TABLE IV—DIASTOLIC BLOOD-PRESSURE READINGS ON ADMISSION

Diastolic BP (mmHg)	Extracranial cases	Others
180		1
170		
160		
150		1
140		
130		
120		3
110		3
100	2	7
90	4	2
80	3	2
75		1
70	6	2
60	3	1
50	1	
40	1	
Unrecordable	2	

arterial narrowing in these areas would have been missed. Certainly, the statement that, in these patients, hypotension superimposed upon cerebral atherosclerosis was the sole cause of the stroke, can be disputed.

What is not disputable, however, is the coexistence of undiagnosed extracranial acute diseases capable of producing hypotension.

All the clinical records have been studied in detail. In many cases the blood-pressure was not recorded very soon after the stroke, but table IV shows, where recorded, the diastolic blood-pressure on admission in patients of 70 and over. In the patients judged to have extracranial causes for their strokes the diastolic blood-pressure was 100 mm Hg or less in all cases. Diastolic readings of, say, 80 mm Hg were often referred to as "normal"; to judge from the known distribution of blood-pressure readings in the elderly and the high proportion of subjects with evidence of pre-existing hypertension, it seems likely that such readings represent an unusually low blood-pressure for many elderly patients.

The brain is not the only organ to be damaged by an abrupt decrease in blood supply; hypotensive episodes often manifest as renal or hepatic failure, or as hæmorrhagic enterocolitis. All of these manifestations of hypotension superimposed upon atherosclerosis are, in the experience of pathologists, very common and underdiagnosed.

The hypotensive strokes found in this series are probably only the tip of the iceberg. Transient or non-fatal neurological disorders in the elderly seem to be even more commonly attributable to episodes of hypotension. A tenable view is that acute cerebral signs in the elderly signals inadequacy of blood-pressure, unless proved otherwise, and especially if the diastolic reading on admission is less than 100 mm Hg.

This suspicion, that hypotensive strokes in the elderly are very common, can only be tested by prospective clinical studies. But such pathological findings as those reported here suggest that, in every elderly person with acute cerebral signs, early management should include a determined effort to diagnose and treat internal bleeding, heart-failure, and multiple pulmonary emboli. The restoration of normal blood-pressure in these patients might not always reverse their cerebral deficit, but it should lead to an improvement in overall prognosis.

I thank my colleagues in the histopathology laboratory; and Prof. G. A. Gresham, who has been stressing the frequency of hypotensive strokes for many years.

REFERENCES

1. Haberman S, Capildeo R, Rose FC. The changing mortality of cardiovascular disease. *Q J Med* 1978; 47: 71–88.
2. Heasman M, Lipworth L. Studies on medical population subjects, no. 20. London: H.M. Stationery Office, 1966.

Occasional Survey

VIRAL HEPATITIS MARKERS IN BLOOD DONORS AND PATIENTS WITH A HISTORY OF JAUNDICE

E. A. C. FOLLETT

Hepatitis Reference Laboratory, Regional Virus Laboratory, Ruchill Hospital, Glasgow

A. BARR R. J. CRAWFORD
R. MITCHELL

Glasgow and West of Scotland Blood Transfusion Service, Law Hospital, Carluke, Lanarkshire

Summary Selected blood donors, antenatal patients, and hospital patients with a history of jaundice were investigated for evidence of prior exposure to hepatitis A and B viruses. Two markers of hepatitis B-infection were sought—surface antibody (anti-HB_s) and core antibody (anti-HB_c). The prevalence of both markers was low in jaundice history donors and antenatal patients and was no different from the prevalence in random populations of both groups. In contrast, the prevalence of antibody to hepatitis A-virus (anti-HAV) was very much higher in donors and antenatal patients with a history of jaundice than in random groups of the same age and ethnic origin. Similarly, hospital patients with a history of jaundice showed a very low prevalence of prior hepatitis-B infection and a very high prevalence of prior hepatitis-A infection. The findings suggest that in a country with a low incidence of hepatitis-B carriage a history of jaundice is much more likely to equate with prior hepatitis-A infection than B infection. There is no evidence to support the practice of regarding blood donors or patients with a history of jaundice as a special group with more prior exposure to hepatitis-B virus and thus more likelihood of being long-term carriers of hepatitis-B virus.

