- aPTT prolongation by antiphospholipid antibodies in patients with liver cirrhosis. *Thromb Haemost* 1990;63:183-6.
- 3 Viganò D'Angelo S, Tombesi S, Marcovina S, Albertini A, Della Valle P, D'Angelo A. Monoclonal antibody-based enzyme-linked immunosorbent assays (ELISA) for the measurement of vitamin K-dependent protein S: the effect of antibody immunoreactivity on plasma protein S antigen determinations. *Thromb Haemost* 1992;67:631-8.

- 4 Asherson RA, Khamashta MA, Hughes GRV. The hepatic complications of the antiphospholipid antibodies. *Clin Exp Rheumatol* 1991;9:341-4.
- 5 Al-Seed A, Malia RG, Makris M, Cooper S, Preston FE, Greaves M. The development of antiphospholipid antibodies is strongly linked to infection with hepatitis C [abstract]. *Thromb Haemost* 1991;65:2028.

(Accepted 10 March 1994)

Value of Kleihauer testing after administration of anti-D immunoglobulin

Jennifer K M Duguid, Imelda Bromilow

National Blood Transfusion Service Mersey and North Wales, Liverpool L7 8TW
Jennifer K M Duguid, consultant haematologist
Imelda Bromilow, clinical scientist

Correspondence to:
Dr Duguid.

BMJ 1994;309:240

The standard dose of 500 IU of anti-D immunoglobulin given in Britain to RhD negative mothers postnatally is lower than that used in Europe, the United States, and Canada, where 1000-1500 IU is the routine dose. In Britain a Kleihauer test is performed after the 500 IU dose is given.¹ The results of this test should indicate the volume of fetomaternal haemorrhage that has occurred and whether a further dose of anti-D immunoglobulin is required. Kleihauer testing is not performed routinely in Europe, the United States, or Canada as the higher dose of anti-D immunoglobulin used prevents Rh sensitisation in all but 0.3% of cases.

Use of the Kleihauer test in RhD negative mothers who have been given anti-D immunoglobulin is intrinsically incorrect as the test measures fetal haemoglobin and not RhD positive cells. Up to a quarter of women have an increased proportion of fetal haemoglobin during pregnancy, and increased proportions of fetal haemoglobin can also occur in women with haemoglobinopathies. The Kleihauer test can be performed and reported in several ways but has poor reproducibility.² In Britain no quality assurance scheme exists for assessing Kleihauer testing.

These factors detract from the test's reliability in assessing accurately the size of a fetomaternal haemorrhage. We undertook a survey of the laboratories responsible for Kleihauer testing for a single transfusion centre in Britain to assess how effective Kleihauer testing is in monitoring the outcome of doses of anti-D immunoglobulin.

Subjects, methods, and results

We surveyed all hospital transfusion laboratories served by the Mersey and North Wales Blood Transfusion Service. Using a questionnaire, we requested information on the techniques used for Kleihauer testing, the methods of reporting, and situations in which increased doses of anti-D immunoglobulin and further Kleihauer testing were recommended. We also asked about antenatal Kleihauer testing after potentially sensitising episodes to see whether the British recommendations for antenatal use of anti-D immunoglobulin and Kleihauer testing were being followed.³

We contacted 23 hospital transfusion laboratories, all of which returned a completed questionnaire. Eleven hospitals did not perform Kleihauer testing since they were not responsible for an obstetric unit. The remaining 12 hospitals performed Kleihauer testing for all RhD negative mothers delivered of an RhD positive baby. No uniformity existed, however, with regard to the technique or counting procedure used or the reporting of the test (table).

Most of the hospitals reported the number of fetal cells per low power field. None indicated whether the

Variations in Kleihauer testing in 23 hospital transfusion laboratories served by Mersey and North Wales Blood Transfusion Service

	No of hospitals
<i>Postnatal testing</i>	
No of tests a year:	
100-500	6
>500	6
Reagents used:	
In house	3
Commercial kits*	9
No of microscopic fields examined†:	
3	3
5	1
10	3
20	1
50	4
<i>Antenatal testing</i>	
Done in cases of:	
Amniocentesis	7
Haemorrhage	10
Ectopic pregnancy	1
Maternal trauma	1

*Kits from four manufacturers were used.

†One hospital scanned high power fields, 11 low power fields.

result represented a large fetomaternal haemorrhage, requiring a further dose of anti-D immunoglobulin. Ten hospitals indicated that they would give advice on further doses of anti-D immunoglobulin if asked. One hospital would not recommend repeat Kleihauer testing after a large transplacental haemorrhage for which an increased dose of anti-D immunoglobulin had been given.

Antenatal Kleihauer testing also showed wide variations in practice (table). Only one hospital complied with all the current recommendations.³

Comment

If the hospitals we contacted are representative the results of our survey are worrying. European recommendations state that the postpartum dose of anti-D immunoglobulin should be 1000-1500 IU⁴; routine Kleihauer testing is not recommended. The failure rate of anti-D prophylaxis in Britain, though low at 1.5%, is considerably higher than that in some other European countries—for example, in the Netherlands it is 0.65%.

Because of this failure rate, the known variability and poor reproducibility of Kleihauer testing, and the results of our survey we believe that the adequacy of the dose of anti-D immunoglobulin given to RhD negative mothers should be assessed with a more reliable and accurate technique. The technique should measure RhD positive cells rather than fetal haemoglobin. Furthermore, because of the reported failure rate in Britain the recommended dose of 500 IU anti-D immunoglobulin should be reviewed.

We thank the staff of all the transfusion laboratories in north Wales and Merseyside for cooperating with this survey, and Mrs M Laffoley for her typing.

- 1 Lee D. Recommended dose of anti-D immunoglobulin. *BMJ* 1993;307:1145-6.
- 2 Polesky HF, Sebring ES. Evaluation of methods for detection and quantitation of fetal cells and their effect on Rh IgG usage. *Am J Clin Pathol* 1981;76 (suppl 1):525-9.
- 3 National Blood Transfusion Service Immunoglobulin Working Party. Recommendations for the use of anti-D immunoglobulin. *Prescribers' Journal* 1991;31:137-45.
- 4 Committee For Proprietary Medicinal Products. Note for guidance: core summary of product characteristics for human anti-D immunoglobulin. Brussels: Commission of European Communities, 1992. (111/3463/92-EN.)

(Accepted 7 February 1994)

See editorial by Letsky and De Silva