Biokinetics of Bone-Seeking Radionuclides

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Bone-seeking radionuclides are those that have the skeleton as their primary deposition site in the body. This category includes radionuclides of both historical and contemporary importance, such as ^{226}Ra and ^{239}Pu, that have been well studied in both animals and humans. For operational purposes, bone seekers are described as either bone surface- or bone volume-seekers, although neither classification is an accurate description of the behavior of such radionuclides over time. Their retention in bone can be described by rather simple exponentials in the case of the transuranics or by rather complicated power functions in the case of the alkaline earths. The induction of bone cancer is the primary risk from these radionuclides; although leukemia induction might be anticipated from irradiation of the bone marrow, it has not been observed in humans. Deterministic effects of bone-seekers include bone necrosis, sclerosis, fibrosis, and metabolic effects. There can be little doubt that the dose-response relationships of these radionuclides are the best understood of all internal emitters, and a brief summary of the human experience with these radionuclides is provided.

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