

Palliation of Pain in Cancer Metastatic to Bone: Clinical Use of $^{89}\text{Sr Cl}$

Alexander JB McEwan, M.D.

Nuclear Medicine, Department of Oncologic Imaging, University of Alberta, Canada

Strontium-89 is a pure β emitting isotope of strontium with an E_{\max} of 1.53 MeV and mean range in tissue of 6-8 mm. Strontium is physiologically handled as calcium, and shows preferential binding in the inorganic matrix of bone. It was first described as a potential palliative treatment of cancer metastatic to bone by Pecher in 1940. Sporadic reports appeared in the literature until 1977 when Firusian published data supporting its possible role as an effective means of controlling pain in patients with prostate cancer metastatic to bone.

Strontium-89 is now marketed as Metastron and has gained widespread use as a safe, effective and repeatable palliative treatment in patients with painful bone metastases.

Pharmacokinetic data by Blake and co-workers will be reviewed showing an absorbed radiation dose to bone metastases of 200-2000 rads/mCi with a therapeutic ratio of approximately 10:1. No dose response has been observed and administered doses of up to 20 mCi have been reported as safe. A recommended administered dose of 4 mCi has been established. Toxicity is haematological, with reversible thrombocytopenia being the significant cellular element affected.

Data from the literature will be reviewed showing an efficacy of approximately 70%; of these patients about 1/3 will become pain free, 1/3 will almost cease opiates, and 1/3 will reduce opiates. Response occurs about 7-10 days after injection and typically lasts for 3-8 months. Retreatment is reported as safe and effective with efficacy and toxicity usually mirroring that seen on the first injection.

Requirements for treatment planning and patient selection will be reviewed, and cost efficacy data presented to support the routine use of this exciting new radio-pharmaceutical.