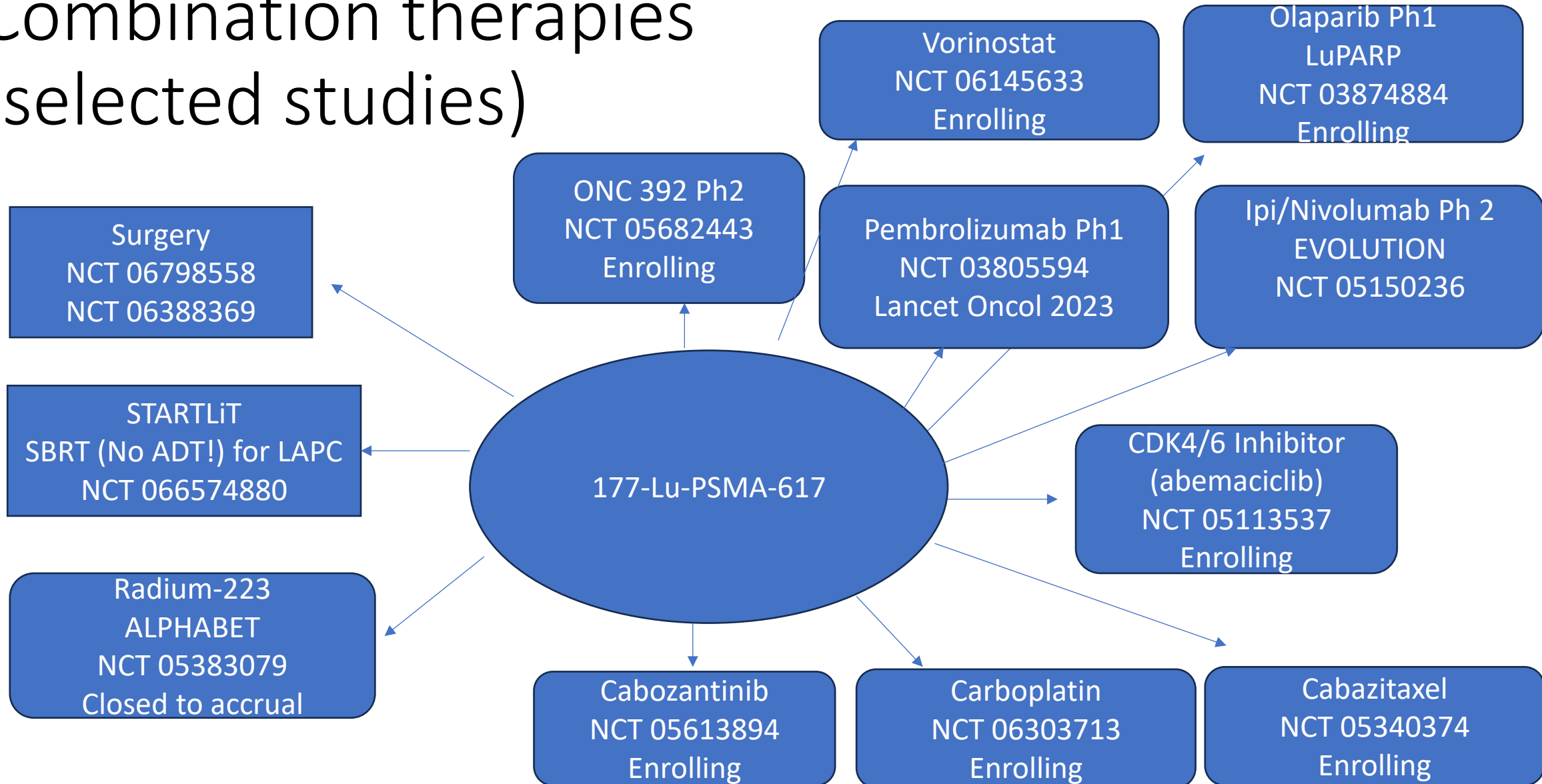
PLUVICTO is a radioligand therapeutic agent indicated for the treatment of adult patients with prostate-specific membrane antigen (PSMA)-positive metastatic castration-resistant prostate cancer (mCRPC) who have been treated with androgen receptor pathway inhibitor (ARPI) therapy, and

- are considered appropriate to delay taxane-based chemotherapy, or
- have received prior taxane-based chemotherapy. (1)

# Where do we go now for 177-Lu-PSMA-617?



# Combination therapies (selected studies)



# Newer Radioligands

- Other PSMA directed targeting
  - Lutetadotatate (better uptake in tumors)
  - Rosopitamab – TLX591 (antibody to PSMA)
- Non-PSMA targets
  - Hk2
  - STEAP1
  - DLL3 (neuroendocrine)
  - CD46
  - Gastrin releasing peptide receptors
  - FAP (non-specific for hypoxic areas)
- Other radionuclides
  - Actinium-223 (alpha emitter)

