Screening for Cystic Fibrosis by Testing Meconium for Albumin

The importance of early diagnosis of cystic fibrosis (CF) has been stressed by many authors (e.g. Lawson, Westcombe, and Sagger, 1969; George and Norman, 1971).

Methods involved have been to test either the sweat or saliva of the infant for increased levels of sodium but neither test has proved reliable, easy, or cheap in the neonatal period.

Schutt and Isles (1968) found excessive albumin in the meconium of 9 cases of meconium ileus (due to CF) and wondered if meconium testing for albumin would be a practical screening test.

Wiser and Beier (1964) had previously found that 3 out of 5 newborn sibs of known cases of CF had increased amounts of albumin in their meconium and that all the neonates with raised levels of albumin were subsequently proved to be further cases of CF.

We are in the process of conducting a newborn screening programme to detect the presence of albumin in meconium, and we are writing this preliminary communication because one case of CF has been found in the first year of the trial.

The maternity units involved in the survey have a combined delivery rate of about 5000 babies a year.

Method

The first specimen of meconium is saved in its nappy. A smear is made of this meconium on to a glass microscope slide and thoroughly mixed with a few drops of distilled water with half an orange stick. A Labstix strip (Ames) is then placed so that the edge of each of the test areas is in the resulting mixture; the strip being held horizontally with the test areas perpendicular to the slide. The presence or absence of albumin and blood is noted, traces of either being ignored. Any baby whose meconium shows the presence of both albumin and blood has a further sample of meconium or stool tested at a later date. Any baby whose meconium contains more than a trace of albumin has further specimens of meconium and stool tested and those who are persistently positive have further investigations for CF.

The time taken to perform the test is 10 to 15 seconds: it is not necessary to wait for the recommended 30 seconds to look for blood if the test is negative for albumin.

Discussion

The trial has now been in progress for 16 months at one hospital and for 13 months at the other, during which time there have been about 6200 births. We have detected one case of cystic fibrosis by screening but there have also been two cases of meconium ileus one of which has survived and been shown to have a high sweat sodium level. We have circulated the paediatricians in the region
Anomalous Sweat Chloride Levels in Cystic Fibrosis During Antibiotic Therapy

It is becoming increasingly common to confirm the diagnosis of cystic fibrosis by using a skin chloride electrode, and estimation of the sodium content of sweat is now often omitted.

The following case report concerns a child with proven cystic fibrosis in whom raised sweat sodium but normal sweat chloride levels were obtained while she was receiving cloxacillin.

Possible explanations for the findings are discussed and attention is drawn to their implications in relation to screening programmes for cystic fibrosis.

Method
Sweat was collected on to sodium chloride free Whatman No. 40 filter paper squares (3·5 cm) after conventional pilocarpine iontophoresis using the EMI sweat unit.* The sweat was eluted with 2·0 ml deionized water. 100 mg of sweat was accepted as the minimum weight for analysis as suggested by Varley (1967). Sodium was estimated by flame photometry and chloride by a modified Schales and Schales technique.

The mean and normal range for sweat electrolytes at this hospital are as follows: sodium: mean 21·1 mEq/l, range 5–45 mEq/l. (n = 56); chloride: mean 13·6 mEq/l, range 2–40 mEq/l. (n = 55).

Case Report
The infant was delivered by caesarean section after a pregnancy complicated by pre-eclamptic toxemia, birthweight 2·3 kg. She was the youngest of three sibs, one of whom has diabetes mellitus. On two occasions in the early months of life she was admitted to an isolation hospital with suspected gastroenteritis, and at the age of 10 months presented with a history of recurrent respiratory infections and persistent stridor. Her chest x-ray was normal and a diagnosis of congenital laryngeal stridor was made. The stridor gradually subsided over the next 14 months.

She was referred again at the age of 3 years with rectal prolapse and a history of passing loose, bulky, grey stools. Coeliac disease was suspected and she was admitted for observation. There was no pot belly or muscle wasting and she was discharged after a few days as her stools were thought to be normal. A total faecal fat excretion of 43·2 g over a 5-day period was recorded at this time, but no further action was taken.

The rectal prolapse remained troublesome for the next 12 months.

She was next referred at the age of 9 years to the chest clinic with a 3-month history of cough. A chest x-ray then showed increased lung markings and fibrosis in the right upper zone. Breathing exercises were started and antibiotics advised during the winter months. She

*EMI—Electromedical Supplies (Greenham) Ltd.