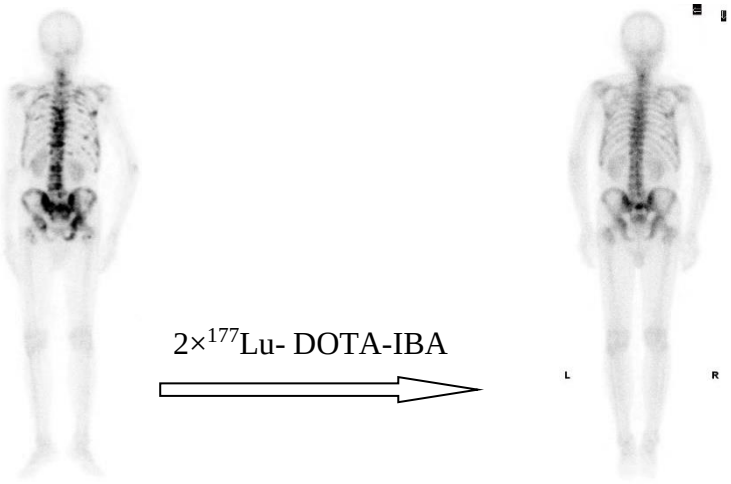
Precise Targeted Therapy for Bone Metastases with ^{177}Lu-TBM: Improve the Quality of Life

Nuclear medicine colleagues in the affiliated hospital of Southwestern Medical University in China published their work on theranostics use of a novel bone affinity agent ^{68}Ga/^{177}Lu - DOTA-IBA in main stream journals, recently.

In March 2021, staff in this nuclear medicine department independently designed, screened and synthesized drug precursor DOTA-Ibandronate, with over 95% purity. In June 2021, labeling, quality control and stability experiments of ^{68}Ga/^{177}Lu- DOTA-IBA were completed. In August 2021, preclinical studies in animal were completed.

^{68}Ga- DOTA-IBA detected 49.6% more bone metastases than ^{99m}Tc-MDP in a comparison study with 168 patients. The T/NT ratio of bone metastases in ^{68}Ga- DOTA-IBA imaging ranges from 9 to 20.

^{68}Ga- DOTA-IBA imaging can guide ^{177}Lu- DOTA-IBA precise targeted therapy; every cycle of treatment was performed 6 to 8 weeks apart. The T/NT ratio of ^{177}Lu- DOTA-IBA in bone metastases was 9-26.8, which was significantly higher than that of other bone affinity radiopharmaceuticals. After ^{177}Lu- DOTA-IBA treatment, patients experienced significant pain relief, and the pain score (NRS) dropped from 2.53±1.55 (baseline) to 0.67±0.97 ($p<0.001$). Pain relief effect was prompt and sustainable. Patient's life quality score (KPS) increased from 77.22±12.27 at baseline to 91.11±7.58 at week 4. There was no significant side effects in follow-up.



June 15, 2022
pre-treatment

2022.06
PSA=1018.2ng/ml

October 26, 2022
post-treatment

2022.10
PSA=2.6ng/ml

Fig. Left: ^{99m}Tc-MDP bone scintigraphy of a prostate cancer patient with bone metastases before ^{177}Lu-TBM treatment, showing multiple bone metastases throughout the body; Right: ^{99m}Tc-MDP bone scintigraphy after 2 cycles of ^{177}Lu-TBM treatment, showing the systemic lesions and the tracer uptake were significantly reduced.

References:

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2. Qiu L, Wang Y, Liu H, Wang Q, Chen L,Wang L, Feng Y, Chen Y. Safety and Efficacy of Gallium-68- or Lutetium-177-Labeled DOTA-IBA as a Novel Theranostic Radiopharmaceutical for Bone Metastases: a Phase 0/I Study. Clinical Nuclear Medicine. Accepted, 20230206.
3. Wang Q, Yang J, Wang Y, Liu H, Feng Y, Qiu L, Chen Y. Lutetium177-labeled DOTA-Ibandronate: a novel radiopharmaceutical for targeted treatment of bone metastases. Molecular Pharmaceutics. Accepted, 20230206.