Inverse planning in intensity-modulated radiotherapy (IMRT) drastically changes our thinking process in treatment planning because of using computer optimization. Unlike conventional forward planning, which highly depends on the geometric relationship between the tumor and the surrounding normal tissues, inverse planning critically depends on the specification of dose constraints to the target tumor and sensitive structures. For a particular inverse planning system, one has to have a good understanding of the inverse planning system and a good intuition about the relationship between the dose constraints and the resulting dose distributions. This review course session will focus on fundamental issues in IMRT treatment planning. We will try to answer the following questions: What are the basic components of commercial IMRT treatment planning systems, and how do they work? What is typical behavior of an IMRT system? How can the user systematically search for a proper dose constraint for a specific disease site? How does the planner know when to quit trying to improve the plan? Lastly, to what extent and how can the typical problems with generated plans be ameliorated? Issues specific to head and neck and prostate IMRT treatment planning will be discussed.

Educational Objectives:

(1) To understand the basic components of commercial IMRT treatment planning systems;
(2) To obtain a good intuition about the relationship between the dose constraints and the resulting dose distributions;
(3) To understand methods for developing class solutions for specific disease sites to streamline the planning process;
(4) To understand special clinical issues related to IMRT treatment planning.

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