similar uptake of ^{14}C -cholesterol in Schilder's disease and control cells when cultured in labelled medium for 13 days.

The difference between our results and those of Burton and Nadler (1974) are unexplained. Clearly more studies are required.

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REFERENCES

- Burton, B. K., and Nadler, H. L. (1974). Schilder's disease: abnormal cholesterol retention and accumulation in cultivated fibroblasts. *Pediatric Research*, **8**, 170.
Eto, Y., and Suzuki, K. (1971). Fatty acid composition of cholesterol esters in brains of patients with Schilder's disease, GM1-gangliosidosis and Tay-Sachs disease, and its possible relationship to the β -position fatty acids of lecithin. *Journal of Neurochemistry*, **18**, 1007.
Forsyth, C. C., Forbes, M., and Cumings, J. N. (1971). Adrenocortical atrophy and diffuse cerebral sclerosis. *Archives of Disease in Childhood*, **46**, 273.
Hoefnagel, D., Brun, A., Ingar, S. H., and Goldman, H. (1967). Addison's disease and diffuse cerebral sclerosis. *Journal of Neurology, Neurosurgery and Psychiatry*, **30**, 56.

Intramuscular versus oral phenytoin

Sir,

The use of intramuscular phenytoin was recommended for seizures in the review article on bacterial meningitis by Hambleton and Davies (*Archives*, 1975, **50**, 675).

Prior reports comparing oral versus intramuscular administration have shown conflicting results. Recent evidence (Serrano and Wilder, 1974; Serrano *et al.*, 1973) has shown that a portion of injected phenytoin is released immediately and the remainder is released over a prolonged period; the half-life is prolonged and drug levels are low. In addition, experimental studies (Wilensky and Lowden, 1973) have shown crystallization of diphenylhydantoin and haemorrhage in the injection site. Serrano and Wilder (1974) showed this to be a variable finding but with chromatographic analysis phenytoin was retained at the injection site at 24 hours.

In seriously ill or unconscious patients in whom adequate levels are required, phenytoin must be given *intravenously* with its recommended caution. There appears to be little place for the use of intramuscular

phenytoin because of variable blood levels and potentially harmful effects on muscle. Should it be necessary, the duration of intramuscular injections should be short and blood levels should be monitored to achieve the desired therapeutic range.

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REFERENCES

- Serrano, E. E., and Wilder, B. J. (1974). Intramuscular administration of diphenylhydantoin. *Archives of Neurology*, **31**, 176.
Serrano, E. E., Royce, D. B., Hammer, R. H., and Wilder, J. B. (1973). Plasma diphenylhydantoin values after oral and intramuscular administration of diphenylhydantoin. *Neurology*, **23**, 311.
Wilensky, A. J., and Lowden, J. A. (1973). Inadequate serum levels after intramuscular administration of diphenylhydantoin. *Neurology*, **23**, 318.

We showed the letter from Dr. D'Souza to Dr. Davies and Dr. Hambleton, who replied as follows:

We are grateful to Dr. D'Souza for drawing our attention to the fact that release of a portion of intramuscularly injected phenytoin may occur gradually over a prolonged period. This makes it, as he says, an unsuitable drug for the immediate treatment of fits. However, we suggested either intravenous diazepam or intramuscular paraldehyde for this, to be followed by short-term anticonvulsant therapy such as phenobarbitone or phenytoin. If oral treatment is not possible, as is so often the case in the very sick infant or child, then intramuscular phenobarbitone would be the drug of choice after the initial treatment.

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Blood urea levels in artificially-fed infants

Sir,

Dale *et al.* (1975) report high levels of blood urea in artificially-fed infants, confirming the results of a previous study by Davies and Saunders (1973). This finding was a surprise to us, for it is in disagreement with our daily experience in hospitalized infants fed on artificial milk, and prompted us to check plasma urea, sodium, and protein in 22 consecutive infants (14 male, 8 female) aged between 14 days and 3 months. All were convalescent from benign, nondigestive disorders, and were fed on powdered half-skimmed cow's milk formulae prepared at the usual 15% concentration, either alone (15 infants), or with additional cereals and infant food (7 infants).

