## V85 Production of photon blocks and electron apertures for TBI treatment using a 3D printer

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**Introduction**
Due to the increasing application of intensity modulating techniques there is nearly no need for the production of photon blocks. However, for special applications they are still useful. Lung shields to avoid pneumonitis after total body irradiation (TBI) are rather common. We demonstrate the production of photon blocks and electron apertures for TBI using a commercial 3D printer.

**Materials & Methods**
The configuration of the blocks is performed using the treatment planning system Oncentra [1]. The RT plan DICOM file is exported to an in-house developed Matlab® program. This generates a 3D-model of the blocks under consideration of geometric parameters. The molds for electron aperture cut-outs are calculated as complementary shapes of the photon blocks. The surface file from the Matlab program is imported in the PrusaSlicer software which creates a gcode file for the printer type Prusa i3MK3S. We chose standard printing materials as PLA and PETG. The moulds were filled with MCP96.

**Results**
The geometric shape of the molds for blocks and apertures corresponds precisely to the requirements. Both materials PLA and PETG showed sufficient heat resistance when filled with molten MCP96 without visible deformation. The required height of photon blocks is achieved by printing the mold in the specified height.

**Discussion and Conclusion**
The material of the actual medical product – the blocks and apertures – is unchanged compared to the former production process with polystyrene foam (PS) cutting devices. The blocks can be handled in the accustomed manner. However, the 3D printing process takes more time than cutting a mold of PS foam. This must be considered in the treatment preparation.

**References**
[1] Hartl PM, Treutwein M, Hautmann MG, Marz M, Pohl F, Kolbl O, Dobler B. Total body irradiation-an attachment free sweeping beam technique. Radiat Oncol. 2016;11:81. doi:10.1186/s13014-016-0658-y.