The national dried blood spot testing service for infants of hepatitis B positive mothers
Rationale for not requiring high anti-HBs levels in infants born to HBsAg positive mothers

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Rationale for not requiring high anti-HBs levels in infants born to HBsAg positive mothers

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Evidence of response to vaccine in infants

In the initial studies of hepatitis B vaccine and HBIG in the UK, of 49 babies immunised and successfully followed up, six (12%), all born to anti-HBe negative women, became infected. The remaining 43 (88%) (of whom 15 were anti-HBe negative) became immune, suggesting that response to vaccine in infants vaccinated under trial conditions was close to 100% (28/28 born to anti-HBe positive and 15/15 born to HBeAg positive women). An extensive review of field evaluations of infant vaccination conducted in 2000 identified only 13 studies, comparable to the current UK situation, where serological results were reported (table). In some of these studies the results are not confined to fully immunised infants and in many, resolved infection was not specifically excluded. Overall, however, 1.3% became chronically infected and around 87% acquired active immunity. Many studies used 100iu/l as the putative protective level; and should therefore represent the minimum proportion of children protected under the current UK recommendations. For example, in the large study from East London only 3/217 (1.3%) children had levels below 10iu/l.


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A more recent large evaluation in the UK summarised the follow-up of infants born to anti-HBe negative women in the UK—all of the babies were eligible to receive HBIG and vaccine. A blood test was taken from 555/906 (61%) at of after one year of age. Of the children tested, 15 samples were insufficient for testing, leaving a total of 540 results for analysis. Twenty-six children were HBsAg positive suggesting an overall rate of chronic infection of 4.9%; a further 34 (6.3%) were found to have evidence of resolved infection. Of the remaining 480, 460 children without known infection were tested for anti-HBs and 443 (96%) were reported to be immune (anti-HBs levels greater than 10 iu/l). Of the 267 with quantitative anti-HBs results available, 222 (83%) had levels above 100iu/l and 45 (17%) between 10 and 100 iu/l. Amongst the 17 children who had not developed active immunity, eight had no documented test for infection and so may have had chronic or resolved infection. Of those on the 0, 1, 2 and 12 months schedule, 288/295 (98%) were reported to be immune compared to 155/165 (94%) on the 0, 1, and 6 months schedule. Therefore, this large study suggests that, under the current UK recommendations, amongst infants who escape infection a maximum of 2% of will not make any immune response.

Practical issues

Based on this experience, the risk of chronic infection in high-risk infants (born to anti-HBe negative women) is significantly higher than the risk of non-response. To inform management of the infant, it is therefore important to test for HBsAg. As drop out rates increase with the number of visits\(^3\), it is recommended that the blood sample is obtained at the same time as the fourth dose to maximise compliance with testing. As the major risk of transmission is at the time of birth, and because the response rate is high in those who escape infection, the need to document immunity for prospective management is therefore negligible. Many children will also be boosted by the vaccine given at the same time as the test is taken.

In view of the small volume of blood routinely available, anti-HBs testing should only be performed if there is sufficient blood and/or if required to help clarify the child’s infection status. As PHE Colindale has identified four infants who are HBV DNA positive in the presence of anti-HBs levels above 100iu/l, anti-HBs should never be used as a substitute for HBsAg testing.
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<table>
<thead>
<tr>
<th>Author</th>
<th>Relevant intervention group</th>
<th>Tested</th>
<th>HBsAg positive</th>
<th>Protective Anti-HBs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polakoff⁴</td>
<td>HBIG + vaccine</td>
<td>102</td>
<td>4</td>
<td>3.9%</td>
</tr>
<tr>
<td>Evans⁵</td>
<td>HBIG + vaccine</td>
<td>29</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Jonas⁶</td>
<td>HBIG + vaccine</td>
<td>64</td>
<td>1</td>
<td>1.6%</td>
</tr>
<tr>
<td>Okun⁷</td>
<td>HBIG + vaccine</td>
<td>67</td>
<td>0</td>
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</tr>
<tr>
<td>Chernesky⁸</td>
<td>HBIG + vaccine</td>
<td>31</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Smith⁹</td>
<td>HBIG + vaccine</td>
<td>3</td>
<td>1</td>
<td>33.3%</td>
</tr>
<tr>
<td>Niu¹⁰</td>
<td>Completed vaccination</td>
<td>26</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Marion¹¹</td>
<td>HBIG + vaccine</td>
<td>703</td>
<td>6</td>
<td>0.9%</td>
</tr>
<tr>
<td>Sangfelt¹²</td>
<td>Various vaccine schedules</td>
<td>212</td>
<td>2</td>
<td>0.9%</td>
</tr>
<tr>
<td>Kohn.¹³</td>
<td>Completed vaccination</td>
<td>130</td>
<td>2</td>
<td>1.5%</td>
</tr>
<tr>
<td>Hale¹⁴</td>
<td>Vaccine (+/- HBIG)</td>
<td>367</td>
<td>6</td>
<td>1.6%</td>
</tr>
<tr>
<td>Larcher¹⁵</td>
<td>Vaccine (+/- HBIG)</td>
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<td>0.9%</td>
</tr>
<tr>
<td>Wallis¹⁶</td>
<td>Vaccine (+/- HBIG)</td>
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<td>2</td>
<td>9.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>1972</td>
<td>26</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

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¹⁴ Hale J. Personal communication. Audit of hepatitis B programme in Lambeth, Southwark and Lewisham
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