Severe echo 19 virus infection in a neonatal unit

Frequent isolations of echo 19 virus were reported in the United Kingdom in the years 1967, 1968 (British Medical Journal, 1970), and again in 1974 (Communicable Disease Report, 1974). Sporadic isolations only were reported from Birmingham in that year but they increased in 1975 and rose sharply in May to assume the proportions of a minor epidemic (Communicable Disease Report, 1975).

Experience in neonatal unit

During the week starting 21 July 1975, between 14 and 22 infants were being nursed in the neonatal unit and between 47 and 57 term infants were being cared for in the lying-in wards of Birmingham Maternity Hospital. On 22 July two preterm infants aged 2 and 4 weeks respectively suddenly became very ill with similar symptoms and signs. They refused feeds, became irritable especially on handling, and had several cyanotic attacks, one case needing endotracheal intubation and assisted ventilation. They were febrile, had a tachycardia, and developed abdominal distension with reduced bowel sounds. The fontanelle tension was raised so cerebrospinal fluid was examined and blood and urine cultured, and then they were treated as suspected bacterial infection with penicillin and gentamicin. They remained very ill for 3 days and on the fourth made a rapid and uneventful recovery. When 3 more babies became similarly affected, viral studies were made in the belief that echo 19 was likely to be the responsible agent. Over the whole period, 21 July-21 August 1975, 12 infants and 5 staff members became infected (see Fig.).

<table>
<thead>
<tr>
<th>Case no.</th>
<th>Sex</th>
<th>Age at onset (d)</th>
<th>Temperature</th>
<th>Pulse</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>14</td>
<td>38-2</td>
<td>160</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>30</td>
<td>38-0</td>
<td>200</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>5</td>
<td>37-0</td>
<td>160</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>10</td>
<td>38-4</td>
<td>160</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>5</td>
<td>39-0</td>
<td>156</td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>10</td>
<td>38-0</td>
<td>160</td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>7</td>
<td>40-0</td>
<td>190</td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>6</td>
<td>38-5</td>
<td>190</td>
</tr>
<tr>
<td>9</td>
<td>F</td>
<td>14</td>
<td>38-0</td>
<td>160</td>
</tr>
<tr>
<td>10</td>
<td>F</td>
<td>4</td>
<td>39-0</td>
<td>NR</td>
</tr>
<tr>
<td>11</td>
<td>M</td>
<td>2</td>
<td>38-0</td>
<td>140</td>
</tr>
<tr>
<td>12</td>
<td>F</td>
<td>7</td>
<td>38-0</td>
<td>NR</td>
</tr>
</tbody>
</table>

NR, not recorded; NT, not tested; T/S, throat swab; +, positive isolation; −, negative isolation.
Of the 12 infants affected, 10 showed cerebral irritability, 7 had marked abdominal distension with reduced bowel sounds, and 5 had apnoic attacks. 4 had increased fontanelle tension. There were no respiratory symptoms. The other clinical and pathological findings are summarized in the Table. This shows predominance of males and preterm delivery, pyrexial presentation, irrelevance of the peripheral leucocyte count, and despite absence of CSF pleocytosis in all but 3, a ‘raised’ CSF protein in all those examined. There is, however, a wide range of normal in the newborn period (Bauer, New, and Miller, 1965).

Despite virological screening of all babies and staff in the unit and intensification of barrier nursing techniques and geographical separation with different nursing teams between infected and noninfected babies, further cases occurred and one infant died from whom virus was isolated from brain, lung, and myocardium at necropsy. It was therefore decided to stop admissions to the unit and to direct mothers in preterm labour to neighbouring hospitals.

**Virological studies**

Virus transport medium was used for washing throat swabs and for preparing homogenates of specimens of faeces; the latter were centrifuged at 5000 rpm for 30 minutes and the supernatant was retained. All specimens were inoculated into HeLa and HEP 2 cell monolayers and incubated as rolling cultures at 35°C. All isolates were identified with a specific antiserum, using microtitre techniques.

The infected staff shown in the Fig. were kept off clinical duties until their throat swabs were negative. The virus was grown from the faeces of the mother of Case 3 but faeces from all other mothers tested proved to be negative. Throat swabs were taken from 176 medical and nursing staff in the rest of the hospital and from none was the virus isolated. 2 term babies in the unit were found on routine screening to have virus growing in their stools but were asymptomatic.

**Reopening the unit**

The virological findings suggested that the neonatal unit was the source of infection. The remaining 4 infants were discharged, the walls and furniture were cleaned with hypochlorite, and the cubicles fumigated with formaldehyde. After 9 days the unit was reopened and there has been no recurrence. Only staff with negative throat swabs were allowed to return to work. This decision was justified by the detection of echo 19 virus in a prospective member of the nursing staff and the policy was continued until the epidemic in Birmingham declined.