INTRODUCTION

THE most important cause of acute jaundice is probably infection by a virus, usually either hepatitis A or B virus. Because hepatitis-B virus can occasionally give rise to long-term carriage of the virus and its surface antigen HB_sAg, volunteers giving a history of jaundice were until recently not accepted by blood transfusion services. With the sensitive methods of testing for HB_sAg now available, such volunteers can be accepted as donors,[1] but a recent report from Manchester[2] suggests that donors with a history of jaundice have a higher prevalence of HB_sAg carriage. HB_sAg is but one

marker of prior exposure to hepatitis-B virus, and only a small proportion of people exposed to the virus become HB_sAg carriers. In many more people core antibody (anti-HB_c) and/or surface antibody (anti-HB_s) develop.[3] Accordingly, we have examined the prevalence of these markers in blood donors with a history of jaundice and in the random donor population.

In the diagnostic laboratory a test for HB_sAg may be requested because the patient gives a history of jaundice/hepatitis and carriage of HB_sAg is suspected. With increasing awareness of hepatitis B as a potential hazard to hospital staff, the number of such requests is increasing and in some laboratories specimens from patients giving a history of jaundice/hepatitis are regarded as "high risk" specimens that may not be processed further until tested for HB_sAg. To what extent these actions are justified depends on the proportion of patients with a history of jaundice who have had hepatitis-B infection. Hepatitis-A infection is commoner in West Scotland than hepatitis B,[4] and it must be considered a more likely cause of previous jaundice. Now that sensitive methods are available for detecting antibody to hepatitis-A virus (anti-HAV) to indicate prior infection with hepatitis-A virus, we have investigated patients and blood donors with a history of jaundice to determine if, in the West of Scotland, a history of jaundice is more likely to equate with prior infection by virus A or virus B.

SUBJECTS AND METHODS

Selected Populations (Selected for a History of Jaundice)

Donors.—All new blood donors are asked if they had ever been jaundiced. The records of 7460 consecutive new donors showed that 195 had had jaundice. Sera from 184 were available for testing. The 184 were divided into two age-groups (18–40 and 41–65 years) because the prevalence of anti-HAV can rise significantly with age.[5]

Antenatal patients.—At one Glasgow maternity hospital all antenatal patients are routinely asked if they have ever had jaundice, and those who have have their blood tested for HB_sAg. All such specimens (156) received at the Regional Virus Laboratory in 1978 were included in this study.

Hospital patients.—Over a 6-month period specimens from hospital inpatients and outpatients aged 40 years and under and for which a history of jaundice/hepatitis was given as a reason for a test for HB_sAg were also examined for other markers of prior hepatitis A and B infection. Patients giving a history of previous laboratory-diagnosed hepatitis-B infection were excluded as were patients of Asian, African, or Chinese origin and patients from a sexually transmitted disease clinic. These groups were excluded so that the final selected population would be similar to the blood donor and antenatal populations in which the cause of prior jaundice was not asked for and in which the number of donors of African, Asian or Chinese origin was extremely small or, in the case of the antenatal patients, nil (see below). Although in Britain the prevalence of anti-HB_s in the general population is low, the prevalence in homosexuals is very high.[6] Accordingly, inclusion of even a small number of patients from these groups could produce a misleading bias in the results.

Random Populations (No Selection for a History of Jaundice)

Donors.—In a study to assess prior exposure to HB_sAg among blood donors, 200 HB_sAg-negative donors were selected every month for one year by age and sex to provide four groups divided equally between males and females aged 18–40 or 41–65 years. These 2400 sera were screened for anti-HB_s.

Antenatal patients.—All antenatal patients are tested for susceptibility or immunity to rubella infection. The prevalence of anti-HB_s in antenatal patients in West of Scotland was determined by testing 523 sera received at the Regional Virus Laboratory for screening for rubella antibody. Antenatal patients in Glasgow include African, Indian, Pakistani, and Chinese minorities. The group of 156 antenatal patients with a history of jaundice contained no patients from these minorities. To produce a group of random antenatal patients of similar ethnic background to the 156, the names of 523 random antenatal patients were scrutinised and 43 obviously foreign women were excluded.

Tests

Tests for HB_sAg, anti-HB_s, anti-HAV, and antibody to hepatitis-B core antigen (anti-HB_c) were carried out by standard radioimmunoassay methods (Ausria II, Ausab, Havab and Corab; Abbott Laboratories). Specimens reacting positively for anti-HB_s were retested, and if still positive they were incubated with an equal volume of high-titre HB_sAg (containing both *ad* and *ay* sub-types) for 2 h at 45°C. Only those specimens showing a reduction in anti-HB_s level of more than 50% as determined by the counts per minute of ^{125}I after this incubation were considered true positives.

