

AbstractID: 2606 Title: IMRT of the Central Nervous System

Most of the clinical work with intensity modulated radiation therapy (IMRT) has focused on its use for the treatment of patients with prostate or head/neck cancers. However, IMRT for the central nervous system (CNS) is becoming more commonplace in the radiation oncology community. There are two general situations that the treatment of CNS disease may benefit from the use of IMRT compared to conventional, three-dimensional conformal radiation therapy: 1) since multiple critical structures are confined within the intracranial vault, one may reason that optimization of the dose distributions should allow the dose to these structures to be minimized, and 2) since high-grade gliomas tend to recur locally, IMRT should allow for dose escalation proportional to the corresponding heterogeneous cell populations. Based on the anatomic location of the treatment volumes, one can visualize examples where IMRT could be of benefit. Patients with a concave or irregularly-shaped target in a frontal lobe may require IMRT in order to spare the adjacent globe and any uninvolved optic apparatus. In patients with well-lateralized tumors involving the brain parenchyma, complete sparing of the contralateral hemisphere is desirable. Patients with infiltrative gliomas traditionally have large margins placed around the treatment volumes, and these may often encompass uninvolved critical normal structures. In these cases, IMRT allows non-uniform reduction of the treatment volume around these structures. The goals of this presentation are to provide an overview of the practice of IMRT for the CNS, to review the corresponding published data, and to discuss future directions of exploration for CNS IMRT.

Though much attention has been given to the inverse planning and quality assurance aspects of IMRT, one should have an adequate understanding of the entire process; from proper patient selection to positioning/immobilization and continuing through the actual radiation treatments. A discussion of the steps to the CNS IMRT process will include: patient selection, immobilization, recommended imaging acquisitions, structure delineation, planning strategies/parameters, dose objectives, plan evaluation, QA, and potential delivery issues. Guidelines and practical examples for each component of this process will be presented.

To gain further familiarization of CNS IMRT, a review of published data is recommended. The focus of the review should examine both technological and clinical outcome data. Comparisons to conventional radiotherapy methods will be examined in terms of technique, dosimetry and clinical outcome. Finally, current research and future directions of CNS IMRT will be introduced such as the novel use of sophisticated imaging techniques for improved structure definition and dose modulation.

Educational Objectives:

1. To understand the general practice of CNS IMRT from patient selection through actual treatment.
2. To become familiar with specific details pertaining to the CNS IMRT process through several illustrative examples.
3. To be introduced to some of the research and future directions of CNS IMRT.

Research supported, in part, by Varian Medical Systems.