Brachytherapy source capsules and intravascular stints routinely are routinely constructed of material with atomic numbers (Z) $\geq$ 20. We have shown that a 20X forward dose perturbation factor (FDPF) in tissue near the interface of high Z materials irradiated with kilovoltage X-rays. A FDPF > unity is due to secondary electrons and its magnitude is strongly dependent on the scatterer's atomic number and source energy. We have also shown associated RBEs to be cell type dependent.

Cs-137, Ir-192 and I-125 sources were used to irradiate 0.1-0.5mm scatterers of aluminum (Z=13), titanium (Z=22), copper (Z=27), zinc (Z=50), tantalum (Z =73) and lead (Z=82). FDPFs were measured at 0 -1mm depths in tissue equivalent (TE) material with a 5 μm window parallel plate ion chamber. FDPFs increased rapidly with increasing Z and decreasing photon energy. Ir-192 photons incident on 0.1 mm Pb produced a FDPF > 4.0 at the metal-tissue interface and decreased with Z to unity for 0.1mm Al. The FDPFs (corrected for photon attenuation) also decreased with scatterer thickness. The ranges of the scattered electrons, determined from depth measurements in TE material, produced a maximum of 0.7 mm (electron energy ~300 keV) for Cs-137. We therefore conclude that the dose to the yet-to-be-determined biological target varies rapidly with photon energy, material for both stint and source encapsulation, material thickness, and tissue depth.