Backscatter Factors for 0.3 to 18 MeV Electron Beams from Linear Accelerators.

For electron beam therapy, dose enhancement from backscattered electrons at the interface of tissue and high atomic number materials such as lead, is a very important consideration. This dose increase can be properly taken into account if intensity and range of the backscattered electrons are known. We measured back scatter factors (BSFs) for lead from 0.3 to 18 MeV mean electron energies. A Capintec parallel plate chamber, polystyrene plates, and commercially available lead sheets in conjunction with electron beams from a Varian Clinac 2500 linear accelerator were used. Measurements were done at 100 cm SSD and constant source to detector distance. The BSFs were determined as a function of applicator size, lead thickness and energy. We found that backscatter remaines constant for applicators ranging from 4x4 to 20x20 cm^2. The saturation lead thickness for maximum backscatter increases linearly with beam energy, in agreement with the published results of Klevenhagen et al. As the electron energy is decreased, the BSF increases, reaching a peak at about 3 MeV. Below 3 MeV the BSF decreases, and levels off at about 0.28 MeV. Below 0.28 MeV the BSF seems to remain constant. Work is in progress to investigate the low energy regions in more detail, and to find an explanation for the observed behavior.