

Preliminary Studies to Obtain ^{186}Re -Perrhenate: Biological Pattern in Rats and Labelling Compounds

MESTNIK SAC, LIMA ALP, DE CARVALHO OG,
COLTURATO MT, MURAMOTO E

Instituto de Pesquisas Energéticas e Nucleares,
Comissão Nacional de Energia Nuclear; São Paulo (Brazil).

^{186}Re is an important radionuclide to be used for palliative therapy of bone pain associated with skeletal metastases, due to its suitable characteristics: a) half-life: 90.64 hours; b) main emissions: β -particles, $E = 1.073$ MeV (73.0%) and 0.9494 MeV (21.0%) with a range in tissue of the order of 4.5 mm and 3.8 mm, respectively; c) emission of a gamma photon with an ideal energy (137 KeV, 9%) for gamma-camera imaging; d) it can be produced in a nuclear reactor with activities in the range from a few mCi to tens of mCi. ^{186}Re is employed in nuclear medicine complexed with molecules such as EHDP (ethane-1-hydroxy-1-1-diphosphonate) and MDP (methylene diphosphonate).

In the present work, experimental studies on the irradiation conditions of metallic rhenium and ^{186}Re -perrhenate preparation were started. The biodistribution pattern of ^{186}Re -perrhenate in rats was also studied. From now on, the ^{186}Re product obtained will be used for labelling EHDP and MDP, and a comparative study with $^{99\text{m}}\text{Tc}$ -MDP will be performed.

Samples of natural metallic rhenium were irradiated inside quartz ampoules under a thermal neutron flux of $1 \times 10^{13} \text{ n.cm}^{-2}\text{s}^{-1}$ during 3 hours. The samples were then left to cool for a period of 8 days, to reduce ^{186}Re content. The ^{186}Re activity produced was about 30 mCi, with a specific activity of about 1 mCi $^{186}\text{Re}/\text{mg Re}$.

The preparation of ^{186}Re -perrhenate from metallic rhenium-186 was achieved by the oxidation of Re with H_2O_2 and further neutralization with aqueous ammonia. The solution was sterilized by filtration with 0.22 μm millipore filters. The biodistribution of ^{186}Re -perrhenate was studied in rats at the 2, 4, 6, 24 and 48 hour time-points, and the same biological pattern as for NaTcO_4 was observed, without any uptake in any other organ. This is an advantage in terms of radiation dosimetry to the patients.