AbstractID: 1188 Title: Theoretical calculation and measurement of the attenuation in lead and steel for the primary and scattered radiation of a high dose rate source (iridium 192) in a treatment suite.

Knowledge of the attenuation in lead and steel of the radiation emitted by an iridium 192 source is necessary to adequately block the radiation for a treatment suite. If a maze is present, scattered radiation has to be taken into account. The recommended values for the half value layer (HVL) and the tenth value layer (TVL) for an iridium 192 source are easily found in the literature. However, the corresponding values of HVL and TVL for the scattered radiation needed for door shielding are practically non-existent. In this study, a theoretical calculation of the attenuation through lead and steel for both the primary radiation and the radiation scattered into the maze was developed and is suitable for any planned treatment suite as long as the dimensions of the room are known. The scattered radiation is calculated using the Compton probability of a photon to be scattered by the concrete wall, reaching the detector. Values of the HVL, the first TVL and the second TVL are measured and estimated. For the primary radiation, the maximum difference between the calculated and the measured values is 1.1 mm for the second TVL in lead. For the scattered radiation, the maximum difference between calculated and measured values is 4.2 mm for the second TVL in steel. The influence of the source and detector positions on the measurements is discussed and can be predicted by the model.