LETTERS TO THE EDITOR

Asthma—time for a change of name?

EDITOR,—In his robust defence of the term asthma,¹ Dr Speight has failed to grasp the significance of the changed definition of this term. The original definition of asthma was purely functional: "airway obstruction which varies over the course of time and with treatment".² In small infants in whom lung function measurements are not usually available, this was modified to "cough and/or wheeze in a setting where asthma is likely, and other rarer conditions have been excluded".³ By this definition, few would quarrel with Dr Speight's wish¹ to retain the term for infant wheezing.

Unfortunately, to use Asher's words,⁴ "an abominable semantic crime has been committed, a single term has knowingly been applied to two completely different things without making the slightest effort to determine if the one is the equal to the other, or even related to the other. A pathological process and a collection of symptoms have been given the same name". Asthma is now defined as "a chronic inflammatory disorder of the airways in which many cells play a role, including mast cells and eosinophils"⁵ or "a common and chronic inflammatory condition of the airways whose cause is not completely understood",⁶ and by these definitions many of the infants whom Dr Speight labels as asthmatic have no such condition. This is not merely of theoretical importance, because there is abundant evidence that earlier treatment of T lymphocyte driven, eosinophil mediated airway inflammation with inhaled corticosteroids is beneficial both in terms of immediate symptomatic benefit and long term preservation of lung function.^{7,8} Confusedly labelling infants who wheeze with colds as asthmatic, with the implication of airway inflammation, will result in exactly the same treatment policy being advocated for them, despite evidence that there is no benefit either on acute symptoms⁹ or long term lung function.¹⁰ The safety record of inhaled steroids is impressive, but even in the short term, there is evidence that overtreatment causes harm which is not reversed on stopping therapy.¹¹ Furthermore, the fiscal cost of the medications is not small and the long term effects are sufficiently imponderable as to make this not a subject for complacency.

The issues may be different if the sole concern is the laudable one of ensuring acutely ill children get ambulances quickly. Speed is of the essence, and accuracy less relevant. In this setting, the use of the term is justified, and has in the past been absolutely invaluable. In 1997, between consenting adults in the cold light of day, the use of the unqualified term asthma is indefensible, unless the clock be turned back and the old definition restored.

ANDREW BUSH
Department of Paediatrics,
Royal Brompton Hospital,
Sydney Street,
London SW3 6NP

Dr Speight comments:

In his indignation Dr Bush attacks not only my position but that of Professor Silverman and Dr Wilson. In their article Professor Silverman and Dr Wilson argued that it is perfectly reasonable in clinical practice to both label and treat episodic viral wheeze as "asthma".¹ Crucially, they pointed out that in early childhood it may prove impossible to distinguish between a future moderately severe perennial atopic asthmatic and a mere episodic viral wheezer (and of course both may wheeze in response to viruses).

The sheer practical value of using "asthma" as an umbrella concept far outweighs Dr Bush's academic objections. Just because successive committees have changed the definition of asthma from (a) a clinical definition to (b) one based on bronchial hyperactivity to (c) one which emphasises inflammation, does not mean that any doctor who objects on the grounds of common sense should be cast into outer darkness. Neither should we necessarily assume that no one will ever be allowed to revise the definition of asthma again as if the 1992 statement was written in tablets of stone. If Dr Bush is really losing sleep over his fears that some children may receive inhaled steroids unnecessarily, surely he should concentrate his efforts on arguing (as I would) against their use in mild episodic wheezing/asthma.

I personally lose far more sleep over the prospect of a return to the bad old days when children had to earn the diagnosis of "asthma" the hard way, with general practitioners and district paediatricians inhibited in their use of the word for fear of having their wrists slapped by someone in a teaching centre. In our survey of childhood asthma deaths,¹² two of the children who died under the age of 5 years had an official diagnosis at the time of death of "wheezy bronchitis", and only received a diagnosis of asthma at necropsy.

The early and confident use of the word asthma as a provisional clinical diagnosis allows doctors to give the families of all wheezing children a "crisis pack" for the management of future possibly severe attacks outside hospital.¹³ (This consists of high dose β_2 agonist and a crash course of prednisolone plus written instructions.) If they never need to use it no harm has been done. Families of children labelled "viral induced wheeze" or "wheezy bronchitis" are left up the creek without a paddle.

I rest my case.

- 1 Silverman M, Wilson N. Asthma—time for a change of name? [Commentary by N Speight.] *Arch Dis Child* 1997;77:62-5.
- 2 American Thoracic Society. Chronic bronchitis, asthma, and pulmonary emphysema. *Am Rev Respir Dis* 1987;136:224-5.
- 3 Warner JO, Gotz M, Landau L, et al. Management of asthma: a consensus statement. *Arch Dis Child* 1989;64:1065-79.
- 4 Asher R. *Talking sense*. Bath: Pitman Press, 1972.
- 5 International consensus report on the diagnosis and management of asthma. *Clin Exp Allergy* 1992;22(suppl 1):1.
- 6 Guidelines on the management of asthma. *Thorax* 1993;48(suppl):S1-24.
- 7 Agertoft L, Pedersen S. Effects of long-term treatment with an inhaled corticosteroid on growth and lung function in asthmatic children. *Respir Med* 1994;88:373-81.
- 8 Haahtela T, Jarvinen M, Kava T, et al. Effects of discontinuing inhaled budesonide in patients with mild asthma. *N Engl J Med* 1994;331:700-5.
- 9 Wilson N, Sloper K, Silverman M. Effect of continuous treatment with topical corticosteroids on episodic viral wheeze in preschool children. *Arch Dis Child* 1995;72:317-20.

- 10 Oswald H, Phelan PD, Lanigan A, et al. Childhood asthma and lung function in mid-adult life. *Pediatr Pulmonol* 1997;23:14-20.
- 11 Doull IJM, Freezer NJ, Holgate ST. Growth of prepubertal children with mild asthma treated with inhaled beclomethasone dipropionate. *Am J Respir Crit Care Med* 1995;151:1715-9.
- 12 Fletcher HJ, Ibrahim SA, Speight N. Survey of asthma deaths in the Northern region 1970-85. *Arch Dis Child* 1990;65:163-7.
- 13 Speight ANP. The diagnosis and management of asthma in childhood. *Practitioner* 1986;230:549-52.

