



## Positive Quality Intervention: Radium Ra 223 Dichloride (Xofigo®) Management

**Description:** This document will cover Radium Ra 223 Dichloride (Xofigo®) and management technique to optimize patient care.

**Background:** The active moiety of Xofigo® is the alpha particle-emitting isotope radium-223 (radium Ra 223 dichloride), which mimics calcium and forms complexes with the bone mineral hydroxyapatite at areas of increased bone turnover, such as bone metastases. The high linear energy transfer alpha particles (80 keV/micrometer) lead to a high frequency of double-strand DNA breaks in adjacent cells including tumor cells, osteoblasts and osteoclasts, resulting in an anti-tumor effect on bone metastases. The alpha particle range from radium-223 dichloride is < 100 micrometers (< 10 cell diameters) which limits damage to the surrounding normal tissue.<sup>1</sup> <sup>223</sup>Radium (Ra) is a bone-targeting radiopharmaceutical with hydroxyapatite (Ca<sub>5</sub>[PO<sub>4</sub>]<sub>3</sub>OH) as target, which is an essential component of the inorganic bone matrix. Ra, barium, strontium, and calcium are all elements in the alkaline earth metal family on the periodic table and each will localize in the areas of osteoblastic metastases. <sup>223</sup>Ra is currently the most commonly used radioisotope for medical therapeutics, showing an increased survival in patients with metastatic castration-resistant prostate cancer<sup>2</sup> and has a half-life of 11.4 days.<sup>1</sup> <sup>223</sup>Ra is the first α-emitter approved by the US Food and Drug Administration.<sup>3</sup> In addition, <sup>223</sup>Ra is the first α-particle-based therapy that results in pain relief and extends survival in patients with progressive castration-resistant prostate cancer and bone metastasis in the absence of visceral metastasis. Thus, <sup>223</sup>Ra is naturally incorporated in areas of increased bone turnover in bone metastasis.<sup>4</sup> More than 90% of patients with metastatic resistant prostate cancer have radiologic evidence of bone metastases.<sup>2</sup> <sup>223</sup>Ra dichloride has been evaluated in two phase I trials and three double-blind phase II trials. The phase III ALYSMPA trial showed an improved overall survival of 3.6 months with a side effect profile similar to placebo.<sup>3</sup>

### PQI Process:<sup>1</sup>

- The dose regimen of Xofigo® is 55 kBq (1.49 microcurie) per kg body weight, given at 4-week intervals for 6 injections
  - Xofigo comes as a premeasured, patient ready dose from the manufacturer
    - Calculation formula available in the package insert for reference
  - Safety and efficacy beyond 6 injections with Xofigo have not been studied<sup>1</sup>
  - No adjustment needed for hepatic insufficiency or mild/moderate renal impairment
  - Supplied in single-dose vials containing 6 mL of clear, colorless solution at a concentration of 1,100 kBq/mL (30 microcurie/mL) with a total radioactivity of 6,600 kBq/vial (178 microcurie/vial) at the reference date
  - Store at room temperature, below 40° C (104° F)
- **Administration:**
  - Administer by slow intravenous injection over 1 minute
  - Flush the intravenous access line or cannula with isotonic saline before and after injection
  - Do not dilute or mix with any solutions
  - Discard any unused portion per state and local regulations

### Patient Centered Activities:<sup>1</sup>

- Counsel patients on side effects and to report signs of bleeding or infection
- Educate patients on the importance of monitoring and advise patients to be compliant with all follow up monitoring appointments

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- Inform patients to speak with their healthcare provider about any other medications they are currently taking for prostate cancer
  - Xofigo had increased bone fractures and mortality when used in combination with abiraterone acetate and prednisone/prednisolone
- Advise patients to stay well hydrated and to monitor oral intake, fluid status, and urine output while being treated with Xofigo and instruct patients to report signs of dehydration, hypovolemia, urinary retention, or renal failure/insufficiency
- Inform patients that there are no restrictions regarding personal contact with other people after receiving Xofigo; follow good hygiene practices while receiving Xofigo and for at least 1 week after the last injection in order to minimize radiation exposure from bodily fluids to household members and caregivers
  - Whenever possible, patients should use a toilet and the toilet should be flushed several times with the lid closed after each use
  - Clothing soiled with patient fecal matter or urine should be washed promptly and separately from other clothing
  - Caregivers should use universal precautions for patient care such as gloves and barrier gowns when handling bodily fluids to avoid contamination
- Patient Assistance: [NCODA Financial Assistance Tool](#)

### Supplemental Information:

Xofigo (an  $\alpha$  particle-emitting pharmaceutical) should be received, used and administered ONLY by authorized persons in designated clinical settings. The receipt, storage, use, transfer and disposal of Xofigo are subject to the regulations and/or appropriate licenses of the competent official organization.

### References:

1. [HIGHLIGHTS OF PRESCRIBING INFORMATION \(xofigo-us.com\)](#)
2. [Patient Counseling Support | Xofigo® \(Radium Ra 223 Dichloride\) \(xofigohcp.com\)](#)
3. Dekempeneer Y, Keyaerts M, Krasniqi A, Puttemans J, Muyltermans S, Lahoutte T, D’huyvetter M and Devoogdt N; Targeted alpha therapy using short-lived alpha-particles and the promise of nanobodies as targeting vehicle. *Expert Opin Biol Ther*; 2016 Aug 2; 16(8): 1035-1047.
4. Parker C, Nilsson S, Heinrich D; Alpha emitter radium-223 and survival in metastatic prostate cancer. *N Engl J Med*; 2013; 269(3):213-223.

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