RESULTS

Prevalence of Prior Hepatitis-B Infection

Donors.—Of the 184 new donors giving a history of jaundice 3 (1·6%) had circulating anti-HB_s and 1 of them also had circulating anti-HB_c. Of the 2400 random donors tested for anti-HB_s 52(2·2%) were confirmed as being positive (table I). Of these 52 only 31 were positive for anti-HB_c. If exposure to hepatitis-B virus results in the appearance of either or both markers then these results clearly show no significant difference in the prevalence of prior hepatitis-B infection between donors with and those without a history of jaundice. In both groups exposure to hepatitis-B virus is low, in keeping with the known statistics on overt hepatitis-B infection and carriage[7,8] in the West of Scotland.

Antenatal patients.—Of the 156 antenatal patients selected because of their history of jaundice, 5 had circulating anti-HB_s; none had evidence of circulating anti-HB_c (table I). Patients who have an acute clinical hepatitis-B infection with jaundice normally acquire anti-HB_c early and have an easily detectable level.[9] The absence of anti-HB_c in the 5 patients with circulating anti-HB_s suggests that these patients did not have a

TABLE I—PREVALENCE OF PRIOR HEPATITIS-B INFECTION IN BLOOD DONORS AND PATIENTS

Category	No. tested	No. positive for anti-HB_s	No. positive for anti HB_c
A—selected donor	184	3 *(1·6%)*	1
B—random donor	2400	52 *(2·2%)*	..
C—selected antenatal	156	5 *(3·2%)*	0
D—random antenatal	480	17 *(3·5%)*	..
E—selected hospital	168	8 *(4·8%)*	6

A v B, 1df, χ^2=0·049, 0·9>p>0·8.
C v D, 1df, χ^2=0·004, p=0·95.
B v E, 1df, χ^2=3·56, 0·1>p>0·05.
D v E, 1df, χ^2=0·22, 0·7>p>0·5.

clinical infection; more probably, they were exposed to a dose of antigen or virus sufficient to produce an immunising response[3] but not a clinical infection with jaundice. There was no significant difference between the prevalence of anti-HB_s in the random antenatal group and the selected group.

Hospital patients.—No significant difference could be detected by the χ^2 test between the prevalence of anti-HB_s in hospital patients and any other group (see table I). A difference between the hospital patient group and the unselected donors could have arisen by chance but it would not be surprising if a real difference existed (see discussion). Since 6 of the 8 hospital patients with anti-HB_s also had anti-HB_c this incidence was compared with those among 52 unselected blood donors with anti-HB_s who were also anti-HB_c positive (31 patients). The difference was not significant (p=0·33, Fisher's exact test).

Prevalence of Prior Hepatitis-A Infection

Donors.—Of the 184 selected donors 157 were in the younger age-group and all but 11 had circulating anti-HAV. Only 2 of the 27 in the older age-group did not have anti-HAV (table II). Among the random donors, the prevalence in the younger group differed significantly from that in the older group (table II), with over 80% of donors in the latter age-group having antibody. There was no difference in prevalence between males and females. Anti-HAV is very much more prevalent among the younger blood donors who have had jaundice than among the corresponding control group. The difference is highly significant and does not appear among the older donors partly because of the high prevalence of anti-HAV in the control group of blood donors aged over 40 years.

Antenatal patients.—Of the 156 selected antenatal patients 150 had circulating anti-HAV. Since these patients were aged between 16 and 42 years the expected prevalence should have been similar to that among the younger blood-donor group, but the two prevalences differed significantly, suggesting that antenatal patients with a history of jaundice have had more exposure to hepatitis-A virus than the random population. Of the 6 patients negative for anti-HAV 4 had had episodes of jaundice in their early twenties. All 5 patients found to have anti-HB_s (table I) also had circulating anti-HAV. Since this high prevalence of anti-HAV among selected antenatal women could have been caused by some epidemiological or serological peculiarity, 100 other antenatal sera, not selected for jaundice history, were tested for anti-HAV. Only patients with surnames beginning Mac or Mc were chosen to ensure as far as possible that the group was entirely Scottish. Anti-HAV was detected in 57 (table III).

TABLE II—PREVALENCE OF PRIOR HEPATITIS-A INFECTION IN BLOOD DONORS

Category	Age (yr)	No. tested	No. positive for anti-HAV
A—selected donor	18–40	157	146 *(93%)*
B—random donor	18–40	100	57 *(57%)*
C—selected donor	41–65	27	25 *(93%)*
D—random donor	41–65	100	83 *(83%)*

A v B, 1df, χ^2=47·686, p<0·001.
C v D, 1df, χ^2=0·876, 0·5>p>0·3.

