Letter to the Editor

Comment on "Update of AAPM Task Group No. 43 Report: A revised AAPM protocol for brachytherapy dose calculations" [Med. Phys. 31, 633–674 (2004)]

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To the Editor,

This paper by Rivard *et al.*[1] provides updated recommendations to the original AAPM Task Group No. 43[2] (TG-43) for brachytherapy source dosimetry. The updated protocol clarifies many of the definitions and parameters for which there was no sufficient data at the time of the original protocol.

In the updated protocol, the effective length (L_{eff}) of the brachytherapy sources with the radioactivity distributed over a right-cylindrical volume or annulus is defined as the length of the cylinder. However, for the sources containing uniformly spaced multiple radioactive components, the effective active length has been recommended to be calculated using Eq. (5) in TG-43U1, shown as

$$L_{\text{eff}} = N \times \Delta S,$$

where N is defined as the number of discreet pellets contained in the source with a nominal pellet-to-pellet spacing ΔS. This equation has raised two distinct questions.

(1) Is the number of pellets in this equation referring to the number of active pellets alone or the total number of pellets within the source. For example, how can one determine the effective length of a source shown in Fig. 1? This source consists of five 0.5 mm diameter pellets, with center to center distance of 0.82 mm. Only the two end pellets are active. If N represents the number of active pellets, then the spacing between the two active pellets is 3.28 mm and the effective length will be 6.56 mm. Since this is longer than the physical length of the source, the protocol recommends using the maximum separation between proximal and distal aspects of the activity distribution as the active length of the source, which would be 3.78 mm. The assumption of uniform spacing between the pellets is also an issue to be clarified for these calculations. In addition, TG-43U1 does not provide a clear differentiation between the active lengths of the sources shown in Figs. 1 and 2.

(2) The source geometry that is shown in Fig. 3 does not match with either of the two options given in this protocol. Although the activity is distributed on spherical beads, they are not placed with "uniform spacing" as

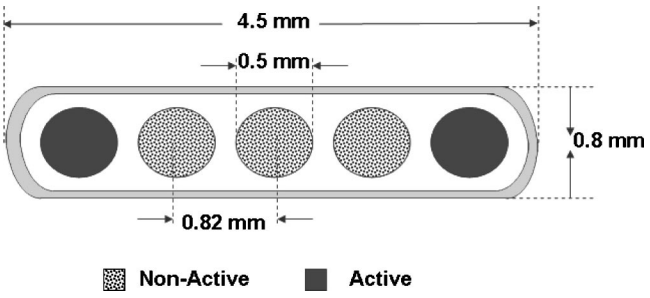

FIG. 1. Schematic diagram of a brachytherapy source containing two active pellets, separated by three non-active pellets, with uniform spacing between the pellets.

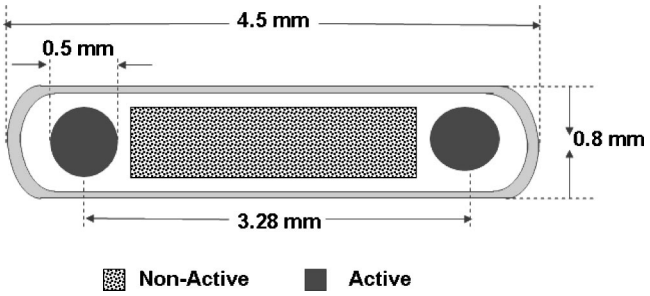

FIG. 2. Schematic diagram of a brachytherapy source containing two active pellets, separated by cylindrical x-ray marker.

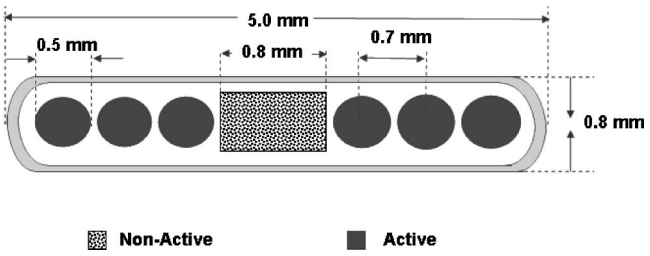

FIG. 3. Schematic diagram of a brachytherapy source containing several active pellets, separated by an x-ray marker.

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defined in this protocol. How should one calculate the active length of such sources?

[1]M. J. Rivard, B. M. Coursey, L. A. DeWerd, W. F. Hanson, M. S. Huq, G. S. Ibbott, M. G. Mitch, R. Nath, and J. F. Williamson, "Update of AAPM Task Group No. 43 Report: A revised AAPM protocol for brachytherapy dose calculations," Med. Phys. **31**, 633–674 (2004).
[2]R. Nath, L. L. Anderson, G. Luxton, K. A. Weaver, J. F. Williamson, and A. S. Meigooni, "Dosimetry of interstitial brachytherapy source: Recommendations of the AAPM Radiation therapy committee task group No. 43," Med. Phys. **22**, 209–234 (1995).

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