1,000 cGy. His population consisted of 503 cases below 1,000 cGy, none with tumors and all "epidemiologically suitable," and another 102 cases above 1,000 cGy, only 67 of which (with 19 tumors) were suitable. (The 35 unsuitable cases had 24 tumors.)

Evans (1974) also addressed other studies that had used the radium data to demonstrate that linear nonthreshold dose-response functions could be fitted to the data. His complaint was that none of the authors had tested their alternative models for goodness of fit. He demonstrated his objection by addressing the paper by Gofman and Tamplin (1971). Using the chi-squared test for goodness of fit over the portion of the data they had selected, Evans found a probability of less than 1 in 200,000,000 that differences from Gofman and Tamplin's linear model as large as or larger than those observed could be due to chance. Evans concluded that the linear model of Gofman and Tamplin was thus not supportable.

When the radium cases were transferred to Argonne's CHR, the now enlarged population was used to examine dose-response relations. Three studies were published in the annual reports (Rowland et al. 1970, 1971a, 1971b). The first two were identical studies; the second was undertaken because some changes in assigned dose values had been made in the previous year, and it was thought appropriate to see whether these changes were sufficient to change the results. The third used initial systemic intake for the measure of radium insult, while the first two had used average skeletal dose.

These studies used all of the available cases, a total of 777 cases at that time, for two reasons. First, it was not clear at that time that cases found as a consequence of their symptoms could be readily identified. Second, including all of the cases would probably bias the results in the direction of enlarging the radium risk, which was thought to be an acceptable practice. In the first study, all tumors were considered together, as had been done in the past; however, the sarcomas and carcinomas were also considered separately, because the tumors and their appearance times were quite different. The following three equations were fitted to the data and tested for goodness of fit:

$$\text{Incidence} = KD \tag{3}$$

$$\text{Incidence} = K_1 D e^{-D/D_1} \tag{4}$$

$$\text{Incidence} = K_2 D^2 e^{-D/D_2} \tag{5}$$

Here $K_s$ and $D_s$ are constants to be determined, incidence is expressed as tumors per person for each dose group, and D is the dose. In each case the sarcoma data were best fitted by the $D^2$-exponential function, while the carcinoma data were