

FAST FIT

Fractionated Accelerator-Based Stereotactic Teletherapy

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Purpose: Interstitial implantation of brain tumors and Stereotactic Radiosurgery both aim to “focus” radiation more effectively on the target. Brachytherapy significantly improves survival, but the implantation procedure may contribute to tumor dissemination within the CNS. Stereotactic Radiosurgery allows the treatment of small volumes, but suffers from the use of large fraction size which is contrary to well-established radiobiologic principles. We felt compelled to develop a system which precisely concentrates dose at the tumor site using external beam irradiation and standard fractionation.

Materials and Methods: The **F**acial **I**mmobilization **T**emplate (FIT) employs a widely available thermoplastic mask which is anchored to a fixed, rigid Plexiglas arch. The arch was specifically designed to fit within the confines of the MRI head coil. Beyond improving immobilization the arch enhances geographic accuracy by integrating with the laser array to define a “point of origin” at magnet center. This represents an important refinement, because the tumor is thus defined in reference to magnet center where spatial resolution is optimal, rather than in reference to point on the external surface of the mask where distortion becomes significant.

MRI was selected as the imaging modality of choice due to its superior delineation of tumor borders. 3-Dimensional treatment planning is essential, as are precise dosimetry of small fields, exacting quality assurance of the laser arrays, and accurate accelerator rotation around isocenter.

Results: This system allows use of small field sizes and generates cumulative isodose curves similar to implantation. It offers significant reductions in the volume of normal tissue exposed above tolerance while providing enhanced flexibility in precise dose delivery to the tumor periphery.

Conclusion: FAST FIT employs linear accelerators and standard fractionation, and therefore represents not a departure from routine therapy, but an enhancement of it. One by-product of the emphasis on precision is significant potential volume-sparing of normal tissue which translates into an immediate reduction in complications.

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