mg/kg per day). This suggests that dietary restriction in infants with hyperphenylalaninaemia will be as severe as in classical phenylketonuria.

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Red cell phospholipid determination in diagnosis of neurological disease

In many cases of disorders of the central nervous system in childhood there is associated mental subnormality. Frequently the severity of the physical disorder makes the assessment of the degree of intellectual deficit a very difficult problem, especially when blindness is a contributory factor. The aetiology of such cases is extremely variable, but from the point of view of prognosis and family counselling the differentiation between disorders due to prenatal, perinatal, or postnatal brain damage and a demyelinating or dysmyelinating disease is most important. Clearly, any simple procedure enabling such a differentiation in order to select suitable cases for more sophisticated procedures, such as cerebral biopsy, would prove invaluable.

Following the report by Hooghwinkel, van Gelderen, and Staal (1969) that the sphingomyelin content of erythrocytes was found to be low in children with progressive brain disease, we decided to apply their method, modified in the light of more recent technical developments, to a number of patients suffering from severe mental and physical handicaps of uncertain cause. In all, 21 children were examined, both male and female, in the 3 to 14 years age group. In addition, 4 other groups of children with previously diagnosed brain disorders were studied (37 cases), along with a group of normal subjects (25 cases). The classification of the 37 cases broadly follows that of Hooghwinkel et al. (1969) except that we had no patients in his Group II (juvenile amaurotic idiocy), but we had an additional group (1a) consisting of patients not expected to show abnormal erythrocyte sphingomyelin content.

Patients

There were 83 patients studied, and they were divided into groups as follows.

Group I. Normal subjects. These were 25 subjects who were either inpatients of Lea Castle Hospital, Kidderminster, or were attending outpatient departments of Birmingham Children’s Hospital or the Royal Orthopaedic Hospital, Birmingham. These patients were selected because diagnosis and treatment were considered unlikely to affect the quality of the erythrocyte membrane, and it was possible to use the red cell mass from a heparinized specimen already obtained for the determination of some substance in the plasma. 12 males and 13 females were included, their ages ranging from 2 months to 16 years.

Group I(a). Children with known causes of brain damage not expected to involve phospholipid metabolism (11 cases). This was a heterogeneous group including meningomyelocele with hydrocephalus 2, Sjögren-Larsson syndrome 1, congenital hydrocephalus 1, Duchenne-type muscular dystrophy 1, Sturge-Weber syndrome 1, tuberous sclerosis 2, chromosomal disorders 2, and striatopallidal degeneration 1.

Group II. Juvenile amaurotic idiocy. (There were no cases in the present study.)

Group III. Cases of proven mucopolysaccharidosis (2 cases).

Group IV. Cases of proven leucodystrophy (3 cases).

Group V. Cases of dementia or amnesia of unknown origin (21 cases), including (a) familial cases 4, (b) cases with progressive degeneration of unknown cause 3, (c) amnesia with epilepsy 3, (d) amnesia with spasticity 7, (e) severe amnesia alone 4.

References


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Group VI. Cerebral atrophy after brain damage (21 cases), including (a) prenatal damage—monozygotic twin 1, (b) perinatal damage—prenaturity 2, anoxia 12, kernicterus 2, (c) postnatal damage—infection 1, battered baby 2, hydrocephalus 1.

The biochemical analyses differed slightly from those of Hooghwinkel et al. and are described in full elsewhere (John and Forrest, 1973).

Results

The values for the sphingomyelin content of the red cells (expressed as percentage of total phospholipid) are shown in the Fig. As expected, cases of proven mucopolysaccharidosis (group III) had values below -2 SD of the mean, and the 3 cases of proven leucodystrophy (group IV) fell within the normal range. These results are similar to those reported by Hooghwinkel and his colleagues (1969), but the diagnosis in these groups was already established by other means and the determination of sphingomyelin in the red cells did not add evidence of diagnostic value.

Comparison of the results for group V (cases of amentia or dementia of unknown origin) and group VI (cases of cerebral atrophy after brain damage) was disappointing, as the results were very similar in the two groups. Out of 21 cases in each group, 19 fell within normal limits and 2 had values less than -2 SD below the mean. The 2 cases in group V were 2 cases of amentia; in 1 case the condition was familial and associated with microcephaly, though cerebral biopsy suggested vascular rather than biochemical cause. Of the 2 cases in group VI, 1 is a monozygotic twin girl with microcephaly and spasticity thought to be due to perinatal brain damage, and the other a boy with severe dystonic tetraplegia following kernicterus due to haemolytic disease.

Discussion

This investigation has not been found to be of practical use in selecting children with dementia or amentia of unknown origin for more complicated neurological investigation.

Summary

The sphingomyelin content of red cells was investigated in 85 children. Values within 2 SD of the mean were found in a group of normal children and in a group of children with miscellaneous disorders of the CNS not expected to affect the sphingomyelin in red cells. Two cases of mucopolysaccharidosis had values less than 2 SD below the mean. The results in 21 children in each of two groups, one of children with cerebral atrophy due to known cause and one with children suffering from amentia or dementia of no known cause, gave similar results in that there were two cases below 2 SD in each group. This investigation was not, therefore, found to be of practical use in differentiating between these two groups of children.

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The following articles will appear in future issues of this journal:

Annotation: Beclomethasone in childhood asthma.  R. S. Jones.

Beclomethasone aerosol in childhood asthma.  S. Godfrey and P. König.

Beclomethasone dipropionate aerosol in childhood asthma.  W. Dickson, C. E. Hall, M. Ellis, and R. H. Horrocks.


Plasma cortisol levels in malnourished children with and without superimposed acute stress.  R. B. Paisey, M. Angers, and S. Frenk.

Rates of creatinine clearance in babies less than one week of age.  H. Sertel and J. Scopes.


Three cases of meningococcal infection in a family, associated with deficient immune response.  D. M. Jones, B. M. Tobin, and A. Butterworth.