TABLE III—PREVALENCE OF PRIOR HEPATITIS-A INFECTION IN PATIENTS

Category	No. tested	No. positive for anti-HAV
A—selected antenatal	156	150 *(96·2%)*
B—Mac/Mc controls	100	57 *(57%)*
C—selected hospital	168	156 *(90·5%)*

A v B, 1df, χ^2=57·856, p<0·001.
B v C, 1df, χ^2=38·992, p<0·001.

Hospital patients.—Of the 168 hospital patients with a history of jaundice/hepatitis more than 90% had circulating anti-HAV (table III). All 168 were aged 40 years or under and thus the prevalence should have been similar to that either in younger blood donors (table II) or in the Scottish antenatal group (table III). It would thus appear that hospital inpatients with a history of jaundice/hepatitis form a group with a prevalence of anti-HAV far in excess of that to be expected for members of the general population in their age-group.

DISCUSSION

Jaundice due to hepatitis B is always accompanied by production of anti-HB_c.[9,10] Anti-HB_s develops after HB_sAg disappears except when the infection becomes chronic. Both anti-HB_c and anti-HB_s remain detectable for at least 13 years after the original infection.[11] Therefore, an attack of jaundice due to hepatitis B should leave two markers, anti-HB_c and anti-HB_s, in the patient's serum. In only 7 instances out of 508 donors and patients tested were we able to detect both these antibodies together. This would strongly suggest that hepatitis-B virus was not the cause of jaundice in the other 501 donors and patients with a history of jaundice. Our finding of a greatly increased prevalence of anti-HAV among young donors and patients with a history of jaundice is compelling evidence that the jaundice was due to hepatitis A. Most of the antenatal patients were jaundiced in childhood or in their teens when hepatitis-A infection is common and hepatitis B comparatively rare in countries with a low HB_sAg carrier rate. If the jaundice was not caused by hepatitis A then it becomes very difficult to explain the increased prevalence of anti-HAV observed in patients and donors with a history of jaundice.

All subjects with a history of jaundice and with anti-HB_s but no anti-HB_c also had anti-HAV. Thus, the previous episode of jaundice could as well have been associated with hepatitis-A infection as with hepatitis B. A few patients with a history of jaundice had no markers of either hepatitis A or B exposure. Infection with other viruses can produce jaundice (e.g., Epstein-Barr virus in infectious mononucleosis, cytomegalovirus, adenovirus, and coxsackie virus), and many other factors can also cause inflammation of the liver.

The comparison of the prevalence of the two markers of prior hepatitis-B exposure, anti-HB_s and anti-HB_c, in blood donors clearly indicates that there is no difference between donors with a history of jaundice and the ran-

dom donor population. Therefore, a history of jaundice is a poor marker for selecting donors with previous hepatitis-B infection. An analysis of donors in the West of Scotland from the past ten years has shown a similar low prevalence of history of jaundice among both HB_sAg-positive and HB_sAg-negative donors.[12] Therefore, a history of jaundice is also a poor marker of current HB_sAg carriage. In this latter study[12] only 13 of 447 HB_sAg-positive donors gave a history of jaundice. A lack of jaundice has also been noted in volunteers infected with hepatitis-B virus and who subsequently became long-term carriers.[3] Since the carrier state appears to be the result of a mild subclinical anicteric infection, a history of jaundice is very unlikely to be a guide to the possibility that a donor is an HB_sAg carrier. There is thus no reason to treat donors with a history of jaundice as a distinct group with a potential for transmitting infection far in excess of the "unjaundiced" population. The question can be raised as to whether or not there is any need to question donors as to a history of jaundice.

Antenatal patients with a history of jaundice show no more evidence of infection with hepatitis-B virus than a random population. Therefore, there is no reason for antenatal patients with a history of jaundice to be specially tested for HB_sAg. They are no more likely to be chronic HB_sAg carriers than other antenatal patients. We found that hospital patients with a history of jaundice/hepatitis show a similar pattern for HB_sAg carriage. The borderline increase in anti-HB_s in this group is not surprising since one function of a hepatitis diagnostic laboratory is to screen such high-risk groups as patients who have impaired immunity or increased exposure to the virus through either blood transfusion or parenteral drug abuse. In any case Payne, Barr, and Wallace[13] found that the prevalence of anti-HB_s is higher among hospital inpatients than among blood donors. Only rarely is evidence of previous hepatitis-B infection found, but evidence of post-hepatitis-A infection is common. Again, there appears to be little justification for regarding such patients as potential transmitters of hepatitis-B infection. Certainly, they are in no way a "high risk" group and any delay in processing laboratory specimens from such patients is unwarranted.