Rapid response to isoflurane in refractory status asthmaticus

EDITOR,—Although the in-hospital mortality from refractory status asthmaticus is low, the treatment strategies used in the management of these patients may cause significant morbidity.¹⁻³ Those children who require ventilation either for resuscitation or impending respiratory collapse often require the addition of "unconventional" adjuvant bronchodilator treatments, such as intravenous β_2 agonists,⁴ ketamine,⁵ or magnesium,⁶ aimed at reduction of ventilator induced volutrauma.

Inhaled anaesthetic gases are known to produce sustained bronchodilation in refractory status asthmaticus, possibly mediated by airway reflex blockade and a direct effect on smooth muscle.⁷⁻⁹ We wish to highlight the use of inhaled isoflurane in two children with severe life threatening asthma, and in particular, the importance of guiding treatment by continuous intra-arterial blood gas analysis (Paratrend 7, Biomedical Sensors, High Wycombe).¹⁰

Patient A, a 4 year old boy with multiple hospital admissions for asthma, presented "in extremis" (oxygen saturation 60%) with a six hour history of increasing dyspnoea, and required emergency intubation. Arterial blood gas showed pH 7.1, carbon dioxide pressure (P_{CO_2}) 9.8 kPa, and oxygen pressure (P_{O_2}) 35 kPa. He was treated with intravenous salbutamol at 3 μ g/kg/min, aminophylline at 1 mg/kg/hour after a loading dose, magnesium sulphate 25 mg/kg, ketamine 2 mg/kg bolus, morphine 20 μ g/kg/hour, vecuronium 100 μ g/kg/hour, and transferred to the paediatric intensive care unit.

However he continued to deteriorate (pH 6.9, P_{CO_2} 17.2 kPa, and P_{O_2} 42 kPa) on settings of: pressure control 44/2 cm H_2O , rate 9, fractional inspired oxygen (F_{IO_2}) 0.6. Sequential P_{CO_2} results are given in fig 1. Two hours after admission he was unable to be ventilated and became bradycardic (pH 6.8, P_{CO_2} 23.9 kPa), requiring disconnection from the ventilator and manual chest compression to achieve forced expiration. Isoflurane was administered at one minimum alveolar concentration via a Boyle's machine and the inspiratory port of the ventilator. In order to monitor the effects of this treatment, a Paratrend sensor was inserted via a femoral arterial line documenting the rapid improvement. The isoflurane was stopped after 7 hours, he was extubated at 36 hours and discharged to the ward on day 3.

Patient B was a 23 month old boy who presented in status asthmaticus with a two day history of increasing dyspnoea. Arterial blood gas showed pH 7.27, P_{CO_2} 6.5 kPa, and P_{O_2} 44 kPa in 15 L of face mask oxygen. He received nebulised salbutamol 5 mg ($\times 2$), atrovont 250 μ g, intravenous hydrocortisone 50 mg, aminophylline loading dose plus infusion at 0.9 mg/kg/hour, and salbutamol infu-

Figure 1 Sequential PCO_2 (kPa) for the first 24 hours after hospital admission in two patients ventilated for status asthmaticus. Patient B was intubated at seven hours with subsequent deterioration. The arrows indicate the point at which isoflurane was started in each patient.

sion at 2 $\mu\text{g/kg/min}$. After clinical improvement he was transferred self ventilating to the paediatric intensive care unit.

He was treated additionally with intravenous magnesium sulphate 25 mg/kg and salbutamol 5 $\mu\text{g/kg/min}$, but became progressively more exhausted and was electively intubated, with morphine 20 $\mu\text{g/kg/hour}$ and vecuronium 100 $\mu\text{g/kg/hour}$. The response to intubation was rapid deterioration (pH 6.9 and PCO_2 17.9 kPa) at initial ventilation settings of: pressure control 39/4 cm H_2O , rate 11, FiO_2 0.6. Passive expiratory time was 8–10 seconds. Isoflurane was administered as described above, with rapid improvement (see fig 1), although he later developed segmental atelectasis requiring five days of continued ventilation for hypoxia.

These two cases illustrate that intubation and ventilation of severe asthmatics, even in the setting of impending respiratory collapse, may result in significant deterioration despite appropriate ventilatory strategies.^{2,3} Early administration of isoflurane is beneficial in those children who fail to improve despite aggressive conventional and adjunctive treatment while the close temporal relationship between isoflurane administration and both clinical and biochemical improvement, suggests a rapid bronchodilatory response. Management of these patients is considerably facilitated by continuous intra-arterial blood gas analysis.

M RICE
M HATHERILL
I A MURDOCH
Paediatric Intensive Care Unit,
Guy's Hospital, St Thomas' Street,
London SE1 9RT

- Stein R, Canny CJ, Bohn DJ, Reisman JJ, Levi-son H. Severe acute asthma in a pediatric intensive care unit: six years' experience. *Pediatrics* 1989;**83**:1023–8.
- Shugg AW, Kerr S, Butt WW. Mechanical ventilation of paediatric patients with asthma: short and long term outcome. *J Paediatr Child Health* 1990;**26**:343–6.
- Williams TJ, Tuxen DV, Scheinkestel CD, Czarny D, Bowes G. Risk factors for morbidity in mechanically ventilated patients with acute severe asthma. *Am Rev Respir Dis* 1992;**146**: 607–15.
- Browne GJ, Penna AS, Phung X, Soo M. Randomised trial of intravenous salbutamol in early management of acute severe asthma in children. *Lancet* 1997;**349**:301–5.
- Rock MJ, Reyes De La Rocha S, L'Hommedieu C, Truempel E. Use of ketamine in asthmatic children to treat respiratory failure refractory to conventional therapy. *Crit Care Med* 1986;**14**:514–16.
- McLean RM. Magnesium and its therapeutic uses: a review. *Am J Med* 1994;**96**:63–76.

