Parathyroid Hormone (PTH) in Children with Chronic Renal Failure; relationship between the 1-84PTH:C-PTH Ratio and Growth

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Effects of PTH and long carboxyl-terminal fragments (C-PTH) on growth are not understood. Optimal PTH levels in childhood chronic renal failure (CRF) are unknown; we aim for normal range (NR) PTH levels. Current intact immunoradiometric (iIRMA) PTH assays cross-react with C-PTH, which antagonises the biological actions of 1-84PTH. The introduction of an assay (CAP-PTH) that is specific for 1-84PTH, enables estimation of the agonist (1-84PTH) to antagonist (C-PTH) ratio. In adults this ratio may be predictive of bone turnover; it may also be relevant to growth. We aimed to investigate the relationship between growth and the 1-84 PTH:C-PTH ratio in children CRF.

195 patients, median (range) age 9.9 years (0.3-17.1) were recruited: 168 with a GFR <60 mls/min/1.73m^2 (including 42 transplanted patients), 19 on peritoneal- and 8 on haemo-dialysis. Over a median (range) period of 1.1 (0.5 to 1.7) years, children attended 5 (3-15) clinics at which iIRMA PTH and CAP-PTH were measured and height standard deviation score (Ht SDS) was calculated. Mean PTH levels were within NR for both assays, CAP-PTH 28.5 pg/mL (NR 5-39) iIRMA 45.1 pg/mL (NR 14-66). Overall, the patients grew normally (change in Ht SDS per year (Ht SDS)= -0.01). There was a correlation between mean Ht SDS and the mean 1-84PTH; C-PTH ratio (r=0.2, p=0.01). Furthermore, those with normal range PTH levels had a significantly higher mean ratio than those with PTH levels outside NR and grew significantly better than those with PTH levels outside NR (see table).

Normal PTH levels in children with CRF are associated with normal growth and a higher 1-84PTH:C-PTH ratio. Normal range PTH levels are appropriate in children with CRF. C-PTH may be of clinical significance.

Mean Ratio and Ht SDS by PTH level

	CAP-PTH <5 pg/mL	CAP-PTH 5-39 pg/mL	CAP-PTH >39 pg/mL	p value (ANOVA)
Mean 1-84PTH:C-PTH Ratio	1.1 (0.4-3.3)	2.7 (2.4-3.1)	2.0 (1.7-2.4)	0.007
Mean ° Ht SDS per year	-0.20 (-1.0-0.6)	0.04 (0.0-0.10)	-0.11 (-0.2-0.0)	0.026

95% confidence interval of mean shown in parenthesis

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