ANNALS of Internal Medicine

DECEMBER 1984 • VOLUME 101 • NUMBER 6

Published Monthly by the American College of Physicians

Hepatitis B Virus Antibody in Blood Donors and the Occurrence of Non-A, Non-B Hepatitis in Transfusion Recipients

An Analysis of the Transfusion-Transmitted Viruses Study

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Patients who received transfusions and nontransfused control patients were followed to assess the incidence and cause of post-transfusion hepatitis and to identify donor factors that might relate to risk of hepatitis. We evaluated as risk factors in donors the presence of antibody to hepatitis B virus compared with elevated alanine aminotransferase (ALT) level. Units of blood that were positive for antibody to hepatitis B core antigen (anti-HBc) were associated with a twofold to threefold greater risk of non-A, non-B hepatitis in the recipients than were units without anti-HBc. In the absence of specific serologic tests for non-A, non-B agents, screening of donors for anti-HBc might be considered. Our data suggest that the incidence of non-A, non-B hepatitis might have been reduced by about one third by such screening. However, elevated ALT levels in donors had a similar association with non-A, non-B hepatitis in recipients but would have resulted in fewer units of blood being discarded than would screening for anti-HBc.

NON-A, NON-B HEPATITIS is now the predominant form of post-transfusion hepatitis (1-5). Although the disease was recognized nearly a decade ago, no specific test for the agents has yet been identified and confirmed. In the absence of specific tests, nonspecific markers have been sought. The level of a serum enzyme, alanine aminotransferase (ALT), in blood donors is one such marker. Two independent studies have shown a correlation between donor ALT levels and the incidence of non-A, non-B hepatitis in transfusion recipients (2, 3, 6). Epidemiologic circumstances predisposing donor populations to infection with hepatitis B virus may also favor exposure to non-A, non-B hepatitis agents. Accordingly, we have analyzed data from the Transfusion-Transmitted Viruses Study to test this hypothesis and evaluate the potential use of testing for hepatitis B virus antibody in screening blood donors.

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Annals of Internal Medicine. 1984;101:733-738.

Materials and Methods

PATIENTS

The Transfusion-Transmitted Viruses Study, conducted from July 1974 through December 1979, was designed to assess the risk of post-transfusion hepatitis in transfusion recipients in four regions of the United States and evaluate factors influencing its incidence (1-3). The four cities were New York (The New York Hospital and Hospital for Special Surgery), St. Louis (Washington University-Barnes Hospital), Houston (Ben Taub General, Jefferson Davis, and Methodist Hospitals), and Los Angeles (UCLA Center for Health Sciences). The details of the protocol have been described previously (1, 2). Briefly, patients cross-matched for transfusion were recruited into the study if they had no history or current evidence of liver disease, were taking no medications likely to cause elevations of liver enzyme levels, had had no blood transfusions in the preceding 9 months, and had given written informed consent. To remain in the study, transfusion recipients could have been given no more than 15 units of blood, and a specimen of blood from each donor unit transfused had to be available for testing. Patients who were recruited but did not receive blood remained in the study as controls to assess the incidence of hepatitis in hospitalized patients having surgical procedures similar to those of the transfusion recipient.

Blood specimens were taken from the patient before transfusion and during follow-up at 1 (optional specimen), 2, 4, 6, 8, 10, 12, 15, 18, 21, 24, and 40 weeks. Additional specimens were drawn weekly if a patient was suspected of having hepatitis.

DONORS

Patients in New York and St. Louis received blood obtained

Table 1. Hepatitis B Virus Antibodies in Blood Donors and Association with Non-A, Non-B Hepatitis in Recipients

Donor Hepatitis B Virus Antibodies*	Donors†	Donors Associated with Non-A, Non-B Hepatitis in Recipients	p Value
	n	*n(%)*	
Negative	3974	373 (9.4)	...
Anti-HBs only	109	12 (11.0)	NS‡
Both anti-HBs and anti-HBc	171	31 (18.1)	<0.001‡
Anti-HBc only	49	10 (20.4)	<0.01‡

* Anti-HBs = antibody to hepatitis B surface antigen; anti-HBc = antibody to hepatitis B core antigen.
† One donor not tested for anti-HBs is not included.
‡ Compared with donors negative for both hepatitis B virus antibodies.

from volunteers who had donated blood to community service agencies. For the period of this analysis (1976 to 1979), blood transfusions given to patients in Los Angeles also came only from volunteer donors. These donors were mostly from middle and upper socioeconomic levels. At Houston, the donors were primarily volunteers who donated blood to the county hospital blood program and generally were from a low socioeconomic level.