- Bierman MI, Brown M, Muren O, Keenan R, Glauser F. Prolonged isoflurane anesthesia in status asthmaticus. *Crit Care Med* 1986;**14**: 832–3.
- Johnstone RG, Noseworthy TW, Friesen EG, Yule HA, Shustack A. Isoflurane therapy for status asthmaticus in children and adults. *Chest* 1990;**97**:698–701.
- Handel J, Adderley R, Bennett M, Skippen P, Wensley D, Rhodes P. Inhaled anaesthetics for refractory childhood asthma. *Clinical Intensive Care* 1996;**7**:152–4.
- Weiss IK, Finh S, Edmunds S, Harrison R, Donnelly K. Continuous arterial gas monitoring: Initial experience with the Paratrend 7 in children. *Intensive Care Medicine* 1996;**22**:1414–17.

Whole body bone mineral content in healthy children and adolescents

EDITOR,—We were interested in the suggestion by Mølgaard and colleagues that whole body bone mineral content (BMC) measured by dual x ray absorptiometry (DXA) should be considered as a function of bone area.¹ Using the same type of DXA equipment (Hologic QDR-1000W) we measured whole body BMC in 300 normal girls aged 11–18 years.² Our results for whole body BMC, both as a function of bone area and age, were essentially identical to those of Mølgaard *et al.*¹ To assess the usefulness of area normalisation in patients we have analysed the results from 71 studies on 51 anorexic females aged 14–18 years. The patients' clinical state was subdivided into "moderate" ($n = 44$) and "severe" anorexia ($n = 27$) based on a body mass index of 15.1–18.9 kg/m^2 and < 15.0 kg/m^2 respectively. Height was within the normal range for age and there was no significant difference in age or height between the two groups.

$Z(\text{Age})$ and $Z(\text{Area})$ were calculated using the predicted values and SDs for age matched and area matched normal subjects from Mølgaard *et al.*¹ Mean (SD) $Z(\text{Age})$ was $-1.01(0.84)$ and $-1.45(0.95)$ for the moderate and severe anorexic groups respectively. For both groups $Z(\text{Age})$ was significantly lower than zero ($p < 0.0001$) as expected and the value for the severe anorexics was lower than that for the moderate anorexics ($p = 0.05$). However, $Z(\text{Area})$ was 1.85 (1.39) and 4.41 (1.60) for the moderate and severe anorexic groups respectively. For both groups $Z(\text{Area})$ was significantly greater than zero ($p < 0.0001$) and the value for the severe anorexics was significantly greater ($p < 0.0001$) than that for the moderate anorexics, which is a most implausible result. Reduced bone mineral density in anorexia nervosa has been reported for specific anatomical sites³ and a significant reduction in total BMC in anorexic patients has also been observed.⁴

Our results in patients with anorexia nervosa illustrate that normalising whole body BMC by the measured area is clearly inappropriate. Misleading conclusions could be made if this method is used to assess the bone mineral status of patients who may have a reduced bone content as a consequence of disease. We believe this anomaly is related to an artifact of DXA processing. A related anomaly has been investigated in longitudinal studies of adult women and with an anthropomorphic phantom.⁵ The phantom results showed that a reduction in whole body BMC was accompanied by concomitant changes in the measured bone area, even although the true skeletal area of the phantom was not altered. Both in vivo and in vitro, a change of fat distribution led to spurious changes of

BMC and bone area. These anomalies varied with the software version used in the analysis. A similar anomaly has been reported for DXA spine scans.⁶ This artifact may be due to the need to assign a bone density "threshold" when determining which pixels represent bone, with the result that the area measured by DXA depends on the BMC value and the soft tissue composition and is not an adequate estimate of the true projected skeletal area.

Our results suggest that the bone area may be significantly underestimated in children with diseases which are known to result in loss of bone mineral. We conclude that for Hologic DXA systems normalisation of whole body BMC by area introduces significant errors which may result in misinterpretation of the bone mineral status. The substantial reduction in the coefficient of variation reported by Mølgaard *et al.*¹ when BMC is normalised by bone area rather than age must be due in part to the spurious link between BMC and area.

W J HANNAN
P TOTHILL
S J COWEN
Department of Medical Physics,
Western General Hospital,
Edinburgh EH4 2XU

R M WRATE
Young People's Unit, Tipperlin House,
Royal Edinburgh Hospital,
Edinburgh EH10 5HF

Drs Mølgaard, Prentice, Cole, *et al* comment:

Hannah *et al* raise an important issue about the interpretation of bone mineral measurements in girls with severe anorexia. They report very high BMC for bone area Z scores in a group of anorexic girls aged 14–18 years.

Our method of interpretation separates out the various components that influence BMC,¹ and, had it been used by Hannan *et al.*, they would have been alerted to the fact that the apparently bizarre results were associated with unusually low values for bone area. We have recently seen the same anomaly in Cambridge data. Among adolescent girls examined twice 15 months apart, one developed severe anorexia between the two measurements (S Stear, A Prentice, unpublished data). She lost 5.9 kg, went from a body mass index of 17.4 to 15.2 and lost 12% of her whole body BMC. During the same period her bone area for height Z score decreased from -1.31 to -2.36 while her BMC for bone area Z score increased from -1.21 to $+4.45$. The problem is likely to be due to poor bone edge detection in these severely anorexic girls as a result of their abnormal soft tissue composition and thickness.

We have examined several hundred children with different chronic diseases likely to affect BMC, including cystic fibrosis, cancer, rheumatic diseases, and osteogenesis imperfecta. In none of these groups have we seen results like those described for the girls with severe anorexia. Of special interest is a group of children with osteogenesis imperfecta (qualitative collagen defect). They are known to have a very low BMC and often have fractures. The children are short, and have mean BMC for age and bone area for age Z scores of -3.7 and -4.9 respectively (A Lund, C Mølgaard, unpublished data). Despite a very low BMC for bone area (Z score -2.7) their bone area for height is only slightly reduced (Z score -0.37), implying that a low BMC is

not always associated with a low bone area for height.

Hannan *et al* refer to a "spurious" association between BMC and bone area. There is indeed a strong association between these variables, but it is not spurious, it is genuine. This is firstly because bigger bones have more minerals on average, and secondly because of the nature of bone edge detection in absorptiometry. Although the algorithms have not been divulged by the manufacturers, it is reasonable to assume that bone is detected when beam attenuation increases above a set threshold. For two bones of the same external dimensions, as the beam moves from soft tissue into bone, the bone with the higher mineral content will cause more rapid attenuation, will be detected earlier and its measured bone area will be greater. As a result, although bone area is closely related to actual bone dimensions, it is also influenced by BMC. The relationship between BMC and bone area is not proportional in most cases, and is not removed by calculating bone mineral density (=BMC/bone area).⁷ Normalisation of BMC for bone area, as in our stepwise diagnostic method,¹ and in regression models,⁷ allows for this association. This approach has the advantage of not constraining the data to fit an arbitrary, often incorrect, relationship (that is bone mineral density) and so minimises the potential for misinterpretation.

