

Preliminary studies on ¹⁷⁷Lu-labeled sodium pyrophosphate (¹⁷⁷Lu-PYP) as a potential bone-seeking radiopharmaceutical for bone pain palliation

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Objective: ^{99m}Tc-Sn-PYP (technetium-^{99m} labeled tin pyrophosphate) has been widely used as a radiopharmaceutical for bone scanning as well as in nuclear cardiology. It is also found in the body in trace amounts. ¹⁷⁷Lu is presently considered as an excellent radionuclide for developing bone pain palliation agents. PYP is an analogue of MDP and MDP has been labeled with ¹⁷⁷Lu. No study on preparing a complex of ¹⁷⁷Lu with PYP has been reported yet. Based on these facts, it was hypothesized that a bone-seeking ¹⁷⁷Lu -PYP (lutetium-177 labeled pyrophosphate) radiopharmaceutical could be developed as an agent for palliative radiotherapy of bone pain due to skeletal metastases.

Methods: ¹⁷⁷Lu was produced by irradiating lutetium foil (11 mg) natural target at a flux $\sim 1.0 \times 10^{14}$ n/cm²/s for 12 h in the swimming pool type reactor. ¹⁷⁷Lu in the form of ¹⁷⁷LuCl₃ was labeled with PYP. The radiochemical purity and labeling efficiencies were determined by paper chromatography. Labeling of ¹⁷⁷Lu with PYP was optimized and a labeled sample was subjected to HPLC analysis. To determine the charge on the ¹⁷⁷Lu-PYP complex, radio-electrophoresis was conducted for 1 hour under a voltage of 300 V and 45 mA current using 0.025 M phosphate buffer (pH 6.9). Bio evaluation studies with rabbit under γ -camera were also performed to verify the skeletal uptake.

Results: The quality control using paper radio-chromatography has shown >99% radiochemical purity of ¹⁷⁷Lu-PYP complex. Radio-chromatography also showed maximum labeling at ligand/metal ratio=60:1. HPLC analysis showed 1.42 \pm 0.01 min retention time of ¹⁷⁷Lu-PYP complex. No decrease in labeling was observed at higher temperatures. Gamma-camera images of ¹⁷⁷Lu-PYP in normal rabbit at 24 h post injection also showed high skeletal uptake.

Conclusion: The study demonstrated that sodium pyrophosphate could be labeled with ¹⁷⁷Lu with high radiochemical yields (>99%). Negatively charged ¹⁷⁷Lu-PYP complex retain stability for a day and at high temperatures too. Gamma-camera images of ¹⁷⁷Lu-PYP in normal rabbit at 24h post injection showed high skeletal uptake, suggesting that it may be useful as a bone- pain palliation agent for the treatment of bone metastases.

Keywords: ¹⁷⁷Lu-labeled PYP, skeletal metastases, bone pain palliation, gamma-camera imaging.

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Ocular surface squamous neoplasia

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This lecture will address on corneal and conjunctival tumors more precisely on clinical characteristics and the changing trend of ocular surface squamous neoplasia (OSSN). The special emphasis was given on the effect of topical mitomycin C (MMC) in recurrent OSSN in terms of its efficacy and induced corneal and cytological changes if any. Further, if surgery has a role in this tumor. In addition to these subjects, attendees of this lecture will be familiarized with the course of the disease and its outcome at length.

Biography

Anita Panda is an ophthalmologist who studied the different aspect of corneal and conjunctival tumors over 30 years. During which time, she has authored more than 250 peer-reviewed reports in ophthalmology and a dozen on OSSN. She is a member of the Scientific Advisory Committees for many Ophthalmic and Corneal Societies of the world. Presently she is the President of All India Ophthalmological Society and taken a project on rehabilitation of blinds. While doing so, she has engaged these blinds to educate the women for prevention and early detection of breast cancer.

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