LABORATORY PROCEDURES

Serum samples from recipients and control patients were tested for hepatitis B surface antigen (HBsAg), its antibody (anti-HBs), and antibody to hepatitis B core antigen (anti-HBc) by radioimmunoassay procedures (AUSRIA-II, AUSAB, and CORAB, respectively; Abbott Laboratories, Chicago, Illinois). All donor units were routinely tested for HBsAg by third-generation techniques (radioimmunoassay or passive hemagglutination). Beginning in 1976, we also tested donor samples for anti-HBs and anti-HBc. Levels of ALT in patient and donor samples were measured in the laboratories of each study center with an automated kinetic spectrophotometric method at 37° C (Beckman Instruments, Inc., System TR; Fullerton, California) (3). The upper limit of normal was defined as less than 45 IU/L.

A patient was diagnosed as having hepatitis if the ALT level was above the normal range (≥45 IU/L) in two or more sequential blood specimens taken within a 3- to 17-day interval and if one of these levels was at least twice the upper limit of normal (≥90 IU/L). An episode of hepatitis was considered to be of probable viral cause if there was no other reasonable explanation for the ALT elevations. Hepatitis type B was diagnosed when HBsAg seroconversion occurred or persistent anti-HBc positivity developed with or without the appearance of anti-HBs. A diagnosis of non-A, non-B hepatitis was made when the hepatitis episode occurred without serologic evidence of either hepatitis type A or type B virus infection. The cases of all patients who had ALT levels that met the criteria for hepatitis were reviewed by the principal investigators and an independent panel of experts (Paul V. Holland, William H. Bancroft, Hyman J. Zimmerman, and Allan Redeker). This review was done without knowledge of the patients' transfusion status or the donors' test results. Only patients for whom a consensus was reached were counted as hepatitis cases.

ANALYSIS AND STATISTICAL METHODS

This analysis of the relationship between donor hepatitis B virus antibodies and non-A, non-B hepatitis is confined to 1151 recipients recruited into the study between 1976 and 1979 who were followed for at least 148 days. Patients who entered the study before 1976 were excluded because anti-HBc testing was not available at that time. This excluded all patients who received blood from commercial (paid) blood donors. Eighty-five recipients (9 of whom had non-A, non-B hepatitis) were excluded because hepatitis B virus antibody testing was not done on all their donors. Eleven patients who had type B hepatitis during the period analyzed and the 42 donors to these patients were also excluded, because in the absence of specific serologic markers, the diagnosis of concomitant non-A, non-B hepatitis could not be made in these patients. A chi-squared (X^2) test of significance with Yates' correction was used for all two-by-two tables.

Results

Data on 1151 recipients and their 4304 donors were analyzed. Among the donors, 109 (2.5%) were positive only for antibody to hepatitis B surface antigen (anti-HBs), 49 (1.1%) only for antibody to hepatitis B core antigen (anti-HBc), and 171 (4.0%) for both anti-HBs and anti-HBc. Donors who were positive only for anti-HBs usually had very low antibody levels (78% had a ratio of sample counts per minute to negative control of less than 10). The total prevalence of hepatitis B virus antibody among donors was 7.6%; however, this rate varied considerably from center to center, from 5.2% in St. Louis (Barnes Hospital) to 16.4% in Houston (Ben Taub General Hospital). Of the 1151 recipients studied, 106 (9.2%) developed non-A, non-B hepatitis.

To assess the relationship between the presence of hepatitis B virus antibodies in donor blood and the development of non-A, non-B hepatitis in recipients, we first examined the proportion of donors associated with a recipient with non-A, non-B hepatitis according to the donor's antibody status (Table 1). Donors who were positive for anti-HBs only were associated slightly more often than were donors who were negative for all hepatitis B virus antibodies (11.0% versus 9.4%, respectively). This difference was not statistically significant. In contrast, anti-HBc-positive donors (with or without anti-HBs) were associated twice as often with development of non-A, non-B hepatitis in recipients than were donors whose blood was negative for this marker. Because anti-HBs positivity alone was not associated with a significant risk, subsequent analyses were confined to the donor's anti-HBc status.

The association was examined in another way by analyzing the incidence of non-A, non-B hepatitis in recipients and the anti-HBc status of all donors to each recipient (Table 2). Recipients of at least 1 unit of anti-HBc-positive blood had a 2.6-fold greater incidence of non-A, non-B hepatitis than did those who received units that were anti-HBc negative. More than one third of recipients with non-A, non-B hepatitis received at least 1 anti-HBc-positive unit of blood (two thirds of recipients

Table 2. Incidence of Non-A, Non-B Hepatitis in Recipients as Related to Hepatitis B Core Antibody Status of Their Donors

Donor Anti-HBc Status	Total Recipients	Recipients with Non-A, Non-B Hepatitis
	n	*n(%)*
All negative	953	69 (7.2)
Any positive	198	37 (18.7)

* $p < 0.001$, comparing anti-HBc-negative donors with anti-HBc-positive donors. Anti-HBc = antibody to hepatitis B core antigen.

