Foreword

The opportunity to study a discrete human population exposed to a potentially toxic agent is rare, and it is rarer still to be able to collect sufficient data on the exposed subjects to reach definitive conclusions about the potency of the toxicant. Such an opportunity emerged when skeletal lesions, including tumors, became associated with workers (luminizers) who painted luminous dials on timepieces, with radioactive radium as the energy source for luminosity. This correlation was observed in the 1920s, when the dial painting industry was centered in the northeastern United States.

The initial medical finding that radium caused the lesions was followed shortly by interest among researchers in the physical sciences in dosimetric measurements of the radium body burdens of the exposed subjects. This interest was stimulated by a turning point in medical history. In the past, the dose of any material was the amount taken into the body through the mouth, a muscle, or a vein. Now, in contrast, it was possible to measure the radium dose in the organ of primary deposition (the skeleton), and this dose could be correlated with the clinically observed skeletal damage.

The concept that radiation should have its own exposure standards grew from early radiobiological effects on humans working with the new radiation energy sources. The first official exposure standard for a radionuclide in the body was established for ^{226}Ra at a level of 0.1 μCi, by a task group assembled by the U.S. National Bureau of Standards in 1941. On the basis of the average radiation dose to the skeleton from deposited radium, a "practical threshold" dose of 10 Gy was established many decades ago by the pioneer of the work contained in this book, Dr. Robley Evans, then at the Massachusetts Institute of Technology. It was Evans who, through appearances before the Atomic Energy Commission and congressional committees, spearheaded the establishment of the Center for Human Radiobiology at Argonne National Laboratory in 1968.

This book is rightly timed. The Internal Emitter Program at Argonne, which was the focal point for data collection and the principal source of information from this type of research over the last 25 years, ended at the direction of the U.S. Department of Energy on September 30, 1993. Much remains to be studied within the medial and dosimetric files on the radium-exposed subjects. The intention is that these files will be proprietarily accessible to scientists who have the means and interest to pursue the unknowns they contain. Many of the luminizers are still alive, in their later decades of life, and are somewhat accessible. At their present age, any