**Discussion**

Echo 19 virus was not recognized as a fatal illness until Philip and Larson (1973) described 3 neonatal deaths after transplacental infection. This epidemic was postnatally acquired and confined to the neonatal unit except for Case 11. Though it is usually difficult to differentiate between bacterio-

### 12 infants infected with echo 19 virus

<table>
<thead>
<tr>
<th>Peripheral white count</th>
<th>CSF</th>
<th>Echo 19 virus isolation</th>
<th>Clinical illness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>WBC/mm³</td>
<td>Protein (g/100 ml)</td>
</tr>
<tr>
<td>9200</td>
<td>No</td>
<td>NT</td>
<td>+</td>
</tr>
<tr>
<td>P74%</td>
<td>No</td>
<td>excess</td>
<td>5.3</td>
</tr>
<tr>
<td>16 400</td>
<td>No</td>
<td>excess</td>
<td>34</td>
</tr>
<tr>
<td>P54%</td>
<td>No</td>
<td>excess</td>
<td>1.57</td>
</tr>
<tr>
<td>7200</td>
<td>No</td>
<td>excess</td>
<td>0.92</td>
</tr>
<tr>
<td>P50%</td>
<td>No</td>
<td>excess</td>
<td>1.35</td>
</tr>
<tr>
<td>7100</td>
<td>No</td>
<td>excess</td>
<td>1.02</td>
</tr>
<tr>
<td>P41%</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7200</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 000</td>
<td>No</td>
<td>excess</td>
<td>1.16</td>
</tr>
<tr>
<td>P56%</td>
<td>69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR</td>
<td>No</td>
<td></td>
<td></td>
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</tbody>
</table>
logical and virological infection in the newborn, the 
epidemic form and similarity of clinical features in this 
outbreak, coupled with the speed and ease of 
isoation of echo 19 enabled an early recognition of 
its nature to be established. The predominance of 
males has previously been noted (British Medical 
Journal, 1970) and in our series preterm delivery 
resulted in much more serious illness. 

In the absence of specific therapy, the decision 
as to whether or not to close the neonatal unit was 
finely drawn. At that time 1 of the 10 affected 
babies had died. This is a similar proportion for 
the mortality of infants with idiopathic respiratory 
distress if treated in a suitably staffed and equipped 
unit (Robertson and Tizard, 1975). To close such a 
unit would inevitably lead to a rising mortality for 
small babies requiring intensive care. By tempo-
really diverting mothers in preterm labour to other 
hospitals we were not presented with this dilemma 
for the short period of closure.

Summary 
An epidemic of echo 19 virus infection in a 
neonatal unit affecting 12 babies with one death is 
described. With one exception it was confined to 
the neonatal unit and medical and nursing staff 
were also affected. The unit was closed for 9 
days, then was disinfected, and there was no 
recurrence.

We are grateful to Drs. J. Insley and B. A. Wharton 
for permission to report cases under their care, and for 
the invaluable advice given by Dr. T. H. Flewett, 
Consultant Virologist, East Birmingham Hospital.

Organic aciduria 
Treatable cause of floppy infant syndrome 
The floppy infant syndrome has several causes 
ranging from disorders of the lower motor neurone 
and muscle, such as infantile spinal muscular atrophy 
and congenital myopathy, to various 
endocrine and metabolic disturbances. These 
have been fully reviewed by Dubowitz (1969). 
This report describes a floppy infant in whom 
hypotonia was due to a rare disorder of organic 
acid metabolism which responded to treatment 
with pharmacological doses of the vitamin biotin.

Case report 
A girl was the first child of healthy Irish parents, who 
are second cousins. There have been 3 unexplained 
childhood deaths in the family. She was born by normal 
delivery at term after a normal pregnancy, birthweight 
3300 g, and was in good condition at birth. There was 
some initial feeding difficulty and vomiting but by the 
end of the first week she was feeding well. Develop-
ment was thought to be normal; by 5 months she was 
able to sit supported with cushions, roll from supine 
to prone, make crawling movements, support some weight 
on her legs and reach out for toys.

When she was 5 months old she developed an upper 
respiratory tract infection and was treated with ampi-

cillin. She seemed to recover from this infection but 
the parents noticed that her respirations had become 
more rapid than before. The mother recalls that at 
about this time she changed the milk from Cow and 
Gate 'V' formula to Babymilk 2, representing an 
increase in protein intake from 1.8 to 3.3 g/100 ml 
reconstituted milk.

From the age of 8 months there was a gradual 
onset of floppiness and weakness. She stopped sitting 
and lost her good head control. She no longer reached 
out for toys and eventually most of her spontaneous 
movements ceased so that she lay in her cot, limp 
and uninterested. She continued to have deep and rapid 
respirations with inspiratory stridor. Numerous in-
vestigations directed mainly toward the respiratory 
system, including laryngoscopy, bronchoscopy, and tests 
for avian precipitins, failed to show the cause of her 
tachypnoea and hypotonia. She was given a trial of 
steroids for one month on suspicion that she had some 
form of pulmonary fibrosis, but this had no effect. 
She was referred to the Hammersmith Hospital at the age of 
10 months for further assessment of what was still 
thought to be primarily a respiratory problem.

Examination showed a profoundly hypotonic, cushing-\noid female child. She was relatively uninterested in 
her surroundings, seeming to have difficulty focusing on 
objects and exhibiting rolling eye movements. She 
lay in a frog-like posture, the hips being easily abduct-
able to 90° with no resistance. She had a very weak 
 grasp of objects placed in her hand. On arm traction 
there was gross head lag (Fig. 1a) and on ventral suspen-

References 
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