Purpose:
Total Body Irradiation (TBI) treatment with photon beams has been accepted as an important radiotherapy treatment for a variety of malignant diseases. Usually lung blocks are used to minimize the lung dose and prevent radiation-induced pneumonitis. The purpose of this paper is to estimate the mid-plane lung doses under block during TBI treatments.

Methods:
The accuracy of the dose calculations under a block from a commercial planning system was first studied. The central axis depth doses under a block were measured using a parallel plate chamber in homogeneous solid water phantom at 100SSD for both 6MV and 18MV beams. A 7.5cm thick, 15x15cm2 cerrobend block positioned on the central axis was used to attenuate the beam with a setting of 30x30cm2. The measurements were compared with calculations generated with the Pinnacle treatment planning system. In addition, measurements were performed in a heterogeneous phantom positioned in a TBI geometry. The phantom consisted of two 4cm solid water slabs sandwiched 16cm foam slabs simulating lung tissues. A parallel plate chamber, garfchromic films and optically stimulated luminescent (OSL) dosimeters were used to measure depth doses for both 6MV and 18MV beams. These data were used to model the mid-plane lung doses under the blocks.

Results:
The depth dose curves calculated by Pinnacle showed significant deviations from measurements. An estimate of the mid-plane doses was calculated by taking the average of measured doses at depth of 2cm and 24cm for 6MV, 4cm and 24cm for 18MV. Our estimated value for the mid-plane doses within ±7% of measurement.

Conclusions:
We have observed that the Pinnacle cannot accurately model the dose in the build-up region under a central block. A method to estimate the mid-plane lung dose under a block was proposed. More measurements and Monte Carlo simulations are proceeding to investigate the robustness of this method.