## A Comparison of general MCNP and EGS4/DOSXYZ Monte Carlo Codes on 2D and 3D-dose calculation of monoenergetic photon and electron beams.

The purpose of this study was to investigate and compare the application of two Monte Carlo codes, a modified version of MCNP and DOSXYZ, a general-purpose EGS4 user code. The codes were used to calculate and analyze the 3D-dose distribution from monoenergetic photon and electron beams. Simulations were performed for a point source beam incident on the front of a homogeneous medium with rectangular collimators. For the same beam geometry and physics parameters, both codes were used to score the energy deposition within user-defined 2D and 3D voxel regions. The calculated dose distributions compared very well between the codes. However, in all calculations, the EGS4/DOSXYZ required shorter computation time. For a 20 MeV monoenergetic electron beam and a 6x6cm-field size the DOSXYZ simulation is approximately 58% faster than MCNP. Much of the difference in simulation time can be attributed to algorithm differences in the uncertainty calculation for each voxel. DOSXYZ uses a batch method while MCNP calculates the standard error based upon a "on the fly" estimation technique. Implications for 3-D, Monte Carlo based treatment planning are discussed.