Personal dosimetry of staff involved with I-131 therapeutic procedures.

SE Jansen, H du Raan, CP Herbst and MG Lötter

Medical Physics Department, University of the Free State, Bloemfontein, South Africa

Body of Abstract: Introduction: Therapeutic doses of I-131 liquid (370 MBq) and I-131 MIBG (3700 MBq) are frequently used in the treatment of patients with hyperthyroidism and neuroblastomas respectively. An increase in the number of patients treated for hyperthyroidism has also been experienced. I-131 is volatile and can be inhaled and accumulate in the thyroid of the persons responsible for the dispensing and administration of the doses. Personnel involved in these treatments may receive high radiation doses.

Aim: The aim of this study was to assess the radiation doses to the personnel involved with I-131 therapeutic procedures.

Methods and materials: The uptake of I-131 in the thyroid of the physicists responsible for dispensing, and medical doctors for administration of liquid I-131 for ablative therapies, was determined with a whole body counter. The doses received on the hands and whole body of the physicist dispensing the I-131 MIBG and the dedicated nurse doing duty during administration of the radionuclide to a patient with neuroblastoma, were monitored using calibrated lithium fluoride TLD (thermo luminescent dosimetry) discs. An additional single measurement of the dedicated nurse’s whole body dose was also determined with a direct reading pocket dosimeter, for the period during which the patient’s blood pressure had to be monitored regularly (± 4 hours).

Results: The mean dose measured for I-131 accumulated in the thyroid was 618 Bq. The annual limit on intake through inhalation of I-131 is 2 MBq (ICRP Publication 30 – Limits for Intakes of Radionuclides by Workers). The doses received by the physicist during preparation and dispensing of the I-131 MIBG were 1.5 mSv (right hand), 1.0 mSv (left hand) and 0.02 mSv (whole body). The dedicated nurse received 0.5 mSv (right hand), 0.2 mSv (whole body, outside lead apron) and 0.03 mSv (whole body, underneath lead apron). The whole body dose received by the nurse, as measured with the pocket dosimeter, was 0.125 mSv (annual limit 20 mSv)

Conclusion: The radiation risk to personnel seems to be very low. It is however important to adhere to strict safety regulations during the performance of the mentioned therapeutic procedures. Routine and regular monitoring of personnel involved should be instituted.