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Dosimetric Characteristics of Very High Energy Electron Beams for Radiation Therapy: Monte Carlo Simulation MOHAMMAD REZAEE, JOHN WONG, Johns Hopkins University School of Medicine — Very high energy electrons (VHEEs) is one of the promising modalities proposed for next generation of medical accelerators. Here, we study dosimetric properties of these electron beams using Geant4 Monte Carlo simulation. VHEE beams were simulated at the mean energies of 50-100MeV with 15% deviation. A water phantom was irradiated with single and pair orthogonal fields using square planar beams at different SSDs. Calculation was performed with grid spacing resolution of 1mm for 10^7 particles. Our results show that VHEE beams can deliver adequate dose to both shallow and deep-seated targets with acceptable lateral dose spread. Increase in penumbra at SSDs up to 50cm is small, while it is considerable at 100cm SSD. Beam obliquity effects are negligible for VHEE beams. At 100MeV, the majority of bremsstrahlung photons (83%) has energies less than 6MeV. This alleviates concern for room shielding. Dosimetry properties of VHEE beams suggest similar dose coverage of both shallow and deep-seated targets with fewer orthogonal beams and lower dose to normal tissue compared to photon beams. The limited range of the electron dose deposition reduces the need of surrounding-beam orientations and entices consideration of alternate delivery arrangements.

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