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Practical Commissioning of Photon Beam Algorithms

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This session will provide an overview of the process of commissioning a photon beam algorithm. The presentation will begin with a brief discussion of the importance of understanding the particular algorithm you are working with. The ability to test an algorithm in a meaningful way can only be achieved by examining the methods and assumptions used by that algorithm. Other factors to be considered when designing the tests are accelerator characteristics and clinical situations.

The tests will be divided into two categories, system validation and phantom validation. The system validation tests involve confirming that what is displayed, reported, or plotted by the system matches what the algorithm calculated. This must be done prior to comparing calculated results with measured results to ensure that an error is not introduced into the process. Factors that will be discussed include calculation grid effects and dose volume histogram verification.

Once the system has been validated, the accuracy of the algorithm will be tested by comparing calculated dose distributions to a series of measured values. A description of the tests and the tools needed to perform the measurements will be presented. To make valid comparisons it is important to use appropriate dosimeters for the measurements. The measurements also must be made to ensure reproducibility and self-consistency. A brief review of published validation studies and the current work of AAPM task group 67, Benchmark datasets for Photon Beams will be included in this discussion.

Finally, once all of the tests are completed, the information needs to be analyzed from a clinical perspective. This includes a discussion of situations such as surface dose, penumbra, field junctions, tongue and groove effects, etc.

Educational objectives:

1. To understand the process for testing a photon beam algorithm.
2. To understand how the test cases are designed.
3. To understand how to properly select dosimeters for dose measurements.
4. Review of past and current validation studies.