Is the UICC/AJCC Classification of Primary Tumor in Childhood Thyroid Carcinoma Valid?

TO THE EDITOR: The TNM classification according to Union Internationale Contre Cancer (UICC) (*1*) and American Joint Committee on Cancer (AJCC) (*2*) is used to classify the primary tumor in childhood thyroid carcinoma (*3–5*). This classification was initially intended for all age groups and may apply to young adults but not children, particularly youngest children (<5 y old).

A total number of 503 cases of childhood thyroid carcinoma were diagnosed in children younger than 15 y old between 1986 and 1996 in Belarus (*3,4*). The classification of primary tumor in this cohort according to UICC/AJCC in four groups revealed an extrathyroidal tumor extension in 50.4%. The remaining patients were divided into T1 and T2 (each 24.3%) groups, whereas only 1% of patients were in group T3.

Age-adjusted extrapolation of the tumor size to thyroid volume in children (Fig. 1) discloses that the tumor size of 1 cm in a 10-y-old child with a thyroid volume of approximately 8–9 mL cannot be compared with that in adults with a twofold higher volume (20 mL). Also, in a 10-y-old child a tumor size of approximately 4 cm in greatest diameter, which can completely occupy one of the thyroid lobes, is less likely to still be limited to the thyroid!

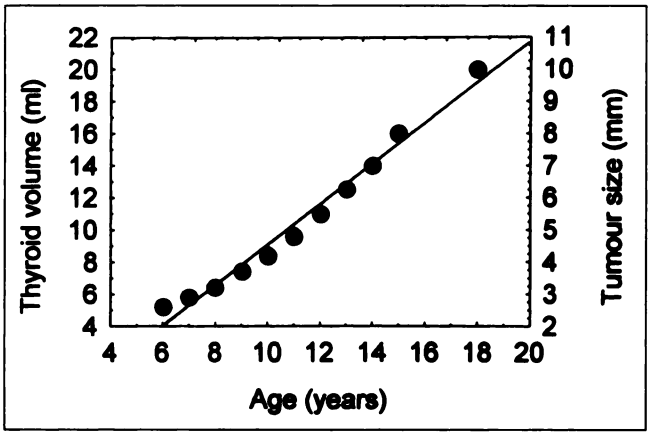

FIGURE 1. Comparison between age-specific childhood thyroid volume and age-adjusted tumor size for occult childhood thyroid carcinoma. Mean values according to World Health Organization for boys and girls < 16 y old are shown. An occult carcinoma is estimated as tumor size of 1 cm in thyroid volume of 20 mL for adults and is linearly adjusted to thyroid volume for different age groups in children.

In the light of this extrapolation, it is no wonder why only a few cases of childhood thyroid carcinoma are classified as T3 and it elucidates the reason for the unexpectedly high frequency of distant metastases (6.7%) in childhood papillary carcinoma confined to the thyroid (Demidchik et al., unpublished data).

In the management of childhood thyroid carcinoma, the current concepts of primary tumor staging according to UICC/AJCC are not of clinical relevance and may have severe prognostic implications for the youngest children (<5 y old). A modified classification of primary tumor for this childhood malignancy would be appreciated.

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Glucose Permeability in Nonprimate Erythrocytes

TO THE EDITOR: In a recent study, Green et al. (*1*) investigated methods for quantifying blood time-activity curves from mice injected with ^{18}F-fluorodeoxyglucose (FDG). To avoid the technically challenging task of determining plasma FDG concentrations, the authors made the assumption that FDG equilibrates rapidly across the erythrocyte membrane, allowing the whole-blood FDG concentration to be used as an approximation for the plasma FDG concentration. This assumption has been widely used in studies with a variety of animal models and is based on the fact that FDG equilibrates rapidly across the erythrocyte membrane in humans. However, a number of studies have shown that erythrocyte glucose transport capacity is low in nonprimate adult mammals (*2,3*). This results from a developmental decrease in transport capacity, because erythrocytes obtained from fetal blood of nonprimate mammals have glucose transport activity similar to that in primate fetal erythrocytes. As a consequence of the low erythrocyte glucose transport rate in nonprimates, erythrocyte-to-plasma glucose distribution ratios varied from 0 in pig to 0.45 in calf, whereas in monkeys the ratio was 0.76–0.85 (*2*). A comparison of human and rat glucose transport rates found a transport rate of 10.7 nmol/mL cells/h at 37°C in the rat erythrocyte (*3*). In contrast, transport was too fast to measure at 37°C in human erythrocytes, but at 4°C the rate was 200 nmol/mL erythrocytes/min, a rate more than 1000 times faster despite the lower temperature. Adult mice erythrocytes are likely to show a rate of glucose transport similar to that in rats; levels of glycosylated hemoglobin, which correlate with erythrocyte glucose transport capacity, were lower in mice than in rats, indicating that the mouse erythrocyte glucose capacity is unlikely to be higher than that of rat (*4*).

The low rate of glucose transport in adult nonprimate erythrocytes has implications that go beyond the study of Green et al. (*1*). Other studies in mammals that have made the assumption of rapid equilibration of glucose and FDG across the erythrocyte membrane