AbstractID: 7684 Title: Measurement of surface dose increase through styrofoam and/or memory foam patient support systems.

Purpose: To investigate the increase of surface dose due to partial loss of build up after the radiation beam passes through Styrofoam and/or Tempur-Med® memory foam mattress.

Methods: Depth dose measurements were performed in water in the build-up region a) under Styrofoam blocks of varying thicknesses placed on the surface, b) under regions of different densities of the mattress with varying gaps between the surface and the mattress with 6 and 16 MV beams. Surface dose measurements with 6 MV beams were performed with GafChromics film strips and TLDs in a solid water body phantom imitating a prone breast setup, and on 20 consented patients undergoing prone breast treatments.

Results: The depth dose measurements under Styrofoam showed that the build-up region of the depth dose curve was shifted towards the surface by 0.03*thickness of the Styrofoam in cm, where 0.03 represents the density of Styrofoam. The phantom measurements, imitating the treatment conditions showed about a twofold increase of the surface dose when a beam traversed through the mattress and/or the Styrofoam relative to that of air. The superficial depth dose under the mattress showed strong field size dependence, and the buildup loss was almost complete with zero gap, and still significant even with a 5 cm gap. The 16 MV beam, still showed relevant, although diminished surface sparing, and the depth of the maximum dose moved closer to the surface.

Conclusion: Dosimetric analyses (both clinical and phantom measurements) showed an approximately twofold increase when using Styrofoam or Tempur-Med platform. Despite their low density, the long path through the mattress and/or Styrofoam can be equivalent to 0.6 to 1.2 cm of water. The use of 16 MV, however, can provide the necessary skin sparing, and the approximate superficial dose of the 6 MV beam.