

ICRU Report 62: A Review of the New Supplement to ICRU Report 50

One of the important factors that has contributed to the success of the current 3-D treatment planning process is the standardization of nomenclature published in the International Commission on Radiation Units and Measurements (ICRU) Report 50. This report has given the radiation oncology community a language and a methodology for image-based 3-D planning for defining the volumes of known tumor, suspected microscopic spread, and marginal volumes necessary to account for setup variations and organ and patient motion. However, since publication of Report 50, significant advances in 3-D planning have been made. New conformal irradiation techniques have been introduced and modern imaging procedures provide even more information on the location, shape, and limits of the tumor/target volumes, as well as the organs at risk (OAR). Commercial 3-D treatment planning systems with many advanced features are now widely available. Also, there are some limitations and practical issues when using Report 50 methodology that have spurred vigorous discussions and debates. For these reasons, the ICRU has decided to publish a supplement to Report 50 (ICRU Report 62) to formulate more accurately some of the definitions of concepts and to take into account the consequences of the advances made over the last six years. Perhaps the most criticized limitation of Report 50 is that it does not account for OAR positional uncertainties. In response, Report 62 introduces a new concept, the *Planning Organ at Risk Volume (PRV)*, in which a margin is added to the OAR to account for movements and changes in shape and/or size of the OAR, as well as set-up uncertainties. Thus, the PRV for the OAR is analogous to the PTV for the CTV. Report 50 does not address directly how to combine the different positional uncertainties (e.g., setup margin and internal organ motion margin) that make up the PTV or PRV margins. This is a complicated situation since the margins result from random and systematic uncertainties. Report 62 introduces the concept of the *Internal Margin (IM)* which is defined to account for variations in size, shape, and position of the CTV in relation to anatomical reference points. Report 62 also introduces the concept of the *Set-up Margin (SM)* which is defined to account for uncertainties in patient-beam positioning. Report 62 recognizes that simple linear addition of the two margins to account for each of their independent effects may make the PTV inappropriately large and the problem is discussed in some detail. The selection of an overall margin and delineation of the border of the PTV and PRV involve a compromise that requires the experience and the judgment of the radiation oncology team. Other pertinent issues in defining and reporting volumes for 3-D planning will be discussed.

Educational Objectives:

This presentation will provide a review of the new concepts introduced in ICRU Report 62 including:

1. Internal Margin and Set-up Margin
2. Combining margins
3. Planning Organs at Risk Volumes (PRV)
4. Conformity Index