

reasonably independent of species . . . then the toxicity ratios may be assumed tentatively to also apply to man.

$$\frac{(\text{human } ^{90}\text{Sr toxicity, continuous exposure}) \text{ [unknown]}}{(\text{human Ra toxicity, brief exposure}) \text{ [known]}}$$

$$= \frac{(\text{dog } ^{90}\text{Sr toxicity, continuous ingestion}) \text{ [measured]}}{(\text{dog Ra toxicity, brief exposure}) \text{ [measured]}}$$

In this way the radiation protection guide pivot point of 0.1  $\mu\text{g}$  of radium, as measured in man, may then be used as the basis for rational protection guides for other radionuclides in man.

Evans continually came back to the ideas of the pivot point, the use of animal toxicity ratios to determine the radiation protection standards for other bone-seeking internal emitters from the radium standard, and the importance of the several thousands of humans who had acquired internal burdens of radium. These ideas are emphasized in an article in *Health Physics* (Evans 1974), in which Evans also estimated that at least 2,000 dial workers were employed during the high-ingestion period before mouth tipping was discontinued in 1926. Further, he suggested that between 500 and several thousand radium chemists were employed in some 23 refineries and radium laboratories. Finally, he said that the list of those potentially exposed to internal radium must include those who received radium for medical reasons, whether by ingestion or injection; their number Evans estimated at several thousand.

In 1967 Evans, who was looking forward to retirement, was concerned about the continuation of the ongoing studies of radium in man, the most active of which were under his direction at MIT. During the symposium on the Delayed Effects of Bone-Seeking Radionuclides at Sun Valley in 1967, Evans suggested the formation of a National Center for Human Radiobiology to carry on the studies of internal emitters in humans (see the discussion in Evans et al. 1969). Toward this end he subsequently drafted a report titled *Comments on a National Center of Human Radiobiology*, which he submitted to the Division of Biology and Medicine of the AEC in December 1967. Included in that report were the following eight relevant points, on which Evans elaborated:

1. Radiation protection guides that are valid for humans are essential for the nuclear era.