# Trials planned at KUCC

- Open:

- PSMA-DC: Phase II randomized of SBRT vs SBRT + 177-Lu-PSMA-617

- In pipeline

- AcTFirst (CAAA817B12301): Phase III randomized 225-Ac-PSMA-617 +/- SOC vs SOC in first line mCRPC
- PSMAcTION (CAAA817A122001): Phase III randomized 225-Ac-PSMA-617 vs SOC in patients who progress after 177-Lu-PSMA-617

# Additional Future Directions

- Dosimetry
  - Current treatment is based on infused activity NOT delivered dose
- Patient selection
- How to optimize treatment
  - Response adapted
  - Dosimetry adapted
  - Changing dose density or duration
- Combination with other treatments
- Sequencing with other treatments

Thank you

# Major toxicity after Ac-225

- Xerostomia (71% of patients)
  - 68% after 1 cycle
  - 86% after 2 cycles
  - 91% after 3 cycles
  - 88% after 4 cycles
  - 95% after 5 cycles
- Cytopenias
  - Grade 3+ Anemia: 13%, Any grade anemia 81%
  - Grade 3+ Leukopenia: 4%, Any grade leukopenia 44%
  - Grade 3+ thrombocytopenia: 7%, Any grade thrombocytopenia 54%
- Renal impairment
  - Grade 3+ renal impairment: 5%

# Nuts and bolts of Administration of 177-Lu-PSMA-617

- Dose: 7.4 GBq every 6 weeks
  - Dose reduction by 20% if significant adverse event
- Infusion:
  - Slow IV push over 1-10 minutes
- Instructions to patients **(this will be specific for each agent)**
  - Limit close contact (within 3 feet) for 2 days and children/pregnant women for 7 days
  - Sleep in separate bedroom for 3 days (7 for children, 15 for pregnant women)
  - Hydrate well

# PSMA Modes of administration

- VISION: 7.4 GBq per cycle
- TheraP: 8.5 GBq 1<sup>st</sup> cycle and decrease 0.5 GBq each cycle. Stop if post-treatment SPECT show no appreciable uptake.
- Enza-P: 7.5 GBq x 2-4 cycles

# Estimated absorbed doses in tissues

**Table 2: Estimated Radiation Absorbed Dose for PLUVICTO in VISION**

Organ*	Absorbed dose per unit activity (Gy/GBq) N = 29		Calculated absorbed dose for 7.4 GBq administration (Gy)		Calculated absorbed dose for 6 x 7.4 GBq (44.4 GBq cumulative activity) (Gy)	
	Mean	SD	Mean	SD	Mean	SD
Adrenals	0.033	0.025	0.24	0.19	1.5	1.1
Brain	0.007	0.005	0.049	0.035	0.30	0.22
Esophagus	0.025	0.026	0.18	0.19	1.1	1.1
Eyes	0.022	0.024	0.16	0.18	0.99	1.1
Gallbladder wall	0.028	0.026	0.20	0.19	1.2	1.1
Heart wall	0.17	0.12	1.2	0.83	7.8	5.2
Kidneys	0.43	0.16	3.1	1.2	19	7.3
Lacrimal glands	2.1	0.47	15	3.4	92	21
Left colon	0.58	0.14	4.1	1.0	26	6.0
Liver	0.090	0.044	0.64	0.32	4.0	2.0
Lungs	0.11	0.11	0.76	0.81	4.7	4.9
Pancreas	0.027	0.026	0.19	0.19	1.2	1.1
Prostate	0.027	0.026	0.19	0.19	1.2	1.1

# Estimated absorbed doses in tissues

Organ*	Absorbed dose per unit activity (Gy/GBq) N = 29		Calculated absorbed dose for 7.4 GBq administration (Gy)		Calculated absorbed dose for 6 x 7.4 GBq (44.4 GBq cumulative activity) (Gy)	
	Mean	SD	Mean	SD	Mean	SD
Rectum	0.56	0.14	4.0	1.1	25	6.2
Right colon	0.32	0.078	2.3	0.58	14	3.4
Salivary glands	0.63	0.36	4.5	2.6	28	16
Small intestine	0.071	0.031	0.50	0.23	3.1	1.4
Spleen	0.067	0.027	0.48	0.20	3.0	1.2
Stomach wall	0.025	0.026	0.18	0.19	1.1	1.1
Testes	0.023	0.025	0.16	0.18	1.0	1.1
Thymus	0.025	0.026	0.18	0.19	1.1	1.1
Thyroid	0.26	0.37	1.8	2.7	11	16
Total body	0.037	0.027	0.27	0.20	1.6	1.2
Urinary bladder wall	0.32	0.025	2.3	0.19	14	1.1

\*Estimated radiation absorbed dose for bone marrow is not included [see *Warnings and Precautions (5.2)*].