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## **$^{177}\text{Lu}$ labeled radiopharmaceuticals as potential palliative bone agents**

Phosphonate ligands labeled with radioisotopes decaying by beta emissions have been effective as palliative agents for painful bone metastasis. One of the most successful radiolabeled phosphonates,  $^{153}\text{Sm}$ -EDTMP, is being used clinically for the treatment of painful bone metastases. In the palliative treatment of bone metastases with beta emitting radionuclides, the radiation dose to the active red bone marrow is a very important factor. An issue of major concern is the possibility of bone marrow ablation due to therapy with higher energy beta emitters. Another radioisotope,  $^{177}\text{Lu}$ , has radionuclide properties that make it suitable for use in palliative therapy of bone metastasis. The lower energy  $\beta^-$  emissions of  $^{177}\text{Lu}$  could be effective in minimizing bone marrow suppression. Because of this,  $^{177}\text{Lu}$  should be considered as a possible alternative radioisotope for bone pain palliation. It is possible to label phosphonates such as EDTMP and DOTMP with the radioisotope  $^{177}\text{Lu}$ . These ligands will form complexes with high yields of 99%, and the complex will remain stable for at least 14 days at room temperature without any significant amount of dissociation. Biodistribution studies with EDTMP and DOTMP were performed and have shown significant selective skeletal uptake with rapid blood clearance and minimal uptake in other major organs. Based on these results, and its decay properties  $^{177}\text{Lu}$  should be considered as a promising alternative to  $^{153}\text{Sm}$ -EDTMP for use in the palliative treatment of painful bone metastasis.