In summary, we agree with Hannan *et al* that bone mineral assessments of girls with severe anorexia can be anomalous. This is due to erroneously low measurements of bone area, probably caused by problems with bone edge detection. It would be unwise to assume that the corresponding BMC or bone mineral density values are valid or clinically meaningful in this situation. The identification of this problem underscores the strength of our interpretative approach,¹ which does not rely on the calculation of bone mineral density but makes use of all the information available in a decision making tree and ultimately normalises BMC for bone area.

- 1 Molgaard C, Thomsen BL, Prentice A, Cole TJ, Fleischer Michaelsen K. Whole body bone mineral content in healthy children and adolescents. *Arch Dis Child* 1997;76:9-15.
- 2 Hannan WJ, Cowen SJ, Wrate RM, Barton J. Improved prediction of bone mineral content and density. *Arch Dis Child* 1995;72:147-9.
- 3 Davies KM, Pearson PH, Huseman CA, *et al*. Reduced bone mineral in patients with eating disorders. *Bone* 1990;11:143-7.
- 4 Bachrach LK, Guido D, Katzman D, *et al*. Decreased bone density in adolescent girls with anorexia nervosa. *Pediatrics* 1990;86:440-7.
- 5 Tothill P, Hannan WJ, Cowen S, *et al*. Anomalies in the measurement of changes in total-body bone mineral by dual-energy X-ray absorptiometry during weight change. *J Bone Miner Res* 1997;12:1908-21.
- 6 Peel NFA, Eastell R. Comparison of rates of bone loss from the spine measured using two manufacturers' densitometers. *J Bone Miner Res* 1995;10:1796-80.
- 7 Prentice A, Parsons TJ, Cole TJ. Uncritical use of bone mineral density in absorptiometry may lead to size-related artifacts in the identification of bone mineral determinants. *Am J Clin Nutr* 1994;60:837-42.

Diurnal variation in children: is stretching the answer?

EDITOR,—We were interested to read the findings of Voss and Bailey concerning diurnal variation in the stature of children.¹ De Puky was the first to suggest that changes in stature, which lengthens during sleep and

shortens during daytime, were due to fluctuations in the water content of the intervertebral discs.² Adams *et al* postulated that increased fluid within the discs resulted in the spine being more resistant to flexion immediately after a period of rest.³ Magnetic resonance imaging (MRI) has demonstrated diurnal variation in the water content of the discs.^{4,5} We have applied the Cavalieri method of modern design stereology in combination with MRI to obtain unbiased estimates of the volume of the lumbar intervertebral discs immediately at the end of a day of normal activity and again after a night's rest, in seven women of average age 21 years (range 19-23 years).⁶ In addition, pixel-by-pixel mapping of the relaxation time has been used to assess the water content and its distribution within the intervertebral discs in this group. The mean increase in height of the subjects, measured with a stadiometer, was 19.3 mm (range 8-26 mm) overnight. Image analysis showed that the mean overnight increase in volume of lumbar discs was 1300 mm³. The increase in disc volume was accompanied by an increase in the T2 relaxation time of the nucleus pulposus. This suggests that the change in disc volume is probably caused by a preferential increase in the water content of the nucleus pulposus. Voss and Bailey observed a mean loss in height of 31 mm between the morning and afternoon.

This difference in diurnal variation in height between children and adults could be attributed to greater concentrations of purified proteoglycan macromolecules in the nucleus pulposus of children compared with adults,⁷ allowing more drawing in of water into the intervertebral discs during periods of rest.

GRAHAM WHITEHOUSE
NEIL ROBERTS

Magnetic Resonance and Image Analysis
Research Centre,
University of Liverpool, Pembroke Place,
Liverpool L69 3BX

PETER DANGERFIELD

Department of Human Anatomy and Cell Biology,
University of Liverpool

- 1 Voss LD, Bailey BJR. Diurnal variation in children: is stretching the answer? *Arch Dis Child* 1997;77:319-22.
- 2 De Puky P. The physiological oscillation of the length of the body. *Acta Orthop Scand* 1935;6:338-47.
- 3 Adams MA, Dolan P, Hutton WC. Diurnal variations in the stresses on the lumbar spine. *Spine* 1987;12:130-7.
- 4 Isherwood I, Prendergast DI, Hickey DS, Jenkins JPR. Quantitative analysis of intervertebral disc structure. *Acta Radiol Suppl* 1987;369:492-5.
- 5 Boos NA, Wallin T, Gbedegbegnon T, Aeebi M, Boesch C. Quantitative MR imaging of lumbar intervertebral discs and vertebral bodies; influence of diurnal water content variations. *Radiology* 1993;188:351-4.
- 6 Roberts N, Hogg G, Whitehouse GH, Dangerfield P. Quantitative analysis of diurnal variation in volume and water content of lumbar intervertebral discs. *Clin Anat* 1998;11:1-8.
- 7 Johnstone B, Bayliss MT. The extracellular matrix of the intervertebral disc: proteoglycan biochemistry. In: Aspden RM, Porter RW, eds. *Lumbar spine disorders; current concepts*. Singapore: World Scientific, 1995: 51-62.

Oral testosterone undecanoate for the induction of puberty in anorchid boys

EDITOR,—Testosterone undecanoate, an orally active androgen, has been in clinical use for about 20 years.¹ Its efficacy for the acceleration of growth has been well docu-

mented in prepubertal and early pubertal boys.^{2,3} We wondered if it could be used for the induction of puberty in anorchia as preliminary data suggested.⁴

Ten anorchid patients (bilateral neonatal testicular torsion in three, congenital anorchia in seven) were treated with testosterone undecanoate. Four boys received 40 mg three times weekly. This dose was felt to be insufficient. Six boys aged 11-14 years (mean 12.0 years) received 40 mg daily for 12.5 months (range 5-20) and then 80 mg daily for another 10.2 months (range 6-15). In these six boys, pubic hair Tanner stage 2 was observed after 5.8 months (range 5-8) and Tanner stage 3 after 15.5 months (range 12-20). The time interval of 10 months for progression of pubic hair stage 2 to stage 3 is comparable with the finding in normal boys. In their longitudinal study, Largo and Prader observed that in 52% of the boys pubic hair progressed from stage 2 to stage 3 within one year.⁵ In the first year of treatment, height velocity was 7.2 cm/year (6.0-9.0) and weight gain was 7.0 kg (5.2-8.0). Stretched penile length increased from 3.5 cm (3.0-4.0) before to 6.2 cm (5.0-8.0) at the end of treatment.

