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What does TG-51 mean by "clinical %dd (10)"?

The AAPM calibration protocol (commonly referred to as "TG-51") requires as a final step the use of the "clinical %dd (10) for SSD set up" or "clinical TMR (10, 10 x 10) for SAD set up". For electron beams, the protocol asks for the "%dd (d_{ref}) as used clinically". We have received questions from physicists who asked us to help clarify what is meant by "clinical" and how it is distinguished from the measurements made as part of performing the TG-51 calibration.

The TG-51 protocol considers the determination of %dd $(10)_x$ and the "clinical depth dose" to be two entirely different measurements. Often, these measurements will have been made at different times, possibly separated by days, months, or even years.

%dd $(10)_X$ is the depth dose value used only to specify the quality of the x-ray beam. Its purpose is to obtain k_Q; once k_Q has been determined, %dd $(10)_x$ has no further importance. In fact, %dd $(10)_x$ is a little like a measurement of HVL for orthovoltage beams. The HVL was used to determine the beam quality, which defined several parameters including BSF and PDD, which were then used in treatment planning calculations. However, the HVL itself was not used in dosimetry calculations.

On the other hand, the "clinical depth dose" is obtained from the depth dose data that were determined when the beam was commissioned. These are the data that are used in your treatment planning computer, and are used to determined monitor setting (and most likely also are used for performing calculation checks). These clinical depth dose data are ordinarily measured once (at the time of beam commissioning). They then are checked annually, but ordinarily are only repeated if a full recommissioning of the beam is required (following a major repair, for example).

TG-51 requires the use of clinical depth dose data for the following reason:

The final step in calibrating the beam is to refer the calibration measurement performed at 10 cm depth (or at d_{ref} for electron beams) back to the depth of maximum dose, d_{max}. When treatment planning calculations are performed, the dose rate at d_{max} is multiplied by the appropriate clinical depth dose value. These two actions must be consistent for patient treatments to be delivered correctly.

The "clinical depth dose" data may contain some smoothing or averaging, and may include minor variations from year to year, but these are the data that are used to determine patient treatments.

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