Table 3. Relationship Between Alanine Aminotransferase Level and Hepatitis B Core Antibody in Donors*

ALT Level	Donors	Anti-HBc Positive
IU/L	*n*	*n (%)*
<45	4183	201 (4.8)
45-59	61	6 (9.8)
≥60	60	13 (21.7)

* ALT = alanine aminotransferase; anti-HBc = antibody to hepatitis B core antigen.

with non-A, non-B hepatitis did not receive an anti-HBc-positive unit).

A correlation between donor ALT level and the incidence of non-A, non-B hepatitis has been previously reported (1-3, 6). We therefore examined the relationship between donor anti-HBc status and ALT level (Table 3). As the donor ALT level increased, the prevalence of anti-HBc also increased. Although these two markers were associated, only 8.6% (19 of 220) of anti-HBc-positive donors also had an ALT level of 45 IU/L or more (0.4% of all donors). Thus, these two markers identified overlapping, but different, donor subsets.

The relation of both donor anti-HBc status and ALT level to the risk of non-A, non-B hepatitis among recipients is shown in Table 4. The lowest rate (5.6%) was seen among recipients of units of blood that were all anti-HBc negative and had ALT levels of less than 45 IU/L. There was a twofold increase in the rate (to 11.0%) among recipients of units of blood that were anti-HBc positive but had ALT levels less than 45. This difference is statistically significant ($\chi^2 = 6.6$; $p < 0.01$). Transfusion of blood with an ALT level of 45 IU/L or more was associated with an even higher risk of non-A, non-B hepatitis in the recipient. Among these recipients, the lowest rate (25.3%) was seen when all units transfused were anti-HBc negative. If the recipient received blood that had an ALT level of 45 IU/L or more and blood from another donor who was anti-HBc positive, the rate of non-A, non-B hepatitis increased slightly. This increase was not statistically significant when compared with the rate in recipients of blood that only had an elevated ALT level. However, the number of recipients in this category was too small to detect even a twofold increased risk at a statistically significant level. The highest rate (73.7%) was seen in recipients of units of blood that had both an ALT level of 45 IU/L or more and were anti-HBc positive. The risk in these recipients was significantly greater than that in any other category ($p < 0.05$).

Donor anti-HBc status and ALT level were related to the severity of non-A, non-B hepatitis as well as to the risk of disease (Table 5). For purposes of this analysis, severe hepatitis cases were defined as those in which peak ALT levels were at least ten times the upper limit of normal (450 IU/L or more). Among recipients with non-A, non-B hepatitis given units of blood that were anti-HBc positive or had an ALT level of 45 IU/L or above, or both, more than 60% had severe hepatitis. In contrast, among recipients with non-A, non-B hepatitis who received blood that was anti-HBc negative and had ALT levels of less than 45 IU/L, only 14.3% had severe hepatitis ($p < 0.01$), a rate similar to that seen among nontransfused controls (data not presented).

Discussion

Studies of post-transfusion hepatitis in the early 1970s focussed on the relationship between one hepatitis B virus antibody, anti-HBs, and the risk of post-transfusion hepatitis type B (4, 5, 7-9). These early studies were done to ascertain whether anti-HBs-positive blood harbored infectious hepatitis B virus particles that might not be detected by testing for hepatitis B surface antigen (HBsAg) because of immune complex formation with anti-HBs. These studies failed to show a relationship between anti-HBs positivity in donor blood and subsequent hepatitis among recipients. However, some of the methods used to detect anti-HBs were insensitive and the number of recipients studied was usually small. Although the primary goal of these studies was to show an association with type B hepatitis, two investigators reported an increase (not a statistically significant one) in cases of HBsAg-negative hepatitis among recipients of anti-HBs-positive units of blood (8, 9). More recently, Knodell and colleagues (10), in a trial of hepatitis B immune globulin for the prevention of post-transfusion hepatitis, reported a significantly increased incidence of non-B hepatitis in their patients given an anti-HBs-positive unit of blood and placebo. The authors attributed this increase to the larger number of units transfused to these patients, which could have resulted in a greater chance of receiving an infectious unit. Seeff and colleagues (11), in another trial of hepatitis B immune globulin, also reported an excess of cases of non-B hepatitis among recipients of anti-HBs-positive blood. These authors postulated that much of the excess could be explained by a higher proportion of blood from commercial sources in recipients of anti-HBs-positive units. However, the excess of cases of non-B hepatitis associated with the transfusion of anti-HBs-positive blood was most apparent in patients who had received a relatively small number (three or less) of commercial units. Cossart and colleagues (12) in a study of post-transfusion hepatitis in Australia found an association between donor anti-HBc positivity and non-A, non-B hepatitis in recipients. Donors in that study were not tested for ALT level, however, and the relative impor-

Table 4. Risk of Non-A, Non-B Hepatitis in Recipients as Related to Donor Hepatitis B Core Antibody Status and Alanine Aminotransferase Level*

Donor Status		Recipients	
ALT Level	Anti-HBc	Total	With Non-A, Non-B Hepatitis
IU/L		*n*	*n(%)*
All <45	All negative	874	49 (5.6)
	Any positive	164	18 (11.0)
Any ≥45	All negative	79	20 (25.3)
	Other unit positive	15	5 (33.3)
	Same unit positive	19	14 (73.7)

* ALT = alanine aminotransferase; anti-HBc = antibody to hepatitis B core antigen.

