

AbstractID: 1267 Title: Anthropomorphic phantoms for quality assurance in radiation therapy

Modern conformal treatment planning and delivery, using techniques such as 3D-CRT and IMRT, requires imaging of the patient, delineation of target volumes and organs at risk (OAR), calculation of dose distributions and QA procedures before the treatment is delivered as planned. Each step is vulnerable to errors.

To evaluate an institution's ability to deliver the planned dose to patients, 4 anthropomorphic QA phantoms have been constructed by the Radiological Physics Center. The phantoms simulate the head, head and neck, prostate and lung, and enable verification of SRS and IMRT.

The phantoms contain imageable targets and several include OARs with densities similar to normal tissue densities. They provide realistic geometries for dose constraints used in treatment planning. TLD and radiochromic film dosimeters are used to determine absolute dose and dose distribution, respectively.

Several modifications to the original designs are being pursued:

- incorporation of a polymer gel dosimetry insert for 3-D dose distribution analysis
- incorporation of a hip prosthesis to evaluate the dose distribution in the IMRT prostate phantom
- change in the target position to analyze heterogeneity correction algorithms within the lung phantom
- development of a reciprocating table to simulate breathing cycles for the lung phantom
- construction of a liver phantom with multiple targets and OARs

The phantoms are powerful tools for QA and verification of IMRT and 3D-CRT techniques.

This investigation was supported by PHS grant CA10953 and CA81647-1 awarded by the NCI, DHHS.