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CANCER

Safe ^{131}I treatment for children with advanced DTC

The radioiodine (^{131}I) activities that are as high as safely administrable (AHASA) for the treatment of children with advanced differentiated thyroid cancer (DTC) are twice as high as those previously estimated, Verburg *et al.* report.

Advanced DTC in children and adolescents is treated by surgery and ^{131}I therapy, but the AHASA of ^{131}I therapy in children with this disease is not known.

"We wanted to know what we could theoretically give these children without inducing dangerous radiation exposure levels for the bone marrow. As we had data from extensive post-therapy measurements in Belarusian children with DTC after the nuclear reactor accident at Chernobyl treated at our center from 1995 to 2007, we thought we would try and derive such safety data," explains study researcher Frederik A. Verburg of the University of Würzburg.

Data on the ^{131}I treatment on 180 individuals of <20 years of age with advanced DTC were analyzed, which included 133 courses of ^{131}I thyroid remnant ablation, performed with a median ^{131}I activity of 51.8 MBq per kg of body weight, and 250 courses of subsequent ^{131}I therapy, performed with a median ^{131}I activity of 98.0 MBq/kg. Levothyroxine therapy had been stopped 4 weeks before ^{131}I therapy.

> "...instead of giving a child 50 MBq/kg for initial ^{131}I therapy or 100 MBq/kg for further therapy, I can now safely use the double of each..."

The investigators used twice-daily measurements of ^{131}I still present in each child or adolescent after ^{131}I administration to calculate ^{131}I whole-body retention, and these data were used to calculate the radiation dose absorbed to the blood per unit of ^{131}I activity administered during each treatment course. The researchers considered the upper safe limit for the blood radiation dose to be 2 Gy, which is the accepted limit for adults with DTC. However, they acknowledge that experimental data on this safe limit in children are lacking.

"The most significant findings were that for initial ^{131}I therapy no child had an AHASA activity that was lower than 100 MBq/kg and for further therapy no child came under 200 MBq/kg; both these values are twice what we conservatively assumed to be safe in current practice. Furthermore, most children can have even the double of these doses for treatment, but it takes pretherapeutic dosimetry to determine which children that concerns. The implication for clinical practice is that instead of giving a child 50 MBq/kg for initial ^{131}I therapy or 100 MBq/kg for further therapy, I can now safely use the double of each of these values without individual dosimetry in the knowledge that I will do no harm to the bone marrow," concludes Verburg.

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Original article Verburg, F. A. *et al.* I-131 activities as high as safely administrable (AHASA) for the treatment of children and adolescents with advanced differentiated thyroid cancer. *J. Clin. Endocrinol. Metab.* doi:10.1210/jc.2011-0520