

# Safe use of Ra-223 radium dichloride (223Ra) across a wide-range of clinical scenarios: A 10-year single-institution radiation safety experience.

**Objectives:** 223Ra is an effective therapeutic radiopharmaceutical for the treatment of prostate cancer metastatic to bone. As an institutional participant in the ALSYMPCA trial, and early adopter of Xofigo as a clinical modality, our facility has accrued over 10 years' experience in the regulatory-compliant use of this radiopharmaceutical. Because 223Ra is a pure alpha emitter, there is negligible concern regarding external exposure from injected patients. However, several radiation safety related factors still need to be considered when treating patients with 223Ra. Our presentation will discuss a number of these concerns, based on first-hand experience gained from navigating several specific scenarios and additional information gathered from the medical literature, to provide guidance on the safe usage of 223Ra in the treatment of patients with boney metastases.

**Methods:** Personnel involved in the clinical care and radiation safety oversight of patients treated with 223Ra were canvassed to recall cases with radiation safety concerns. By drawing upon our institution's experience, and reviewing the relevant world-wide literature, we have provided guidance for various scenarios in the radiation-safety compliant treatment of patients with 223Ra.

**Results:** Physical, biological and regulatory aspects of 223Ra form the basis of understanding radiation safety concerns. We describe the potential of internal contamination from patient excreta, body fluids, and tissue samples based on a number of clinical scenarios, and the ensuing exposures that may result. Adherence to Universal Precautions is paramount in avoiding internal contamination. Of particular interest is our first-hand experience with a patient who underwent hip replacement surgery following 223Ra therapy, including the proper handling and storage of radioactive bone fragments. Handling of a deceased patient, and the associated guidelines regarding 223Ra decedents, is a potential outcome that should be familiar to physicians administering 223Ra therapy.

**Conclusion:** While the lack of a gamma emission greatly reduces exposure and radiation concerns when treating patients with therapeutic levels of 223Ra activity, there are still several regulatory and safety concerns that need to be addressed in the course of potential patient scenarios. We will review appropriate solutions to these scenarios in a radiation-safety compliant manner.

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