reaching the aorta through the coarctation, the ductus, and collateral vessels to be pumped caudally. When the final observations were made the more usual femoral flow synchronous with systole presumably resulted from intervening dilatation of the ductus. Expiration induced femoral flow may be useful as an indicator of ductal closure in coarctation.

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Serum thyroxine and thyroid stimulating hormone values in unreferred children with short stature

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SUMMARY Of 449 children aged 6-9 years with heights below the first centile in a total population of 48 221, only 1 had previously undiagnosed hypothyroidism. In a community with well developed health services hypothyroidism is unlikely to be the cause of short stature among primary school children.

Primary hypothyroidism has been described as the commonest endocrine cause of short stature.¹ This was tested in a total population study designed to find the prevalence of growth hormone deficiency.

Subjects and methods

The screening of height in this group has been described.^{2,3} Many children were excluded because of previous negative studies (10), previous diagnosis of an organic cause (82), insufficient residual blood (6), and parental refusal (77). Two hundred and sixty seven children had thyroxine (T4) and 274 thyroid stimulating hormone (TSH) estimations. Serum T4 and TSH values were determined by radioimmunoassay with between assay coefficients of variation of 11.7 and 5.1 percent respectively. Bone age was determined by radiographic examination of the left wrist.

Results

Serum T4. The distribution of T4 concentrations is shown in Table 1. Values did not differ appreciably in boys and girls (mean (SD) 116.5 (21.4) nmol/l (9.1 (1.7) µg/dl) and 118.3 (17.9) nmol/l (9.2 (1.4) µg/dl)). Those with values exceeding 161 nmol/l had normal TSH values and were clinically euthyroid.

There was no correlation with sex, age, height, or bone age. Six children had values in the lower range for normal adults (75-80 nmol/l) and of these, 2 were being treated for coeliac disease. Another had a marginally raised TSH (7.3 mU/l), the upper limit of normal being 5.7 mU/l. He had been a 'light for dates' twin, of 42 weeks' gestation, and of below average intelligence. He was clinically euthyroid.

Serum TSH values. The distribution of TSH values shown in Table 2 approximates to that of a log normal curve.

One 7 year old girl had a value of 98.4 mU/l. Her parents were small. One paternal relative had thyrotoxicosis and 2 others were type I diabetics. Her hair was dry and she was often sleepy but there were no other features and her IQ was 107 (Wechsler intelligence scale). Bone age was 3 years retarded

Table 1 *Distribution of serum thyroxine (T4) values in 267 children aged 6-9 years*

Serum thyroxine (nmol/l)	Boys	Girls	Total
<70	—	—	—
71-80	5	1	6
81-90	9	7	16
91-100	22	8	30
101-110	29	22	51
111-120	28	24	52
121-130	28	27	55
131-140	12	14	26
141-150	13	7	20
151-160	2	3	5
>161*	5	1	6
Total	153	114	267

Conversion: SI to traditional units—thyroxine 1 nmol/l ≈ 0.08 µg/dl. *Five children had T4 values >162 nmol/l and were clinically euthyroid. Their T4 and TSH values (TSH normal value ≈ 2.2 mU/l), were; 170 (3.7), 172 (2.0), 175 (4.3), 190 (5.1), and 210 (5.4).

Table 2 Distribution of thyroid stimulating hormone (TSH) values among boys and girls aged 6-9 years

TSH (mU/l)	Boys	Girls	Total
<0.9	1	1	2
1.0-2.9	68	50	118
3.0-4.9	66	44	110
5.0-6.9	15	17	32
7.0-8.9	5	5	10
>9.0	0	2	2

and the patella showed multicentre ossification sites suggesting that hypothyroidism dated from age 5 or 6 years. The thyroid scan showed low iodine uptake. Of the 11 children with TSH values greater than 7.0 mU/l, 1 with a TSH value of 7.2 mU/l and T₄ value of 126 nmol/l also had an indifferent human growth hormone response (9.5 mU/l) to insulin hypoglycaemia. Another child had a T₄ value of 76 nmol/l but like the remaining 9 was otherwise clinically normal. The TSH concentrations in boys and girls were similar (mean (SD) 3.38 (1.44) mU/l and 3.63 (1.70) mU/l respectively). There was no significant correlation with sex, age, height, or bone age.

Discussion

The diagnosis of only 1 child with previously undiagnosed hypothyroidism in a very large epidemiological study of 6-9 year old children refutes the belief that hypothyroidism is the commonest cause of short stature in this age group in a population with well developed health services. It does, however, prove that onset and progress may be so insidious that hypothyroidism may escape notice

especially when it occurs after the routine examination at school entry that includes the recording of height in centiles. It is likely given the knowledge from neonatal screening that about 1 baby in 4000 has congenital hypothyroidism, and that some children in the 48 221 screened were receiving thyroxine and had heights above the first centile.

Although associations between coeliac disease and diabetes mellitus and between diabetes and autoimmune thyroiditis are recognised, we do not know of any published reports linking coeliac disease and hypothyroidism. The finding of borderline low values for T₄ in the 2 coeliac children in this study was not associated with TSH abnormality and in these cases this excludes primary hypothyroidism but not perhaps some disturbance of thyroid binding globulin.

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Human chorionic gonadotrophin secreting pineal germinoma and precocious puberty

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SUMMARY A 10½ year old boy presented with raised intracranial pressure and precocious puberty caused by a human chorionic gonadotrophin (HCG) secreting pineal germinoma. After craniospinal irradiation he improved clinically and his HCG concentration fell to an undetectable value. Two years later he remains well. Pineal germinomas are highly radiosensitive obviating the need for difficult surgery associated with high mortality.

Precocious puberty in boys may be caused by pineal tumours. Premature sexual development has been variously attributed to activation of hypothalamic centres initiating pubertal development, tumour involvement of hypothalamic centres that normally inhibit sexual development, loss of a pineal anti-gonadotrophic factor, or the production of a gonadotrophin by the tumour. Secretion of human chorionic gonadotrophin (HCG) by pineal tumours has been reported in 5 patients,¹⁻⁴ 2 of whom