

AbstractID: 3129 Title: An Experimental Comparison of Whole-body Photon Doses for IMRT and 3D-CRT

**Purpose:**

IMRT is a viable form of radiation treatment. As a new technology, however, IMRT techniques present many new challenges. The change from 3D-CRT to IMRT, for example, may result in an increase in second malignancies due to more fields and longer exposure times. Although NCI and others have identified this potential problem, there has been limited guidance. The goal of this study is to establish a method for comparing in-phantom measurement of whole body doses resulting from typical 3D CRT and IMRT treatment plans.

**Method and Materials:**

The measurements involved a RANDO phantom and MOSFET dosimeters. Three different treatment plans, 4-field 3D-CRT, 6-field 3D-CRT and 7-field IMRT for the prostate, were used for this study. The steps to re-construct organ doses using a physical phantom and MOSFET dosimeters are summarized in the supporting material.

**Results:**

The dosimeter readings show that the doses decrease as the distances increase for all treatment plans. At 40 cm from the target, the doses are reduced nearly 100%. At this location, however, the IMRT plan resulted in a dose that is a factor of 3-5 higher than the two 3D-CRT plans. This is due to the increased scattered radiation from the extended exposure time for IMRT case. The total monitor unit (MU) is 2850 for the IMRT case, while 1308 and 1260 for 6-field and 4-field 3D-CRT cases, respectively.

**Conclusion:** A method has been developed and tested to use MOSFET dosimeters to measure and compare whole-body doses resulting from IMRT and 3D CRT treatment plans. The case study for prostate shows that the IMRT indeed delivers higher photon doses to locations that are away from the prostate target. On-going studies will use a whole-body VIP-Man model containing 80 segmented organs and Monte Carlo method to simulate various treatment plans for photons and protons.