

Medical Physics Seminar

Monday, September 12th, 2016

1345 HSLC ~ 4:00 P.M.



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Advancements in electronic brachytherapy dosimetry for the treatment of cervical cancer

This work proposes and implements a modified brachytherapy dosimetry formalism for use with electronic brachytherapy sources, specifically the Xoft Axxent model S700 source. The formalism allows for NIST traceability and permits the presence of gynecological applicators to be included in patient dose calculations. This investigation involved extensive measurements using novel phantoms and measurement techniques, and Monte Carlo-based simulations using multiple Monte Carlo codes. The modified dosimetry parameters for the Xoft Axxent electronic brachytherapy source in both the presence and absence of a titanium cervical applicator have been developed and benchmarked for future clinical use. A retrospective study is also included to quantify the impact of the applicator on patient dose calculations.

Design of a modulated orthovoltage stereotactic radiosurgery system

In order to achieve dose distributions approaching rectangular functions with a stereotactic radiosurgery system (SRS) platform, an energy fluence modulated, cone-based, orthovoltage system has been designed using mathematical optimization techniques as well as Monte Carlo simulations. Monte Carlo simulations of dose distributions in water were completed of four cone sizes at three depths. For each depth and cone size combination examined, the beam flatness and penumbra were calculated for both standard, open cone-collimated beams as well as for the optimized, filtered beams. For all configurations tested, the modulated beams were able to achieve improved penumbra widths and flatness statistics at depth, therefore providing the mathematical foundation for a novel, orthovoltage energy fluence-modulated SRS system.



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1345 Health Sciences Learning Center (HSLC) 4:00 - 5:00 P.M.