

in 1913 of the journal *Radium* (Figure 1), in which physicians could record the results of the treatment of many diseases through internal or external application of the element. These experiments appeared to be serious investigations of the medical uses of the new material.

The Standard Chemical Company put much effort into its research on the biological effects of internally administered radium. Its research laboratory supported the publication *Radium* until 1921. The director of the laboratory, Dr. Frederick Proescher, treated many patients with radium, in order to identify the conditions responding most readily to radium treatments and the doses required. In an early series of four papers, Proescher (1913, 1914a-c) stated that he had injected 34 individuals with radium and described in detail the results for 16 subjects with arthritis. These 16 individuals received multiple radium injections totaling 70-350  $\mu\text{Ci}$ . Proescher stated that doses up to 1,000  $\mu\text{Ci}$  were tolerated well; he estimated that the lethal dose to a human was 60,000  $\mu\text{Ci}$ .

None of the individuals who received radium in Proescher's studies have been identified. However, another publication from the staff of the Standard Chemical Company, by Seil et al. (1915), did identify Mr. Seil himself as one of the early recipients of radium. The authors of this paper were investigating the rate and routes of radium loss from the body; they published data on two adult subjects. One was a 23-year-old male who received two intravenous injections of 100  $\mu\text{Ci}$  of  $^{226}\text{Ra}$  two months apart, and the other was Seil, who received two 50- $\mu\text{Ci}$  doses of radium by mouth seven days apart. Seil, who was then 33 years old, died at the age of 69; the cause of death was listed as diverticulosis of the colon. Subsequently, after an exhumation, his body content of  $^{226}\text{Ra}$  was determined to be 0.15  $\mu\text{Ci}$ , and his initial systemic intake was calculated as having been 73  $\mu\text{Ci}$ .

The *initial systemic intake* is a measure of the total quantity of radium that entered the systemic circulation. It may be considered equal to the quantity intravenously injected or to about one-fifth of the amount taken orally (Maletskos et al. 1966). The initial systemic intake is calculated from a subsequent measurement of the body content and the time interval between acquisition and the measurement. In a case like Seil's, the recorded intake was assumed to be the only such intake, an assumption that probably was not valid.

Although the producers of radium investigated its medical possibilities, its greatest use and endorsement as a medication came from others (Figure 2). One of these early proponents was a physician, Dr. C. Everett Field, listed for