subsequent delay in motor milestones, and her 10-year-old sister with bilateral pes cavus and talipes equinovarus, otherwise symptom-free, who was also found to have facial weakness and EMG evidence of myotonia; two floppy infants with delayed milestones whose related mothers have a subclinical (almost) involvement; and a 6-year-old boy who presented with bilateral facial palsy and whose symptom-free mother and grandfather have EMG evidence of myotonia.

The typical EMG pattern is readily missed, unless carefully searched for in distal as well as more proximal muscles. Muscle biopsy may be histologically normal in these children, but may show selective type 1 fibre atrophy with histochemical enzyme reactions.

**Late onset form of globoid cell leucodystrophy.** Desmond Patrick and John Wilson (introduced by John Wilson). (Department of Biochemistry, Institute of Child Health, 30 Guilford Street, London WC1N 1EH.)

**Elevated erythrocyte 2,3-diphosphoglycerate concentration in primary trisomic Down's syndrome.** Elizabeth Nelson and Philip F. Benson. (Department of Clinical Haematology, University College Hospital Medical School, London W.C.1, and Paediatric Research Unit, Guy's Hospital, London S.E.1.) The level of 2,3-diphosphoglycerate (DPG) in erythrocytes is an important factor in regulating oxygen delivery to the tissues. It does this by binding to deoxyhaemoglobin and has the effect of lowering the haemoglobin affinity for oxygen. DPG is a glycolytic intermediate and its concentration is dependent upon the activity of the enzymes in the pathway. In Down's syndrome there is a marked increase in the activity of erythrocyte phosphofructokinase, a unidirectional enzyme which plays an important role in the regulation of glycolytic rate.

We have therefore investigated the possibility of a concomitant rise in erythrocytic DPG concentration.

The DPG level was higher in 20 subjects with primary trisomic Down's syndrome (12 males, 8 females, mean age 17-6 years, range 9 to 26 years; mean 5·37 µmoles/ml RBC; SD 0·625) than in 20 matched controls (mean 4·32 µmoles/ml RBC; SD 0·368; P < 0·001).

Changes in DPG concentration may be influenced by red cell pH and conditions of hypoxia as well as glycolytic activity. Anaemia was excluded in our patients (mean PCV = 43·1%; SD 3·4; mean Hb concentration 14·7 g/100 ml; SD 1·498).

One can calculate that the observed increase in DPG concentration would produce a 14% increase in PaO₂ when associated with Hb-A. Though there would not be such a significant difference with Hb-F we do not know the effect of DPG on embryonic Hbs and further studies are necessary to determine the DPG level in Down's fetuses and to assess any possible effects that changes might have on fetal growth and development.

**Creatine phosphokinase (CPK) in the CSF: its value in the management of children with myelomeningocele and hydrocephalus.** Margaret B. Drummond and Neville R. Belton (introduced by J. Keith Brown). (Department of Child Life and Health, and Royal Hospital for Sick Children, Edinburgh.)

A need exists for a reliable test which will indicate 'brain damage' during the course of acute or chronic neurological disease. A number of studies have previously investigated the level of enzymes and other suitable substances in the CSF.

Creatine phosphokinase is present in high concentration in brain as well as in skeletal and heart muscle. Previous studies (Herschkowitz and Cumings, 1964; Nathan, 1967) have suggested increased CPK activity in a number of neurological diseases, particularly in patients with progressive hydrocephalus and symptomatic epilepsy. Sherwin, Norris, and Bulcke (1969) have shown that CSF contains only the brain isoenzyme of CPK.

In this study, which is part of a wider investigation of CSF–CPK in children with neurological disorders, all 65 children studied had a myelomeningocele and hydrocephalus. CPK was estimated, along with routine bacteriological and biochemical estimations, and pressure measurements taken whenever a ventricular tap was indicated clinically. CSF was withdrawn during the investigation and treatment of increased intracranial pressure, ventriculitis, and blocked shunts. Serum CPK levels were estimated concurrently in 11 cases.

The main findings were: (1) No correlation was found between serum and CSF levels of CPK, or between CSF–CPK and protein levels or pressure readings.

(2) Newborn infants with myelomeningocele have increased levels of CPK in CSF. (3) Increased CSF–CPK levels are also found in most cases of raised intracranial pressure and in ventriculitis where they tend to parallel the clinical course of the infection. (4) CPK levels in the myelomeningocele lesion fluid were much higher than those in ventricular CSF on concurrent specimens.

Thus there are indications that CSF–CPK determinations can be useful in the management of blocked or malfunctioning shunts but may not add additional information in the management of ventriculitis.

**REFERENCES**


**Fat absorption in children with chronic liver disease.** J. F. T. Glasgow (introduced by I. J. Carré, Belfast). The digestion and absorption of dietary fat in 15 children (aged 2–90 months) with varying degrees of chronic liver disease has been investi-

*Carried out in co-operation with Drs. J. R. Hamilton and A. Sass-Kortsak, The Hospital for Sick Children, Toronto, Canada.
gated. 8 had proven extrahepatic biliary atresia and the others had intrahepatic obstructive liver disease of undetermined aetiology since early infancy.