We conclude that oral testosterone undecanoate treatment in anorchid boys is simple, safe, and effective. Starting at the age of 11 to 12 years with a dose of 40 mg daily for one year and 80 mg daily for another year provides for a gentle induction of puberty with normal tempo. Life long testosterone substitution must then be continued by the intramuscular or potentially by the transdermal route.

HEINRICH SCHMIDT

DIETRICH KNORR

HANS PETER SCHWARZ

University Children's Hospital,

Lindwurmstrasse 4, D-80337,

Munich, Germany

- 1 Hirschbauser C, Hopkinson CR, Sturm G, Coert A. Testosterone undecanoate: a new orally active androgen. *Acta Endocrinol* 1975;80:179-87.
- 2 Brown DC, Butler GE, Kelnar CJ, Wu FC. A double blind, placebo controlled study of the effects of low dose testosterone undecanoate on the growth of small for age, prepubertal boys. *Arch Dis Child* 1995;73:131-5.
- 3 Albanese A, Kewley GD, Long A, Pearl KN, Robins DG, Stanhope R. Oral treatment for constitutional delay of growth and puberty in boys: a randomised trial of an anabolic steroid or testosterone undecanoate. *Arch Dis Child* 1994;71:315-17.
- 4 Weil J, Bidlingmaier F, Butenandt O, Sippell WG, Baumgartner W, Knorr D. Treatment of anorchia with oral testosterone undecanoate: pharmacodynamics and clinical effectiveness. *Acta Endocrinol* 1980;95:244-50.
- 5 Largo RH, Prader A. Pubertal development in Swiss boys. *Helv Paediatr Acta* 1983;38:211-8.

Coombs positive giant cell hepatitis—a new feature of Evans' syndrome

EDITOR,—Savaşan *et al* describe the diverse immune abnormalities, limited effect of different therapeutic manoeuvres (splenectomy, steroids, intravenous immunoglobulins), and poor prognosis in patients with autoimmune thrombocytopenia and Coombs positive haemolytic anaemia (Evans' syndrome).¹ Fifty five per cent of their patients (six out of 11) had hepatomegaly, some with portal triaditis. We would like to extend their findings by reporting our recent experience of a patient with Evans' syndrome who also had Coombs positive giant cell

hepatitis (CPGCH). CPGCH is a rare disease of early childhood, with unknown pathogenesis and variable response to immunosuppression.² Liver transplantation is not curative, since the disease recurs in the graft.³

An Asian girl, born from consanguineous parents, was diagnosed with Evans' syndrome at 8 months of age. She had three female and two male siblings, all alive and well. She initially responded to intravenous immunoglobulins and low dose steroids (5 mg alternate days), but due to repeated heavy epistaxis required splenectomy at 3.5 years of age. At the age of 5 years she was referred to our unit because of development of liver dysfunction. Clinically, she had jaundice, palmar erythema, diffuse bruising, firm liver palpable 5 cm below the costal margin and minor cervical adenopathy. Laboratory tests demonstrated bilirubin 191 $\mu\text{mol/l}$ (normal value <20), aspartate aminotransferase (AST) 3051 IU/l (<55), γ -glutamyltransferase 58 IU/l (<55), albumin 35 g/l (35–45), creatinine 66 mmol/l , international normalised prothrombin ratio (INR) 1.6 (0.8–1.2), white cell count $14.5 \times 10^9/\text{l}$, platelet count $195 \times 10^9/\text{l}$, haemoglobin 14.3 g/l, reticulocytes 174

$\times 10^9/\text{l}$, direct Coombs test positive, IgG 14.2 g/l (7–18.6) (on monthly supplementation), IgA 3.02 g/l (0.6–3.48), IgM 2.08 g/l (0.49–1.87), thyroid microsomal autoantibodies 1/100, thyroid stimulating hormone 3.33 mU/l (0.3–6), free thyroxine 22.3 pmol/l (10–26), antinuclear, mitochondrial, liver/kidney/microsomal, adrenal, thyroglobulin, double stranded DNA, extractable antigen (Ro, lambda, La, Rn, Jo-1, Scl-70) antibodies: all negative, C_3 1.08 (0.55–1.30), C_4 0.28 (0.2–0.6). Liver histology revealed severe giant cell transformation with cholestasis, marked inflammation, clusters of neutrophils, spotty hepatocyte necrosis, and advanced fibrosis (fig 1A).

After high dose steroids (2 mg/kg/day) and azathioprine (2 mg/kg/day) treatment she made a slow biochemical response over three months (bilirubin 30 $\mu\text{mol/l}$, AST 79 IU/l, γ -glutamyltransferase 194 IU/l, INR 0.89). One month later she developed headaches and hypertension, requiring nifedipine and atenolol, and the steroid dose was reduced to 0.5 mg/kg/day and cyclosporin A (4 mg/kg/day) added. This made a little impact to her liver function and four months later she developed first signs of liver failure (encepha-

lopathy grade I, INR 1.67). Tacrolimus (0.2 mg/kg/day) substituted cyclosporin A with no effect. An additional two weeks' trial of mycophenolate mofetil (40 mg/kg/day) made no difference. A repeated biopsy specimen showed massive collapse of liver parenchyma with less giant cells (fig 1B). OLT was not considered due to our past experience with recurrence in the graft.³ Meanwhile, she developed nephrotoxicity and *Salmonella typhi* murem septicaemia and died with liver and renal failure during a further septic episode 11 months after diagnosis.

Evans' syndrome and CPGCH are rare entities, both associated with immune abnormalities and various autoantibodies.^{2,4} We believe that their occurrence in our patient is not coincidental, but suggestive of a common immune dysregulation mechanism.

