Comment re: Cancer Incidence Falls for Oldest

To the Editor:

Recently, Harding and colleagues (1) have shown that the cancer incidence rates decrease in old age and may drop to zero near the end of the human life span. The authors added a linearly decreasing factor to the Armitage-Doll multistage model of cancer (2, 3) and obtained a $\beta$ distribution-like model function. By this model, they obtained a good fit for incidence rates of many cancers; however, this work has several drawbacks:

1. Confidence intervals for derived model variables and methods for their determination have not been provided.
2. The proposed model does not provide an appropriate fit for cancers with multimodal incidence rate distributions (such as Hodgkin's Lymphoma, testicular cancer, etc.).
3. The authors used incidence rates for ages starting at 50 years. From the observed data, they derived the upper age limit (say, $B$) of cancer development, assuming that in their model, the lower age limit is $A = 0$. However, one can show that the model variables are very sensitive to variation of $A$ (see below for an example).

By introducing a lower age limit ($A$) in addition to the upper limit ($B$), in the $\beta$ function (4), one can obtain the following:

$$I(T) = aT^{k-1}(1 - bT),$$

where $I(T)$ is the incidence rate, $T = (t - A)$, $b = (B - A)^{-1}$, $t$ is the age in years, $k$ is the number of cancer stages, and $a$ is a combined rate constant; $a$ and $k$ can be used as variables, whereas $A$ and $B$ can be treated as a priori data extracted from observations. The use of a priori information can reduce the number of derived variables and stabilize the solution against variations of input data (5). As an example, consider pancreatic cancer incidence rates in males as reported by the Surveillance Epidemiology and End Results database for the years 1999 to 2003. One can evaluate $A$ and $B$, for which the incidence rates are statistically distinguishable from zero, to be approximately equal to 30 and 100, respectively, and obtain a good fit with $k \approx 4$. By contrast, the authors report a fit of comparable quality with $k \approx 7$, when $A$ is 0 and $B \approx 100$.

We appreciate the importance of the work, but determination of confidence intervals is crucial for the model to be applicable for rigorous statistical analysis.

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Disclosure of Potential Conflicts of Interest
No potential conflicts of interest were disclosed.

References

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