A five-day fat balance showed that 11 patients had steatorrhoea. The mean fat excretion was 35 ± 10% of dietary intake. Hence about two-thirds of the ingested fat was absorbed. All of these had obstructive jaundice and 8 were on or below the 10th centile for length and weight. By contrast, 3 of the 4 patients who absorbed fat normally were above the 50th centile. 2 of these had normal bilirubin concentrations.

Proximal intestinal contents were aspirated after ingestion of a standard test meal which contained polyethylene glycol (PEG) as unabsorbable marker. Luminal concentrations of bile salts, lipid, and PEG were measured and, after ultracentrifugation, also the proportion of the lipid present in the aqueous phase of the aspirate.

The mean bile salt concentration was significantly less in those patients with steatorrhoea (P <0·005). Indeed bile salt concentrations above the critical micellar concentration were found in only 3 of the 4 children whose fat absorption was normal. No significant difference was shown in mean PEG or lipid concentration between patients with steatorrhoea and those with normal fat absorption. Patients with steatorrhoea, however, solubilized significantly less fat during each of the four 30-minute collection periods than those who absorbed fat normally (P <0·005). A positive correlation exists between the concentration of luminal bile salts and the proportion of dietary lipid solubilized (r = +0·8).

These studies support earlier investigations in adult patients and highlight the close relation between the intestinal bile salt concentration and fat absorption. It is pointed out, however, that a proportion of dietary fat is absorbed even when bile salts are lacking.

One hour blood D-xylose as a screening test for malabsorption in infants and young children. C. J. Rolles and M. J. Kendall (introduced by P. N. Rayner). (Institute of Child Health, Francis Road, Birmingham 16.) A single blood xylose estimation one hour after an oral dose of 5 g has proved to be a good guide to upper gastrointestinal absorption. 40 control subjects with no evidence of gastrointestinal disorder had a blood xylose level of over 25 mg/100 ml, whereas 9 untreated coeliac patients matched for age had levels below 16 mg/100 ml.

When repeated daily or weekly under standard conditions, the results were consistent in any given patient.

Untreated coeliac patients put on a gluten-free diet all showed a rise in xylose absorption within a few days. A treated coeliac given gluten for only one day showed a marked drop in xylose absorption—this reverted to normal when continuing the gluten-free diet. The use of this test called the 'gluten provocation test' had also proved to be of value in making a retrospective diagnosis of coeliac disease in a child put on a gluten-free diet in the past without a definitive biopsy.

Absorption of calcium by premature infants using a stable isotope. D. Bartrup and A. Sutton. (St. Mary's Hospital Medical School, London W.2.) Tracer investigations can be done in human infants or children without exposure of the subject to ionizing radiation. This paper reports the first application of stable 46Ca as a marker for the measurement of calcium absorbed in bottle-fed newborn premature infants. A trace amount of calcium enriched in 46Ca is administered to the infant as a solution of the chloride mixed with a normal feed. After the feed, urine and faeces are separately collected and specimens of blood obtained. The 46Ca content of the samples is estimated by means of neutron activation analysis. The results obtained with this technique have been compared with conventional metabolic balance studies.

Effect of diet on water intake and urinary solute concentrations in infants. L. S. Taiz. (Department of Child Health, Children's Hospital, Western Bank, Sheffield S10 2TH.)

Circadian variation in plasma 17-hydroxyprogesterone in patients with congenital adrenal hyperplasia. Sheila M. Atherden, N. D. Barnes, and D. B. Grant (introduced by June K. Lloyd). (Division of Infant Development, Clinical Research Centre, Watford Road, Harrow, Middlesex.) (Page 602 of this issue.)

Defective aldosterone synthesis: 18-hydroxylase defect. Anne E. McCandless and William Hamilton. (Royal Hospital for Sick Children, Yorkhill, Glasgow.)

Studies on hydrenephrosis. M. H. Winterborn (introduced by R. H. White). (Children's Hospital, Birmingham.) Papillary necrosis is rarely diagnosed in human hydrenephrosis and then only in association with acute infection. On the other hand, animal experiments, particularly those of Hodson and his colleagues with the pig, have suggested that this complication may commonly cause the anatomical changes of hydrenephrosis.

In the course of a retrospective study of hydrenephrosis in children's kidneys at the Queen Elizabeth Hospital for Children, Hackney, an attempt was made to discover the frequency of papillary necrosis. The methods used were naked eye inspection, microdissection and counting of the number of ducts opening into each minor calyx using the dissecting microscope. Papillary necrosis was thought to have occurred in 3 out of 63 kidneys but was apparent to the naked eye in only one. There was good evidence that all three kidneys had been infected. With increasingly severe hydrenephrosis there is a tendency for the duct count to rise and for the openings to become scattered over the surfaces of the papillae. This is interpreted as evidence of distortion of the kidney and it is suggested that 'back pressure distortion' rather than obstructive atrophy would be a more accurate, if less euphonious descriptive term for the radiological changes of hydrenephrosis.