TABLE
Blood chemistry in 22 artificially-fed infants

	(a) Bottle-fed (n=15) Artificial milk alone*				(b) Bottle-fed (n=7) artificial milk + solid foods*				Difference between (a) and (b)	Combined data (a + b)	
	Range	Mean	SD	SEM	Range	Mean	SD	SEM		Range	Mean (±SD, SEM)
Age (m)	0.5-2.75	1.14	0.7	0.18	1.5-3.0	2.1	0.6	0.23	P<0.001	—	—
Weight (kg)	2.8-4.4	3.5	0.5	0.13	3.5-6.2	4.8	0.3	0.12	P<0.001	—	—
Plasma urea (mg/100 ml)	20-45	25.7	7.8	—	20-45	26.4	9.0	—	NS	20-45	25.9 (±8.0, 1.7)
Plasma protein (g/100 ml)	4.5-6.3	5.3	1.5	0.4	4.9-6.5	5.8	0.6	0.2	NS	4.5-6.5	5.7 (±1.3, 0.27)
Plasma sodium (mEq/l)	130-139	135.4	3.2	0.9	130-141	134.9	3.9	1.5	NS	130-141	135.2 (±3.4, 0.73)
Haematocrit (%)	28-43	37.9	8.3	2.2	29-35	32	2.2	0.9	P<0.001	—	—
Environmental temperature (°C)	20-26	24.5	1.4	0.35	22-27	24.4	1.8	0.7	NS	20-27	25.7 (±1.5, 0.32)

* Different commercially available half-skimmed powdered milks were used at the usual 15% concentration. These milks were either conventional (15) or modified (7). No significant difference was found between the infants fed on unmodified and modified milks.

Venous blood was taken at 11 a.m., after two feeds at 6 a.m. and 9 a.m. Room temperature was noted in each case. Plasma urea was determined by the urease method in a Beckman BUN analyser; plasma sodium, using a flame photometer; total plasma protein by the biuret method; haematocrit by microtube centrifugation. Normal values for our laboratory are: plasma urea ≤ 35 mg/100 ml; plasma sodium 135-140 mEq/l; plasma protein in infants aged less than 3 months 5.0-6.5 g/100 ml; haematocrit 30-45%.

Our data are summarized in the Table. Plasma urea (mean 26 mg/100 ml) lies within normal limits for all but 3 infants (40, 45, and 45 mg/100 ml). The proportion of these high urea levels is small (3/22=14%) and not significant, and is at variance with the findings of Davies and Saunders (75-88% above 40 mg/100 ml), and Dale *et al.* (mean plasma urea ≈ 50 mg/100 ml). Plasma proteins, plasma sodium, and haematocrit in our infants all fall within normal limits, in spite of a fairly high room temperature (mean 26°C) favouring increased evaporative water losses.

Thus the blood urea levels in our artificially-fed infants lie within normal limits. The high levels observed by others may therefore be attributed not to cow's milk in itself, but to some condition associated with artificial feeding, for instance the well-known tendency to prepare a too concentrated milk formulae, as shown by Taitz and Byers (1972). Infants' artificial feeding has its rules, which though simple, are often neglected and have to be constantly recalled. This is a matter of dietary education by physicians, midwives, social workers, and milk manufacturers.

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REFERENCES

- Dale, G., Goldfinch, M. E., Sibert, J. R., and Webb, J. K. G. (1975). Plasma osmolality, sodium, and urea in healthy breast-fed and bottle-fed infants in Newcastle upon Tyne. *Archives of Disease in Childhood*, **50**, 731.
Davies, D. P., and Saunders, R. (1973). Blood urea: normal values in early infancy related to feeding practices. *Archives of Disease in Childhood*, **48**, 563.
Taitz, L. S., and Byers, H. D. (1972). High calorie/osmolar feeding and hypertonic dehydration. *Archives of Disease in Childhood*, **47**, 257.

Three periodic diseases as causes of recurrent abdominal pain in childhood

Sir,

In an article in the *Archives* (Christensen and Mortensen, 1975), in three cited articles therein, and in a current textbook of paediatrics (Vaughan, McKay, and Nelson, 1974) psychogenic reactions, irritable colon, and other conditions are considered to be the main causes of recurrent abdominal pain in childhood. No mention is made of three uncommon, repetitive entities characterized by abdominal pain as described in 1948 (Reimann, 1963). These are periodic peritonitis, periodic oedema (hereditary angio-oedema), and periodic pancreatitis (chronic relapsing pancreatitis). All three are heritable, usually begin in infancy, childhood, or adolescence, and have episodes of the respective diseases lasting a day or more that repeat often with remarkable regularity every 1, 2, 3, or 4 weeks, or irregularly, for decades. Between episodes patients are well. Episodes may cease spontaneously for months or years, only to resume at the same or different rate.