NEDIM HADZIC

BERNARD PORTMANN*

Department of Child Health and Liver Unit*,
King's College Hospital,
Denmark Hill, London SE5 9Rf

IVOR LEWIS

Crawley Hospital,
West Green Drive,
Crawley RH11 7DH

GIORGINA MIELI-VERGANI

Department of Child Health,
King's College Hospital,
Denmark Hill, London SE5 9Rf

Figure 1 (A) Liver histology at age 6 showing a severe hepatitis with focal cell necrosis and prominent multinucleated giant hepatocytes. (B) Four months later there is a marked progression of the parenchymal loss, with only scattered surviving, mostly multinucleated, hepatocytes, set in a loose and mildly inflamed fibrous matrix (haematoxylin and eosin stain $\times 125$).

- 1 Savaşan S, Warrier I, Ravindranath Y. The spectrum of Evans' syndrome. *Arch Dis Child* 1997;77:245–8.
- 2 Bernard O, Hadchouel M, Scotto J, *et al*. Severe giant cell hepatitis with autoimmune haemolytic anemia in early childhood. *J Pediatr* 1981; 99:704–11.
- 3 Vilca Menendez H, Rela M, Baker AJ, *et al*. Liver transplant for giant cell hepatitis with autoimmune haemolytic anaemia. *Arch Dis Child* 1997;77:249–51.
- 4 Wang W, Herrod H, Pui CH, Presbury G, Williams J. Immunoregulatory abnormalities in Evans' syndrome. *Am J Hematol* 1983;15:381–90.

Persistence of neurological damage induced by dietary vitamin B-12 deficiency

EDITOR,—Cases with symptomatology similar to one described by von Schenck *et al*¹ have been amply reported in Indian literature under “infantile tremor syndrome”,² a term very familiar to the paediatricians of the region. Following its first description in 1957 by Dikshit,³ many more such patients were described in subsequent years.² The syndrome, affecting exclusively breast fed infants from low socioeconomic conditions, is characterised by a constellation of neurological, haematological, and skin changes. Affected infants, though plump and chubby, are frequently subnormal in weight and stature. Neurological symptoms include apathy, lethargy, expressionless face, hypotonia, developmental retardation/arrest, and later regression. Involuntary movements, usually tremors, often supervene abruptly in a majority of the cases. The cry is peculiar (high pitched and tremulous). Skin hyperpigmentation, most marked over dorsum of hands and feet contrasts with the generalised pallor of anaemia. Hair is often sparse and depigmented. Documented vitamin B-12 deficiency, megaloblastosis, and therapeutic response to vitamin B-12 administration has been observed in some but not all patients.^{4,5} It is also suggested that megaloblastosis is a

late feature of the syndrome.⁵ In other instances deficiency of other vitamins or minerals has been implicated, though the therapeutic response to supplementation has been poor.² The condition is self limited and recovery almost always occurs.²

Only a small number of cases have been described from developed countries, occurring solely in vitamin B-12 deficient exclusively breast fed infants, whose mothers had unrecognised pernicious anaemia or who were strict vegetarians. Response to treatment with vitamin B-12 in such cases was often dramatic.^{4,6} Therefore the term infantile tremor syndrome defines a broader group of infants with similar neurohaematological symptomatology, which in some cases is due to vitamin B-12 deficiency.

JATINDER S GORAYA
1357 Sector 34C,
Chandigarh 160034,
India

- 1 von Schenck U, Bender-Götze C, Koletzko B. Persistence of neurological damage induced by dietary vitamin B₁₂ deficiency in infancy. *Arch Dis Child* 1997;77:137-9.
- 2 Sharda B, Bhandari B. Infantile tremor syndrome. *Indian Pediatr* 1987;24:415-21.
- 3 Dikshit AK. Nutritional dystrophy and anemia. *Indian Journal of Child Health* 1957;6:132-6.
- 4 Jadhav M, Webb JKG, Vaishnav S. Vitamin B₁₂ deficiency in Indian infants—a clinical syndrome. *Lancet* 1962;ii:903-6.
- 5 Srikanth SG, Reddy V. Megaloblastic anaemia of infancy and vitamin B₁₂. *Br J Haematol* 1967;13:949-53.
- 6 Emery ES, Homans AC. Vitamin B₁₂ deficiency: a cause of abnormal movements in infants. *Pediatrics* 1997;99:255-6.

As subdural haematomas of different stages and lesions in the basal ganglia, occurring in an encephalopathic child without a convincing history of adequate trauma, are characteristic for both shaken baby syndrome and GAI, urinary organic acids and serum carnitine concentrations should be evaluated in the differential diagnosis. If diagnosed early, GAI is a treatable disease. In addition, there is the possibility of prenatal diagnosis and early treatment of affected siblings, and, most importantly, psychosocial consequences can be avoided for the parents suspected of child abuse.

GEORG F HOFFMANN
Department of Neuropediatrics and
Metabolic Diseases,
University of Marburg,
Deutschhausstraße 12,
D-35037 Marburg, Germany

EILEEN R NAUGHTEN
The Children's Hospital,
Dublin, Ireland

- 1 Wilkins B. Head injury—abuse or accident? *Arch Dis Child* 1997;76:393-7.
- 2 Hoffmann GF, Athanassopoulos S, Burlina AB, et al. Clinical course, early diagnosis, treatment, and prevention of disease in glutaryl CoA dehydrogenase deficiency. *Neuropediatrics* 1996;27:115-23.
- 3 Muntau AC, Röscher W, Pflüger T, Enders A, Hoffmann GF. Subdurale Hygrome und Hämatome im Säuglingsalter als Initialmanifestation der Glutarazidurie Typ I: Folgeschwere Fehldiagnose als Kindesmisshandlung. *Monatsschr Kinderh* 1997;145:646-51.
- 4 Goodman SI, Frerman FE. Organic acidemias due to defects in lysine oxidation: 2-ketoadipic acidemia and glutaric acidemia. In: Scriver CR, Beaudet AL, Sly S, Valle D, eds. *The metabolic and molecular basis of inherited disease*. New York: McGraw-Hill, 1995: 1454-60.

Abuse or metabolic disorder?

