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Response

We are very grateful to Dr Aickin for elaborating on the "realized probability of dying" (RPD), the measure of survival time we proposed for long-term follow-up studies of the elderly [1]. Dr Aickin's effort gives us the opportunity to clarify some aspects of the RPD.

As Dr Aickin states, he intends to "point out some simplifications and generalizations in the RPD's computation". However, these modifications are not applicable to the problem we meant to deal with, and lead to question the RPD as the best general solution in survival analysis. Our specific problem was to develop a measure of survival time which achieves comparability among sample members of very different ages-at-baseline.

We sought a solution to this problem by constructing a measure of relative survival time for each individual sample member, based on a comparison of each individual's actual survival time with the survival curve of the reference population cohort (i.e. all citizens of the same age and sex and alive at the time of the baseline examination). We constructed the population survival curves from age- and sex-specific mortality rates as given by life tables of the successive years subsequent to baseline. Since this external survival reference—and thus the RPD—can be assumed to contain no error, a correction on the variance such as Dr Aickin proposes is not necessary.

The basically continuous follow-up time T, in Dr Aickin's model, is redefined into discrete t_k $(k = 1, \ldots, m)$, which are "entirely arbitrary, and can be different for each subject". This discretization suggests that sample members must be actually tracked at t_k. This is not the case in our approach; the only information needed, in addition to date of baseline examination and date of end-of-follow-up, is vital status at end-of-follow-up and, in case of death, date of death. Life tables are usually based on annual mortality rates. If individual survival times are known—as they usually are—in more detail than number of years, in order to find the power of the last factor of the RPD it suffices to determine the fraction of the year of death during which the individual has survived. Thus, the RPD remains a continuous function of survival time. In the illustration we used, we assumed that survival time was only known in years. This facilitated computation which now was based on the same formula for each decedent. To maintain maximal continuity, we applied partial discretization, limited to the year of death only (cf. Appendix to [1]).

Dr Aicken does not state clearly what mortality rates he has used for his calculation of the survival curve of the 30-year-old Framingham male. We conjecture that he has used mortality rates based on the Framingham sample, as opposed to mortality rates derived from U.S. life tables for the general population from 1948 (Framingham baseline) onward. This use of *internal* as opposed to *external* mortality rates obscures one of the greatest advantages of using the RPD, and explains Dr Aickin's question at the end of his letter pertaining to the advantages of "adjust, then analyze" above "analyze, then adjust". This advantage is the ability to check the study sample for its selectivity with respect to survival time. Calculation of the sample's survival experience based on an external standard such as the general population provides a "calibration" and furthermore improves comparability across survival studies. We would greatly encourage the appropriate application of the RPD to the Framingham sample, so that the extent of the selectivity (or non-selectivity) of this important sample will become known!

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