TOTAL BODY NITROGEN (TBN) MEASUREMENTS AND ACCRETION IN PREPUBERTAL CHILDREN

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The accurate measurement of protein in normal children would be useful to determine the protein requirements for growth. To date there have been very few reports of protein content in children and most were based upon measurements of total body potassium (Fomon et al. 1982). The aim of this study was to measure body protein directly by measuring TBN. Twenty-seven prepubertal (4.0 to 11.5 y) were recruited. At enrolment all children had measurements of height, weight, body fat (from skinfold anthropometry) and TBN. Lean body mass (LBM) was derived by subtracting fat mass from body mass. Fourteen of these children had these measurements repeated during the prepubertal period at a mean of 1.3 ± 0.6 y later. TBN was measured by the method of in vivo prompt gamma neutron capture analysis (Baur et al. 1991). There was no gender difference in TBN so the results are pooled. The physical characteristics of the children in the cross-sectional and longitudinal studies are shown in the table.

	Cross-sectional	Longitudinal (8M, 6F)	
	(15M, 12F)	Initial	Final
Age (y)	8.1 ± 1.9	7.2 ± 1.8	8.5 ± 2.0
Height (cm)	128.0 ± 12.7	122.2 ± 11.7	129.9 ± 13.4
Weight (kg)	27.4 ± 7.6	23.3 ± 6.1	27.9 ± 9.2
Lean body mass (kg)	22.0 ± 4.8	19.4 ± 4.2	22.3 ± 5.5
TBN (g)	710.0± 215.0	615.0 ± 180.0	740.0± 250.0

TBN was significantly correlated with LBM, weight, height and age (r=0.97, 0.95, 0.95, 0.98, respectively, all P<0.001). TBN for the controls was best described by simple linear regression:

$$TBN\ (g) = -235 + 43\ LBM\ (kg)\ (r^2=94.0\%, sd=54.12, P<0.001)$$

There was no significant correlation between the age at first measurement and nitrogen deposition rate (NDR). The longitudinal data showed a median NDR of 89 g/y (30 to 187 g/y). The NDR was similar to the Fomon data [medians of 66 g/y (30 to 133 g/y), 68 g/y (46 to 94 g/y), respectively].

This study provides direct TBN measurements in normal children which are in reasonable agreement with the indirect estimates and provides a reference for interpretation of TBN values in children with chronic diseases.

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