Comparation the lead nano-shield with the common lead shield for 6 MeV electron beam

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**Background**: Electron therapy is used in the treatment of carcinoma and lymphoma of the eye and eyelid and periocular, skin, nose, ears and mycosis, as well as radiation to the chest wall in breast cancer, boost dose to lymph nodes and head and neck tumors. The eyelids contain many tissue elements that can be the source of benign or malignant tumors. Up to 10% of all skin cancers are seen around the eyes. Lead shields are used to protect healthy tissues around the treatment area. Internal shields are used to protect healthy tissues beyond the target volume. Since traditional preservatives are costly, heavy and toxic to the environment; the researchers developed tungsten, nickel, carbon and nano-alloys or micro composites based on oxides with a high atomic number.

**Aim of the study**: The effect of lead nano-shield compared to lead shield was investigated for 6 MeV electron beam.

**Materials and Methodst: The** head linac of Variane 2100CD for 6 MeV electron beam was modeled by MCNPX 2.6.0.noramal lead shield whit dimensions 2.5 x 2 x 1 $cm^{3}$ and lead nano-shields with three scale 20, 50, 100 nm lead filler, with same dimensions and a lead nano- shields with dimensions 5 x 7 x 2 $cm^{3}$ and diameter of 100 nm lead filler with the same mass as a normal lead shield at a depth of 0.5 cm was considered. PDD curves and dose profiles were obtained.

**Results:** The results showed thatpb particles in different sizes did not have a significant effect, but lead nano- shields with the same mass as a normal lead shield has a dose reduction of at least 0.295% and at most 53.07% at a depth of 1.05 cm to 3.65 cm nearly in curve falloff. The PDD diagram of a lead nano-shield is similar to an unprotected PDD electron beam, meaning that no electron backscatter is generated.

**Conclusions:**It can be concluded that the lead nano-shield has no effect on the protection of tissues after the shield compared with common lead, but it is effective to reduce the backscattered electrons.

***Keywords: radiotherapy, electron beam, MCNPX, Nano-shield, eyelid cancer***

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