extracerebral: (i) there was little evidence of midline shift, which in view of the size of the bleeding would argue against its location within the brain substance; (ii) this was almost a 'chance' finding in an apparently healthy neonate, suggesting very little brain damage in itself; and (iii) there was no residual tissue loss on follow up ultrasound scan.

In case 7 (fig 6) the text describes a cerebral contusion, which in my view is synonymous with intracerebral haemorrhage of some sort. This bleeding was not big enough to explain the amount and type of tissue loss seen on follow up.

Finally there seems to be little doubt that in patients 1, 5, and 7 obvious mechanical difficulties during delivery, in the absence of clinical signs of hypoxic-ischaemic encephalopathy or bacteraemia, preceded tissue loss within an arterial region of the cerebrum (twice the middle cerebral artery). Whether or not this observation is legally treacherous we tend to leave to solicitors and judges as a matter of eternal debate. From a medical point of view the association stands.

Brain uptake of amino acids in intravenously fed preterm infants

SIR,—Up to 500 000 infants, mostly preterm, in Britain alone have received the intravenous amino acid solution, Vamin 9 (Kabi Pharmacia). Hyperphenylalaninaemia is often induced by Vamin 9,^{1,2} resulting in speculation about brain damage,² as in phenylketonuria (PKU). In PKU cerebral damage probably follows excessive brain uptake of phenylalanine with competitive suppression of uptake of other neutral amino acids to perhaps critically low levels.³

To explore whether such deranged brain uptake of amino acids might occur in intravenously fed preterm infants, sequential plasma samples were analysed for amino acids as described previously¹ in 336 preterm infants below 1850 g birth weight undergoing neonatal care. Brain fluxes of amino acids were calculated from amino acid profiles using a rat model experimentally derived by Pratt.³

Infants were divided into three groups: (1) those never receiving Vamin 9, (2) those who received Vamin 9, and (3) infants on Vamin 9 who developed hyperphenylalaninaemia (peak plasma phenylalanine >300 µmol/l). The table shows data on mean plasma concentrations and calculated mean brain uptake values for neutral amino acids (excluding tryptophan which was not measured). These are compared with corresponding values for normal children and those with untreated and treated PKU.³

The marked brain uptake of phenylalanine, seen in PKU, did not occur in any of the groups of preterm infants. Furthermore, competitive suppression of methionine, histidine, isoleucine, threonine, and tyrosine seen in untreated PKU was not seen in Vamin 9 fed preterm infants. Hypertyrosinaemia, commonly seen in preterm infants, did not appear to result in increased brain uptake of tyrosine. These findings probably reflect the concomitant increase of competing amino acids during intravenous nutrition,⁴ in contrast to the isolated hyperphenylalaninaemia in PKU.

Some caution is required in extrapolating results of an animal model to preterm infants in whom alterations, for example, in cerebral blood flow and blood brain permeability could theoretically influence the results; and the absence of tryptophan data could have affected our calculations. Nevertheless, these concerns are theoretical and kinetics of cerebral amino acid uptake have been shown generally to apply across species, including man.⁵

Recently we showed that hyperphenylalaninaemia induced by Vamin 9 was not associated with an adverse developmental outcome at 18 months.¹ The data presented here provide a potential explanation, as it is unlikely that hyperphenylalaninaemia could have damaged the brain if cerebral uptake of amino acids was unaffected. These preliminary data, therefore, do not provide a biological basis for the view that Vamin 9 could damage the brain.

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Mean plasma values; µmol/l (P) and estimated mean brain fluxes; nmol per min/g brain (F). Groups 1-3 are values in preterm infants; groups 4-6 are published values for comparison

Amino acid	Group 1 No Vamin		Group 2 Vamin-9		Group 3 Vamin-9 (peak phenylalanine) >300 µmol/l		Group 4 Normal children		Group 5 Untreated PKU		Group 6 Treated PKU	
	P	F	P	F	P	F	P	F	P	F	P	F
Phenylalanine	69	5.9	125	5.9	463	5.9	68	7.3	1496	45.0	333	30.1
Methionine	22	1.7	33	1.6	92	1.7	50	3.1	11	0.2	10	0.3
Histidine	137	4.5	144	4.9	240	4.7	74	5.6	47	1.0	99	2.7
Isoleucine	57	1.9	72	1.7	143	1.8	55	2.1	39	0.4	129	1.9
Threonine	238	1.4	214	1.6	252	1.5	92	0.9	67	0.2	217	0.9
Tyrosine	144	4.2	225	4.1	824	4.1	50	3.9	40	0.9	86	2.6

BOOK REVIEW

Molecular Biology for Obstetricians and Gynaecologists. By Phillip Bennett and Gudrun Moore. (Pp 174; hardback.) Blackwell Scientific Publications Ltd, 1992. ISBN 0-632-02744-4.

Molecular biology appears to be coming the cornerstone of medicine and infiltrates itself into all aspects. This book is designed to provide obstetricians with the fundamentals of molecular biology and molecular genetics, although I rather fear that its style will discourage many from reading it in detail. The information available is fascinating, but it takes some effort to extract it from the book's text and although a student of the subject will be keen to read through the various chapters, I fear that a busy obstetrician and gynaecologist will not. Indeed what they require is a 'quick-fix' and easy access to their understanding on the subject.

To some extent the book appeared to be almost in two halves. The first deals with the more basic information on the genome and the second, which is really subdivided into two parts both technical and practical, discusses the more fundamental molecular biological problems. Although it is not clear whether one or other of the authors was involved separately with these parts, there is some overlap particularly between the human genetic and prenatal diagnosis chapters. There are some interesting omissions which probably reflect that this book is about molecular biology rather than genetics. For example there is no discussion of Robertsonian translocation and the terms 'expression' and 'penetrance' are not used or defined.

I think this book has many admirable qualities and certainly, for the reader who has time, will provide a wealth of useful information concerning molecular biology. Unfortunately, I fear that many obstetricians and gynaecologists will not find it, to use the common colloquialism, user-friendly, although undoubtedly an understanding of the language of molecular biology will become imperative for all of us in the near future.