Table 2. Key Examples of Reactor-Produced Radioisotopes for Bone Pain Palliation

Radioisotope	Half-Life (Days)	Beta Energy (MeV)	Gamma Energy, keV (%)	Chemical Form For Clinical Use
Strontium-89	50.5	1.46	None	Ionic - Chloride
Phosphorus-32	14.3	1.71	None	Phosphate
Tin-117*m*	13.6	None, CE	159 (86 %)	Sn(IV)-*DTPA*
Samarium-153	1.93	0.81	103 (28 %)	*EDTMP*
Rhenium-186	3.71	1.08	137 (9.2 %)	*HEDP*
Rhenium-188	0.70	2.1	155 (15 %)	*HEDP*, *MDP*, Re(V)-*DMSA*

DTPA = Diethylenetriaminepentaacetic Acid
ETDMP = Ethylenediaminetetramethylenephosphonate
HEDP = Hydroxyethylidenediphosphonate
MDP = Methylenediphosphonate
DMSA = Dimercaptosuccinic Acid

Table 3. Examples of Key Radionuclide Generators of Current Interest Prepared from reactor-Produced Parents Which Provide Therapeutic Daughter Radioisotopes

Parent	Daughter	Examples of Clinical Applications	Comment
Strontium-90	Yttrium-90	Tumor Therapy, Bone Pain Palliation, Introvascular Brachytherapy	Advantage - long-lived and readily available parent; disadvantage - bone seekers
Tungsten-188	Rhenium-188	Tumor Therapy, Bone Pain Palliation, Introvascular Brachytherapy	Advantage - efficient generator with long shelf-life; disadvantage - limited high-flux reactors for W-188 production
Dysprosium-166	Holmium-166	Tumor Therapy, Bone Pain Palliation, "*In Vivo*" Concept	Advantage - useful high energy beta; disadvantage - routine separation difficult