

## Photon Dose Calculations with Kernel Scaling Accounting for Electron Transport

Most clinical photon dose computations ignore the electron transport perturbations arising at the vicinity of a low density or high atomic number medium. To correct for such heterogeneities, the electron density scaling approach has been modified to incorporate the effect of a change in both stopping and scattering properties of the material. This modified scaling was applied to the energy deposition kernel in a convolution dose model and calculated dose distributions were compared to the corresponding Monte Carlo generated data. The convolution dose predictions including both the stopping and scattering properties of the medium are shown to give better agreement with the Monte Carlo simulation data than the ones obtained with the simple electron density scaling for the high atomic number heterogeneity. There is only a minor improvement with the proposed scaling over the electron density scaling when a low density slab with an atomic number close to that of water was tested. The method is still applicable for media containing heterogeneities of different electron densities and/or different atomic numbers. The proposed scaling method is simple to apply since only a mean energy value was used to obtain the stopping power and the scattering power to scale the convolution kernel.