EDITOR,—It was with great interest that we read the recent annotation and commentary by Drs Wilkins and Sunderland.¹ Recently, an unusual presentation of a neurometabolic disorder, glutaric aciduria type I (GAI), was recognised to mimic shaken baby syndrome. As this association has only been described in two case reports,^{2,3} we would like to take this opportunity to heighten the awareness of the paediatric community.

GAI is an autosomal recessive inborn error of metabolism, with initially normal development and only mild to moderate macrocephalus.^{2,4} Because the bridging veins are elongated and thus seem to be more vulnerable, minor head injuries can lead to subdural haematomas, sometimes repeatedly raising a suspicion for shaken baby syndrome.^{2,3} Due to subarachnoidal effusions minimal trauma can similarly cause retinal haemorrhage further supporting the suspicion of shaken baby syndrome.

The clinical hallmark of GAI is a sudden encephalopathy, mostly occurring between 7 and 18 months of age.^{3,4} Subdural haematomas, often of different stages, and lesions in the basal ganglia may be found on neuroimaging, again raising the suspicion of child abuse. If surgical shunting of subdural hygromas and haematomas is attempted without knowing the diagnosis of GAI, effusions may even increase and further clinical deterioration occur, probably triggered by the catabolic stress during the operation and postoperative period. The children are left with a distinctive severe dystonic disorder, which may be judged as the consequence of severe brain injury afflicted by non-accidental injury.

A new college, a new direction in academic paediatrics?

EDITOR,—Article 3 of the charter of the Royal College of Paediatrics and Child Health states "The objects of the college shall be to advance the art and science of paediatrics", highlighting the importance of academic medicine to paediatrics. To ensure that this objective continues to be fulfilled we need to create a climate which will encourage trainees to pursue an academic career. Several recent articles, however, have reported discontent in academic medicine.¹⁻³ In addition Raine recently described the paucity of hard information about the career paths of junior paediatric staff studying for MDs.⁴ This makes it virtually impossible to assess the true state of research and is a barrier to improving both standards and recruitment. This problem could be addressed by a system of registration and monitoring for all trainees and supervisors engaged in research, and also for their host institutions. This proposal has other benefits: it would strengthen academic training by peer review of projects at an early stage, allow supervision of supervisors, and pastoral care for researchers.

Trainees think that academic medicine lacks a formal training programme, takes longer, and is a more risky career strategy than clinical training.⁵ These perceived differences have been exacerbated by the implementation of Calman, and are of particular relevance to paediatrics where a high proportion of trainees are female. In addition, there has traditionally been more emphasis on clinical skills than research during paediatric training. Practical measures, such as an

assessment of competence when awarding a certificate of completion of specialist training, rather than just time of service, may encourage paediatricians to pursue an academic career. Finally, Calman has imposed a "regional" structure on medical training which may penalise trainees in small disciplines, which are particularly common in paediatrics. This issue could be addressed by facilitating movement between regions in designated specialties.

Many of the changes which we have suggested require a significant readjustment of attitudes to academic research in paediatric training. Such changes would have been difficult to implement in the past, but the creation of our new college with its stated commitment to improving "the science of paediatrics" provides a perfect springboard for these new initiatives.

PAUL WINYARD
BILL CHAUDHRY
CATHERINE CALE
(On behalf of the ICH/GOS Clinical Research Fellows
and Lecturers Forum)
Developmental Biology Unit,
Institute of Child Health,
30 Guilford Street,
London WC1N 1EH

- 1 Anonymous. UK paediatric clinical research under threat. *Arch Dis Child* 1997;76:1-3.
- 2 Savill S. The next generation of academic clinicians. *Lancet* 1997;350:58.
- 3 Aynsley-Green A. What's to be done about the malaise in science training in paediatrics and child health? *Arch Dis Child* 1998;78:101-4.
- 4 Raine J. Current means of obtaining a MD degree in the UK. *Arch Dis Child* 1998;78:174-7.
- 5 Chaudhry B, Winyard P, Cale C. Academia, the view from below. *BMJ* 1997;315:560-1.

Weaning

EDITOR,—Infant feeding advice to be effective needs to be simple and universal. The COMA report on weaning diet recommends the use of pasteurised full fat milk as a daily drink for children between 12 months and 2 years.¹ This was easily described in the past as "silver top doorstep milk". Shopping habits have changed over the past decade and the proportion of doorstep milk has slipped from 80% of total milk sales in 1986 to 40% in 1996 (National Dairy Council, 1997). Major supermarket chains show a bewildering lack of consistency in the description of full fat milk and colour coding for skimmed and semiskimmed varieties. This presents difficulties for several groups of consumers: those whose literacy is poor, those whose vision is poor, and those whose first language is not English. I am sure it has also been the experience of competent but hurried shoppers to find that they have made mistakes.

I suggest that those of us involved in giving dietary advice should lobby the major food retailers to introduce uniformity of labelling and package colour. This would increase the effectiveness of health advice and potentially benefit the nutritional status of the nation's children.

FRANCES WEBSTER
St Bartholomews and the Royal London School of
Medicine and Dentistry,
Department of General Practice and Primary Care,
Medical Sciences,
London E1 4NS

- 1 Department of Health. *Weaning and the weaning diet*. London: HMSO, 1994. (Report on Health and Social Subjects 45.)

BOOK REVIEWS

Paediatric Oncology. Clinical Practice and Controversies. 2nd Ed. Edited by C R Pinkerton and P N Plowman. (Pp 799; £135 hardback.) Chapman and Hall Medical, 1997. ISBN 0-412-63080-X.

American textbooks contain few citations to articles published outside the United States, a form of literary chauvinism that sometimes denies the reader a balanced view of the world, so it is pleasing to see that by recruiting authors almost exclusively from Europe, Ross Pinkerton and Nick Plowman have produced an alternative to the big American texts rather than a competitor.

Like any multi-author effort it has its good and its not so good sections, but there are some real gems. Charles Stiller's essay on epidemiology is a model, and his graph showing the rising number of survivors of childhood cancer will be flagrantly copied and projected at meetings for years to come. Chris Mitchell and Kathy Pritchard-Jones do an excellent job of making tumour suppressor genes and the like understandable, even for those who (like me) do not know one end of a Southern blot from the other.

