

CALCULATION OF PORTAL DOSE DISTRIBUTIONS FOR VERIFICATION IN RADIOTHERAPY

M. Fix¹, M. Sabel¹, H. Keller¹, E. Born², D. Vetterli², R. Mini², P. Ruegsegger¹

¹Institute for Biomedical Engineering and Medical Informatics, ETH Zurich, Switzerland

²Division of Med. Radiation Physics, Clinic of Radio-Oncology, Inselspital-University of Berne, Switzerland

A promising approach of dosimetric quality assurance is to compare measured with calculated portal dose distributions. In this work the feasibility of commercial treatment planning systems (Varian CadPlan, Helax TMS) for calculating portal dose distributions of a 6 MV photon beam was investigated.

For this purpose six phantoms were implemented in the planning systems. The portal imaging device PortalVision was considered as a homogeneous water slab. All portal dose distributions were calculated in 1 cm water depth of the portal imaging phantom. These distributions were compared with measured ones obtained from the PortalVision system and from films.

The range of relative deviations of calculated profiles in the central region of the beam in comparison with those obtained from films was (for all phantoms) 0-4% (CadPlan), 1-10% (TMS) and 0-1.5% (PortalVision). Profile shapes of PortalVision and TMS were rather consistent with those from film whereas the roundness of the Cadplan profiles behind absorbers led to appreciable deviations.

In summary, the calculation of portal dose distributions shows appreciable inaccuracies due to the air gap between the phantom and the portal imaging plane. Therefore, calculation algorithms have to be improved before using the planning systems for accurate portal dose calculations.