

THERANOSTICS INSIGHTS

^{161}Tb -PSMA-I&T



Radioisotope

Tb-161, terbium-161
Transition metals
T $\frac{1}{2}$: 6.95 days

Production

In nuclear reactor:
 $^{160}\text{Gd} (n, \gamma) ^{161}\text{Gd}(\beta^-) ^{161}\text{Tb}$

Radiation

Beta particles (β^-)
Auger electrons (e^-)
Gamma photons (γ)

Use

Under clinical trial for metastatic castration-resistant prostate cancer (mCRPC)

Target/Mechanism

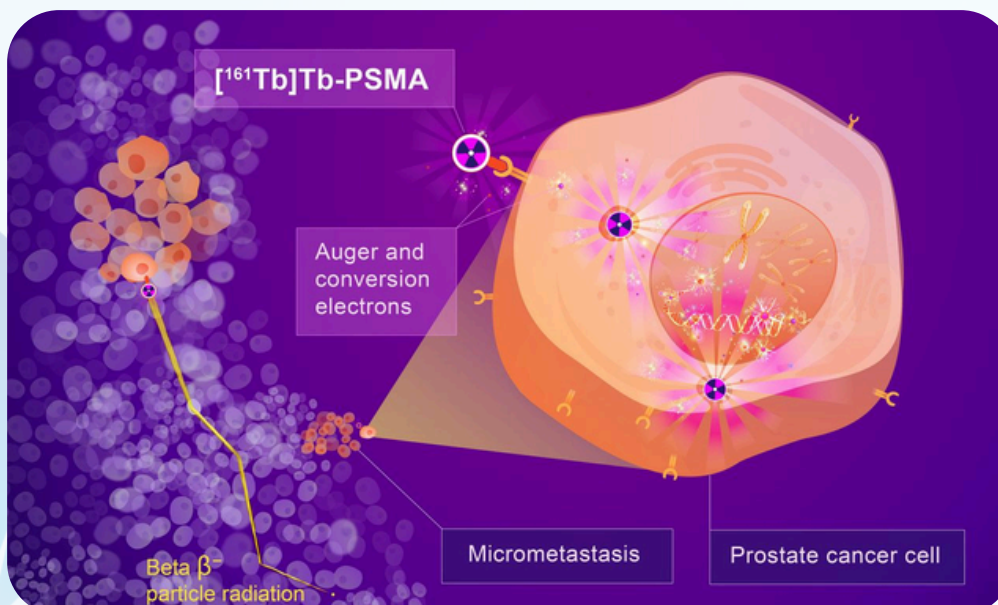
Prostate-specific membrane antigen (PSMA) is overexpressed in 90% of prostatic adenocarcinomas. The ^{161}Tb -PSMA-I&T binds the PSMA receptor and gets internalized in the tumor cell. The proximity to the nucleus allows the dual Beta particles (β^-) and Auger electrons (e^-) radiation to cause both single strand breakage and highly localized DNA damage, leading to cancer cell death.

Insight

The VIOLET clinical trial (NCT05521412) it's a phase I/II study designed to explore safety and efficacy of ^{161}Tb -PSMA-I&T in mCRPC.

Study design:

- Phase I: dose escalation to define the MTD and safety profile, on a 3+3 protocol design (12 patients enrolled) with up to 6 cycles every 6 weeks.
- Phase II: dose expansion to assess anti-cancer effects (additional 18 patients enrolled)



Results: ^{161}Tb -PSMA-I&T safety profile showed no dose-limiting toxicities. Grade 3/4 adverse event were reported in only 2 patients (7%). Early signals of efficacy were encouraging: PSA \geq 90% decline was observed in 40% of patients (95% CI, 23–59) and median radiographic progression-free survival was 11.1 months (95% CI, 6.6–11.7)