

Reactor-Produced Radioisotopes for Bone Pain Palliation

One major current medical use of reactor-produced radioisotopes is for the treatment of painful skeletal metastases which is often encountered in patients with primary tumors of the breast, prostate and lung [3-4]. Although many of these patients are often "end-stage", the quality of life can be significantly improved with the cessation of intractable pain. The use of therapeutic radioisotopes which localize at metastatic sites has been found to be an inexpensive and effective method for treatment of pain, especially for multiple sites for which the use of external beam irradiation is impractical. Such palliative treatment of patients with advanced metastatic disease to the skeleton can dramatically improve their quality of life, and is an important application which has many advantages over traditional use of analgesics and external radiation. There are currently several metastatic-targeted agents radiolabeled with various therapeutic radioisotopes which are in various stages of clinical investigation [3-4]. Most radioisotopes used for bone pain palliation are reactor-produced (Table 2). Key examples produced by single neutron capture of enriched targets include rhenium-186 and samarium-153. In addition, generator systems which provide therapeutic daughter radioisotopes from the decay of reactor-produced parent radioisotopes are also of interest. One important example is rhenium-188, available from generators *via* decay of reactor-produced tungsten-188. Tin-117 m is an example of a reactor-produced radioisotope which decays with the emission of low energy conversion electrons rather than by β^- -decay. Each of these agents and/or radioisotopes has specific advantages and disadvantages, however, and the "ideal" agent for bone pain palliation has not yet been identified.

Reactor-Produced Radioisotopes for Vascular Brachytherapy

An important new therapeutic strategy in the realm of interventional cardiology is the use of beta and gamma-emitting radioisotopes for intravascular brachytherapy (*IVB*) for the inhibition of coronary restenosis following high pressure percutaneous transluminal coronary balloon angioplasty (*PTCA*). Most of the radioisotopes for this application are reactor-produced and the generator-derived beta-emitting radioisotope rhenium-188, is in particular expected to have important applications. An emerging application we have recently proposed [5-8] which is expected to have very important applications is the use of solutions of rhenium-188 agents for the inhibition of coronary artery restenosis following *PTCA*. This new and unique approach involves the low pressure intracoronary balloon expansion using solutions of rhenium-188, since solutions offer the most uniform vessel wall radiation dose delivery system. The chemical species which