A CHARTING TOOL FOR ESTIMATING THE PSA DOUBLING TIME IN PATIENTS WITH PROSTATE CANCER

To the Editor: When following men after prostatectomy or the postradiotherapy prostate-specific antigen (PSA) nadir, it is important to rapidly estimate the PSA doubling time (PSAdt), a major predictor of treatment outcomes (1–8).

We have created a chart onto which serial PSA values can be recorded and from which accurate estimates of the PSAdt can be obtained quickly and without a calculator. The key is to plot the posttreatment PSA observations using an in-built logarithm (log) to the base 2 scale. This log chart has valuable advantages over plots relying on the natural scale (nanograms/milliliter). First, it avoids having to actually calculate the \( \text{log} \) of each PSA value—this conversion is taken care of by the log scale. Second, posttreatment PSA series plotted on a log scale yield approximately linear trajectories (piecewise-linear for radiotherapy). Third, PSA data vary less on the log than on the natural scale. As a result of the linearity and reduction in random fluctuations, one can visually fit a straight line to the trajectories (piecewise-linear for radiotherapy). Third, PSA data vary less posttreatment PSA series plotted on a log scale.

Given the considerable PSA variability, all (and not just the two most recent) measurements should be used to obtain a precise PSAdt estimate; they should preferably be spaced in time (at least 3 months), and from the same laboratory using the same assay. Finally, having the lower detection levels at lower concentration, only PSA levels greater than 0.2 ng/mL should be used. Figure 1 shows PSA values on the log scale for a man treated with radiotherapy. These data suggest about four doublings after the nadir (4 vertical units) over the 8 years postnadir (8 horizontal units); therefore, the fitted doubling time is \( \frac{8}{4} = 2 \) years, or approximately 0.5 doublings per year.

For each patient, PSA levels can be recorded as new data accumulate, and estimates of the doubling time revised. This procedure does not require any computing device, and the chart can be kept in the patient file for quick reference.

For convenience, we provide a blank log sheet, which can be used to record individual PSA series and to estimate the PSA doubling time (Fig. 2).

CARINE A. BELLERA, PH.D.
JAMES A. HANLEY, PH.D.
LAWRENCE JOSEPH, PH.D.
Department of Epidemiology and Biostatistics
McGill University
Montreal, Quebec, Canada
PETER C. ALBERTSEN, M.D.
Division of Urology
University of Connecticut Health Center
Farmington, CT

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Fig. 2. Proposed prostate-specific antigen (PSA) recording sheet for estimating PSA doubling time (PSAdt). One major horizontal unit corresponds to 1 year, and 1 major vertical unit represents 1 PSA doubling.