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New Inverse Planning Tool to Improve Conformal Dosing of Superficial Sites via Combined Energy and Intensity Modulation of Megavoltage Electron Beams

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Abstract:

The use of megavoltage electron beams poses a clinical challenge when 1) the target volume is anterior to radiosensitive structures and 2) the physician must prescribe to a point beyond the depth of peak dose for a single electron energy. The resulting dose heterogeneities heighten the potential for normal tissue damage, especially in large fields. Solving these problems, whether with Bolus Electron Conformal Therapy (BECT) or Monte Carlo-based inverse planning coupled with eMLC has led to vendor-specific software and hardware innovation, not all available commercially at this time. Our solution is an inverse planning tool (e.IMRT Calculator™) that *is* treatment planning system independent and extends the capability of existing 3-D treatment planning systems to deliver conformal electron radiotherapy. The algorithm accepts Excel-formatted files for importation of scanned data from each electron energy. Reduction of dose heterogeneities is accomplished through a unique inverse planning algorithm that combines the techniques of intensity modulated electron therapy (IMET) with simplified-BECT as it is practiced generally. The e.IMRT Calculator™ creates electron dose distributions with user-specified homogeneity, peak dose, and range utilizing existing equipment. Research supported in part by Standard Imaging, Inc. FDA 510(k) premarket notification is pending.