Our conclusion is that screening patients and donors with a history of jaundice for HB_sAg in a low-prevalence country such as Great Britain where hepatitis A is also circulating is unrewarding on two counts. Firstly, the jaundice is much more likely to be due to previous hepatitis-A infection than to hepatitis-B infection. Secondly, the evidence indicates that HB_sAg carriage is normally a result of a subclinical anicteric infection.

We thank Dr Isobel D. Walker and Dr Jean M. Scott for antenatal sera and Miss Marian M. Izatt for the statistical analyses.

REFERENCES

1. Department of Health and Social Security. Second report of the advisory group on testing for the presence of hepatitis B surface antigen and its antibody. London: H.M. Stationery Office, 1976.
2. Renton PH, Roach DG, Stratton F. Blood donors with history of jaundice. *Lancet* 1978; ii: 833.
3. Hoofnagle JH, Seef LB, Bales ZB, Gerety RJ, Tabor E. Serological responses in hepatitis B. In: Vyas GN, Cohen SN, Schmid R, eds. Viral hepatitis. Philadelphia: Franklin Institute Press, 1978: 219–42.

References continued at foot of next column

Medicine and the Law

The Abortion (Amendment) Bill reaches a decisive stage in the House of Commons on Feb. 8. An editorial appeared in last week's issue (p. 186) and there are letters this week on p. 260.

PRENATAL DIAGNOSIS, SELECTIVE ABORTION, AND THE ABORTION (AMENDMENT) BILL

K. M. LAURENCE

Welsh National School of Medicine, Heath Park, Cardiff

ONE of the major advances of the '70s has been the development of early prenatal diagnostic tests for some fetal malformations and abnormalities, for which selective abortion can then be recommended. These abnormalities are all serious and mostly present at birth but some, especially the metabolic disorders, may not become apparent until a little later. The rapid development and introduction of this approach to malformation into clinical practice in most areas of the United Kingdom has, to a large extent, been made possible by the 1967 Abortion Act. The number of abnormal fetuses aborted after prenatal detection accounts for only a very small proportion of the 100 000 or so terminations carried out in the United Kingdom each year. In 1976 they accounted for fewer than 0·25% of the total,[1] and this is unlikely to have risen above 1% in 1979. These relatively few, however, are a very important group, for not only will an appreciable number of abnormal babies have been prevented from reaching term but it will also have been possible for many pregnancies to have been planned and others to have been continued without the fear of the birth of an abnormal baby. For every such pregnancy terminated another 30 will have been allowed to go to term with the reasonable assurance of a normal outcome.[1]

Although at least 30 out of every 1000 pregnancies will end in a seriously malformed infant with reduced

DR FOLLET AND OTHERS: REFERENCES—*continued*

4. Chaudhuri AKR, Chin KC, Follett EAC. Viral hepatitis in Glasgow 1976–77. *Comm Dis Scot* 1979; 79(8): viii-x.
5. Dienstag JL, Szmuness W, Stevens CE, Purcell RH. Hepatitis A virus infection: new insights from seroepidemiologic studies. *J Infect Dis* 1978; **137**: 328–40.
6. Coleman JC, Evan BA, Thornton A, Zuckerman AJ. Homosexual hepatitis. *J Infect* 1978; **1**: 61–66.
7. Barr A, Dow BC, Macvarish I. HB_sAg detection—results of comparative large scale testing of blood donations. *Med Lab Sci* 1979; **36**: 109–14.
8. Follett EAC, Chaudhuri AKR. Drug abuse and hepatitis B infection. *Comm Dis Scot* 1977; **77**(21): iii-iv.
9. Hoofnagle JH, Gerety RJ, Barker LF. Antibody to hepatitis B core antigen. *Am J Med Sci* 1975; **270**: 179–87.
10. Krugman S, Hoofnagle JH, Gerety RJ, Kaplan PM, Gerin JL. Viral hepatitis type B; DNA polymerase activity and antibody to hepatitis B core antigen. *N Engl J Med* 1974; **290**: 1331–35.
11. Krugman S, Overby LR, Mushahwar IK, Ling C-M, Frosner GG, Deinhardt F. Viral hepatitis, type B: Studies on natural history and prevention re-examined. *N Engl J Med* 1979; **300**: 101–06.
12. Crawford RJ, Barr A, Macvarish I, Dow BC, Mitchell R, Follett EAC. Blood donors with a history of jaundice. *Lancet* 1979; ii: 155.
13. Payne RW, Barr A, Wallace J. Hepatitis B antigen (HBAg) and its antibody (HBAb) in hospital patients. *J Clin Path* 1974, **27**: 125–29.