

Designing dose distributions that minimize the risk of radiation-induced normal tissue toxicity is one of the hardest parts of treatment planning. Commonly, many planners use the tolerance guidelines set forth in the famous 1991 'Emami paper'. A wealth of more recent information exists but is dispersed over many, diverse publications. Therefore, AAPM and ASTRO funded the QUANTEC (Quantitative Analysis of Normal Tissue Effects in the Clinic) effort, wherein over 60 volunteer physicists and radiation oncologists collaborated in an expert review of the literature from the "3DCRT" era. Consensus dosimetric guidelines for 16 normal organs were published in early 2010 (International Journal of Radiation Oncology, Biology and Physics V76, #3S supplement). For some complications, the QUANTEC recommendations are in general concordance with the Emami guidelines but for others there are notable differences and the mathematical models of normal tissue complication risk built accordingly reveal wide variations among the different studies. The reasons for these differences and what needs to be done to reconcile them with previous and future clinical practice will be discussed for selected disease sites and organs.

Course outline:

1. **A user's guide to QUANTEC:** All the organ-complication articles have the same format and address the same topics: *clinical significance, complication endpoints, organ volume definition, literature review, non-dosimetric risk factors, mathematical/biological models, special situations, recommended dose-volume limits, future studies*. The difficulties QUANTEC encountered relative to each section are instructive, as they indicate problems in the way outcomes are reported in the literature. These will be described to aid in understanding the limitations of the QuanteC reviews and to improve the state of knowledge going forward. [Presenter: Andrew Jackson, MSKCC]

2. **What's new since Emami:** For some major dose-limiting complications, the QUANTEC and 'Emami' guidelines differ substantially – for others there is general concordance. Examples of each sort will be presented along with suggestions as to clinical application. [Presenter: Larry Marks, MD, UNC]

Educational Objectives:

1. Understand the broad goals and methods of the QUANTEC review.
2. Identify several organs where the dose/volume outcome data presented by QUANTEC is 'significantly' different from what was presented by Emami in 1991.
3. Broadly understand the shortcomings of the QUANTEC review and methods and opportunities for acquiring additional and improved information.