unfortunate that so far as I know, no experiment of that kind has yet been made, and we had 150 microgram pills in the marketplace, while England went ahead with 50. We took testimony from an English scientist.

But you are absolutely right, we have not done the kind of controlled studies we ought to do.

Thank you very much for your testimony.

Our next witness is Dr. Marvin Zelen, Statistical Laboratory, SUNYAB, Amherst, N.Y.

STATEMENT OF MARVIN ZELEN, PH. D., PROFESSOR OF STATISTICAL SCIENCE AND DIRECTOR, STATISTICAL LABORATORY, STATE UNIVERSITY OF NEW YORK AT BUFFALO

Dr. ZELEN. Senator Nelson, thank you for this opportunity to appear before this committee. My general comments will be divided into two parts.

The first topic I wish to comment on is how is it that able and respected clinicians can disagree with the interpretation of the UGDP data? The tolbutamide cardiovascular death rate is more than double compared to other treatments. Yet many clinicians who treat adult onset diabetes find it difficult to accept such a figure. For many of them, this elevated cardiovascular death rate does not appear to have been perceived in the clinic.

I would like to examine other factors which may lead to elevated cardiovascular mortality. According to the UGDP data, the cardiovascular death rate for individuals above the age of 53 is approximately five times that of individuals 53 or younger; people with arterial calcification at time of diagnosis have four times the cardiovascular death rate compared to those without arterial calcification; the initial glucose tolerance test, called GTT, as used by the UGDP investigators, shows that those with a GTT above 723, the median value, have double the rate of cardiovascular deaths compared to those who have a GTT below the median; men have a doubled cardiovascular death rate compared to women. Although the numbers quoted are rounded for simplicity, it is clear that in the clinic there are many factors simultaneously influencing cardiovascular deaths. Several of these have greater or equal effect on the cardiovascular death rate compared to the effect of tolbutamide. As a result it would be difficult for a clinician to perceive an elevated cardiovascular death rate associated with tolbutamide. Such an effect would be almost completely obscured by these other important factors. Only if there is careful and structured recordkeeping on a large number of patients would a changed cardiovascular death rate of two to three be detected. The analysis of such multifaceted data requires more sophisticated data analytic methods than those in common usage by clinicians.

Next, I wish to comment on some features of the Biometrics Society report. A criticism of the original UGDP analysis is that it failed to explore the effects of several factors acting simultaneously on the cardiovascular mortality. Our committee did in fact consider this matter very carefully. We found that when one examines the