Austin Radiological Association

Nuclear Medicine Procedure

XOFIGO
(Radium-223)

Overview

- Xofigo is an alpha particle-emitting radioactive therapeutic agent indicated for the treatment of patients with castration-resistant prostate cancer, symptomatic bone metastases and no known visceral metastatic disease.

Procedure Time

- 30 minutes – to get consent signed.
- 15 minutes – administration of Xofigo

Patient Preparation

- Patient should have had prior imaging demonstrating bone metastasis (radiologist discretion).
- Coordinator to perform consult and verify labs and treatment plan with Radiologist prior to treatment and throughout treatment plan.
- Authorized User obtains written consent and provides written directive.

Equipment & Energy Windows

- NA – No imaging post-treatment.

Radiopharmaceutical, Dose, & Technique of Administration

- Administer Xofigo by slow intravenous injection over 1 minute. Flush the intravenous access line or cannula with isotonic saline before and after injection of Xofigo.
- The dose regimen of Xofigo is 55 kBq (1.49 microcurie) per kg body weight, given at 4-week intervals for 6 injections.

2.1 Recommended Dosage

The dose regimen of Xofigo is 55 kBq (1.49 microcurie) per kg body weight, given at 4 week intervals for 6 injections. Safety and efficacy beyond 6 injections with Xofigo have not been studied.

The volume to be administered to a given patient should be calculated using the:

- Patient's body weight (kg)
- Dosage level 55 kBq/kg body weight or 1.49 microcurie/kg body weight
- Radioactivity concentration of the product (1,100 kBq/mL; 30 microcurie/mL) at the reference date
- Decay correction factor to correct for physical decay of radium-223.

The total volume to be administered to a patient is calculated as follows:

$$\text{Volume to be administered (mL)} = \frac{\text{Body weight in kg} \times 55 \text{ kBq/kg body weight}}{\text{Decay factor} \times 1{,}100 \text{ kBq/mL}}$$

or

$$\text{Volume to be administered (mL)} = \frac{\text{Body weight in kg} \times 1.49 \text{ microcurie/kg body weight}}{\text{Decay factor} \times 30 \text{ microcurie/mL}}$$

Table 1: Decay Correction Factor Table

Days from Reference Date	Decay Factor	Days from Reference Date	Decay Factor
-14	2.296	0	0.982
-13	2.161	1	0.925
-12	2.034	2	0.870
-11	1.914	3	0.819
-10	1.802	4	0.771
-9	1.696	5	0.725
-8	1.596	6	0.683
-7	1.502	7	0.643
-6	1.414	8	0.605
-5	1.330	9	0.569
-4	1.252	10	0.536
-3	1.178	11	0.504
-2	1.109	12	0.475
-1	1.044	13	0.447
		14	0.420

Post Treatment Restrictions

- Follow XOFIGO Patient Discharge Instructions

Patient Position & Imaging Field

- NA

Acquisition Protocol

- NA

Data Processing

- NA

Optional Maneuvers

- NA

Method for timely correction of Data Analysis and reporting errors and notification of referring parties

- Data Analysis and reporting errors are reported to the interpreting physician and appropriate clinic manager for timely correction and notification of the referring physician via report addendum or STAT call if error is significant.

Principle Radiation Emission Data Ra 223

- Physical half-life = 11.4 days
- The six-stage-decay of radium-223 to stable lead-207 occurs via short-lived daughters and is accompanied predominantly by alpha emissions. There are also beta and gamma emissions with different energies and emission probabilities. The fraction of energy emitted from radium-223 and its daughters as alpha-particles is 95.3% (energy range of 5 - 7.5 MeV). The fraction emitted as beta-particles is 3.6% (average energies are 0.445 MeV and 0.492 MeV), and the fraction emitted as gamma-radiation is 1.1% (energy range of 0.01 - 1.27 MeV).

Table 2: Absorbed Radiation Doses per Administered Activity

Organ	Mean (mGy/MBq)	Mean (rad/mCi)	Coefficient of Variation (%)
Osteogenic cells	1152	4263	41
Red marrow	139	514	41
LLI wall*	46	172	83
Colon*	38	142	56
ULI wall*	32	120	50
Small intestine wall	7.3	27	45
Urinary bladder wall	4.0	15	63
Kidneys	3.2	12	36
Liver	3.0	11	36
Heart wall	1.7	6.4	42
Lungs	1.2	4.5	48
Ovaries	0.49	1.8	40
Uterus	0.26	0.94	28
Gallbladder wall	0.23	0.85	14
Stomach wall	0.14	0.51	22
Adrenals	0.12	0.44	56
Muscle	0.12	0.44	41
Pancreas	0.11	0.41	43
Brain	0.10	0.37	80
Spleen	0.09	0.33	54
Testes	0.08	0.31	59
Skin	0.07	0.27	79
Thyroid	0.07	0.26	96
Thymus	0.06	0.21	109
Breasts	0.05	0.18	120
Whole Body	23	86	16

*LLI: lower large intestine; ULI: upper large intestine; colon dose = 0.57 × ULI dose + 0.43 × LLI dose[2]