## Whole-Body Equivalent Dose Estimates in Tomotherapy

Tomotherapy (the Peacock System <sup>®</sup>) has been introduced in our department (first patient June 1995) for treatment of the head and neck region to reduce complications without compromizing treatment outcome. This technique requires an increase in monitor units per target dose yielding an increased risk of inducing secondary malignancies. In vivo measurements of the whole-body equivalent dose have been performed for both the conventional (using parallel opposed wedged treatment fields) and tomotherapy for head and neck lesions with 6MV photon beams. Thermoluminescent badges and neutron bubble detectors have been applied to obtain the estimated whole-body equivalent dose (WBED) for each treatment technique. The nominal probability coefficient for a lifetime risk of excess fatal cancer (ICRP60) has been used for risk estimates. An estimated WBED per monitor unit equal to  $1.2 \times 10^{-2}$  mSv/MU and  $1.6 \times 10^{-2}$  mSv/MU have been obtained with conventional therapy and tomotherapy respectively. Applying the average amount of MU necessary to realize a 70Gy target dose the estimated WBED becomes 242mSv (conventional) and 1969mSv (tomotherapy), yielding an increase in probability coefficients for secondary malignancies with a factor 8 when applying tomotherapy. The results will be discussed against similar reports from literature. The risk of secondary malignancies has been accepted to take advantage of the possible benefits of improved local control and treatment outcome. Introducing sophisticated treatment techniques will change the risk of radiation induced malignancies and risk estimates become important to assess whether the benefits of the treatment technique outweigh the possible risks.