The main tumour-by-tumour section is good and sufficiently well referenced to get an interested reader quickly into the core literature, and the problem of how to cope with rare and strange tumours that do not fit elsewhere is neatly despatched by Nick Plowman in a "stamp collectors'" chapter which he must have enjoyed writing as much as I enjoyed reading. The book is adequately up-to-date with citations to articles up to late 1995, particularly important in chapters dealing with treatment.

The section covering supportive treatment is fine as far as it goes, but is relatively perfunctory for what consumes most of the resources in children's cancer units and where prejudice abounds. While paediatric oncologists may agree on collaborative protocols for chemotherapy or radiotherapy, there is considerable variability in all other aspects of treatment—intravenous access, prevention of infection, dietary advice, antibiotic regimens, and the like. Many of the discrepancies between centres are clinically unimportant, but they are a common source of worry for parents if their children are treated differently at different hospitals. Books like this don't help if they offer guidance which appears as dogma, and there is an appendix at the back—practical guideline tables—where arguably this is so. It describes what antibiotics to choose, what dose and frequency and so on, and in so doing oversimplifies. Inexperienced readers may have difficulty reconciling what they read with what they see in practice, and with what they may be taught in any particular unit.

My only other negative feelings are predictable as I am a haematologist. The business of the pathology and classification of the leukaemias is ours, not that of morbid anatomists. Fair's fair. More importantly, in future

editions (I say this confident that there will be future editions), as blood products are probably the most dangerous drugs oncologists will ever prescribe, and as their use and complexity is increasing, perhaps the editors could give transfusion medicine a section of its own. If something has to go to make room I would be happy to make suggestions.

J S LILLEYMAN
Professor of paediatric oncology

Cancer in Children. Edited by James S Malpas. (Pp 933; £45 hardback.) Royal Society of Medicine Press, 1996. ISBN 1-85315-282-X. (Serial: *British Medical Bulletin* 1996;52:No 4.)

Dramatic improvements in the diagnosis, management, and final outcome of children with a malignancy have been seen over the past 30 (particularly in the last 10) years. Rather than make this slim book a comprehensive textbook on paediatric oncology, editor James Malpas has selected topics which cover areas where the recent growth of knowledge has been especially marked. In the introduction Professor Malpas outlines how treatment for these children has progressed over the 30 year period with the development of new chemotherapeutic agents and treatment schedules, and the establishment of highly organised cooperative groups running the treatment programmes. The United Kingdom Children's Cancer Study Group (UKCCSG), formed in January 1977, now runs many of the cooperative trials in the UK. Almost all of the chapters in this book have been written by UK members of the UKCCSG. Exceptions are Rick Womer from Philadelphia who has written on childhood sarcomas, and Jose Brosard and his colleagues from Montreal Children's Hospital who have contributed a chapter on neuroblastoma.

New findings in the genetics and biology of neuroblastoma have led to an improved understanding of the behaviour of this wildly variable tumour. As examples, both amplification of the *n-myc* gene and loss of heterozygosity of chromosome 1p in neuroblastoma cells may predict a poor prognosis. The genetics of paediatric malignancies are covered in several chapters including a discussion on its importance in the origins of childhood cancer. Lymphoblastic leukaemia, non-Hodgkin's lymphoma, acute lymphoblastic leukaemia, and paediatric myelodysplasias are all covered in separate chapters, as are brain tumours and histiocyte disorders.

Chemotherapy is vital in treating most childhood malignancies; one chapter comprehensively covers the pharmacological and clinical aspects of new and well established paediatric anticancer agents. Other more general chapters include the epidemiological factors relevant to the incidence of childhood cancer, cancer in adolescence (which is increasingly managed by paediatricians), and of course, the last addresses the crucial area of long term survivors. As with all books containing a collection of separately written reviews some chapters are more informative than others. However, that apart, this book is packed with up-to-date information on paediatric malignancies and I recommend it to

anyone involved in the care of children with cancer.

KATE WHEELER
Consultant paediatric oncologist

Diagnosis and Management of Paediatric Respiratory Disease. 2nd Ed. By Robert Dinwiddie. (Pp 352; £40 hardback.) Churchill Livingstone, 1997. ISBN 0-443-05084-8.

An English summer day with rain pouring down outside seemed the ideal opportunity to tackle Bob Dinwiddie's *Diagnosis and Management of Paediatric Respiratory Disease*. Like many single author texts this is well written, easily read, and internally consistent. The task is enormous: to cover the whole of respiratory disease in a slim volume. It is the ideal membership text with sufficient detail to provide answers for all commonplace questions and good references for further reading. The down side is that the information is sometimes rather hidden in the text and better use could be made of bullet points, diagrams, and tables.

Paediatric respiratory disease is a fast growing subspecialty and new information from molecular genetics and biology is broadening our understanding if not yet directly affecting management. Many examples could be given: in the understanding of cystic fibrosis, the basis of wheeze and asthma, the production of mucins, and the role of defensins and antibacterial peptides in the lungs. Little of this excitement is transmitted in this text, which is a main line practical book.

It is of course difficult to maintain a balance between being comprehensive and providing sufficient depth. The chapter on immune disease in the lung is excellent but occupies 32 pages while a similar 30 pages are devoted to asthma. The asthma chapter is disappointing. Dr Dinwiddie is clearly a "lumper" rather than a "splitter" and the interesting and controversial area of wheezing in infancy is not really addressed. I liked the short chapter on rare diseases of the lung. The choice and reproduction of radiographs was excellent throughout.

Many single author textbooks are decidedly idiosyncratic in management recommendations such that one sometimes wonders if they are single author by default. This is decidedly not so in this text. Management suggestions are practical and straightforward and I had only small quibbles. I do not think a possible foreign body aspiration is a mandatory indication for rigid bronchoscopy but prefer to look first using a flexible 'scope under sedation and proceed only to general anaesthetic and rigid bronchoscopy if there is a foreign body present. Piperacillin should not be recommended as a first choice intravenous antibiotic in cystic fibrosis because of the high risk to patients of allergic reactions including anaphylaxis.

Overall however this book represents mainstream British diagnosis and management and is recommended reading for those seeking further information on respiratory disease in children. Unfortunately it will not attract or stimulate the next generation of clinical scientists.

ANNE THOMSON
Consultant paediatrician