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In the population of Utirik (158 persons, all ages) followed for 21 years, the accumulated person-years of observation are estimated at 403708 3140. In such a group, expectation of thyroid cancer would be as follows:

- (1) Based on an average for all registries listed in "Cancer Incidence on Five Continents" (2.5/100,000 per year):
.08 cases, upper 95% confidence limit .66
- (2) Based on incidence rates in the Marshal Islands, (1952-1962) (dates), excluding cases in exposed individuals (2.0/100,000 per year):
.06 cases, upper 95% confidence limit .54
- (3) Based on estimates of the risk per rad thyroid dose per year observed in Rongelap and Ailingnae combined (3.9/1,000,000/rad/year, ~~person-years-at-risk-est-3140~~ thyroid dose 50 rads, 157,000 person-rad-years):
.61 cases, upper 95% confidence limit 2.17

Conclusions:

- (1) The occurrence of even 1 case of thyroid cancer in Utirik is unlikely to be due to chance at conventional levels of statistical significance - if the rates do not exceed normal population rates. The occurrence of 2 cases by chance is extremely unlikely.
- (2) The observed number of thyroid cancers is higher than would be expected on the basis of experience in the exposed populations of R and A, but does not exceed the upper 95% confidence limit of the expected value.

Caveats

- (1) In computing expected values, no account has been taken of age and sex differences between populations. The incorporation of adjustments for these factors is unlikely to change the above conclusions.

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- (2) The above calculations have ignored the possibility that some unknown proportion of person-years of observation are irrelevant because of the latent period between exposure and detection of cancer. Subtraction of these person years would increase the difference between observed and expected values derived from non-exposed populations.
- (3) It should be borne in mind that the Marshallese have been more carefully observed for thyroid disease than the general populations from which expected values have been derived.
- (4) It is curious that the Utirik population evidences no increase in benign thyroid lesions relative to the unexposed population of Rongelap.

George B. Hutchison,
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