Table 5. Proportion of Recipients with Non-A, Non-B Hepatitis with Peak Alanine Aminotransferase Level of 450 IU/L or More as Related to Donor Hepatitis B Core Antibody Status and Alanine Aminotransferase Level*

Donor Status		Recipients with Non-A, Non-B Hepatitis	
ALT Level	Anti-HBc	Total	With Peak ALT ≥ 450 IU/L
IU/L		*n*	*n(%)*
All <45	All negative	49	7 (14.3)
	Any positive	18	11 (61.1)
Any ≥45	All negative	20	12 (60.0)
	Any positive	19	12 (63.2)

* ALT = alanine aminotransferase; anti-HBc = antibody to hepatitis B core antigen.

tance of these two risk factors could not be assessed.

The data presented here show a significantly increased risk for non-A, non-B hepatitis in recipients of anti-HBc-positive blood. This increase could not be attributed to exposure to commercial blood or to the number of units transfused. All blood was from volunteer donors, and the number of units transfused to patients who developed non-A, non-B hepatitis who received anti-HBc-positive blood (mean, 4.2 units ± 3.3 [SD]) was not statistically significantly greater than the number of units given to patients who developed non-A, non-B hepatitis who received blood that was anti-HBc-negative (3.5 units ± 3.0) or the number of units given to recipients who did not develop hepatitis (3.5 units ± 2.6). Transfusion of anti-HBc-positive units of blood increased the risk twofold above that seen in recipients of anti-HBc-negative blood (Table 1). Donor units that were anti-HBs positive were also more likely to be associated with non-A, non-B hepatitis in the recipient than were units negative for hepatitis B virus antibody but only when the blood was also positive for anti-HBc. Units that were positive only for anti-HBs were not associated with an increased risk to the recipient. The anti-HBs in these units was usually only weakly positive and may not have been as specific for past infection with hepatitis B virus as anti-HBc positivity.

One explanation for the association between donor anti-HBc positivity and non-A, non-B hepatitis in the recipient might be serologic reactivity between anti-HBc and an antigen of a non-A, non-B hepatitis agent(s) (13-16). If cross-reactivity had occurred, however, one should expect sera from the patients with non-A, non-B hepatitis also to be reactive for anti-HBc. In fact, none of our patients with non-A, non-B hepatitis developed any hepatitis B virus markers. A more plausible explanation for this association is that donors exposed to one hepatitis agent are more likely, because of epidemiologic circumstances, to be exposed to another. The similarities in the epidemiology of hepatitis B and non-A, non-B support this concept (17).

Why did recipients of blood that had an ALT level of 45 IU/L or more or that was anti-HBc positive have more severe hepatitis? One explanation might be that they received a larger dose of a non-A, non-B hepatitis agent than did recipients of blood negative for these markers. Another possibility is that these events were due to different etiologic agents, either two different non-A, non-B agents or a non-A, non-B agent and some other virus, which have different expressions of clinical disease. In Alter and colleagues' study (18), for example, a small proportion of patients with non-B hepatitis had cytomegalovirus seroconversion and these patients tended to have minimal ALT elevations. An alternative explanation might be that the milder cases of hepatitis were unrelated to transfusion or were of nonviral cause. Cases of hepatitis in the nontransfused controls in the Transfusion-Transmitted Viruses Study were also mild, supporting this final hypothesis. Whatever the explanation, our observation is of particular interest from a clinical perspective. Many clinicians and blood banks minimize the importance of transfusion-associated hepatitis because most cases are asymptomatic and unrecognized if the recipients are not followed carefully, as in this study. Questions have been raised about the wisdom of using a nonspecific marker for screening donors which might prevent only 30% of cases (19-22). In our study, however, the more clinically severe cases of hepatitis were associated with transfusions of anti-HBc-positive or ALT-elevated units of blood.

In the absence of a specific test for non-A, non-B hepatitis agents, one might consider screening donors for anti-HBc to reduce the risk of hepatitis among transfusion recipients. Theoretically, anti-HBc screening might also prevent some residual cases of post-transfusion hepatitis type B. Units of blood that are positive for anti-HBc alone, especially those with high antibody titers or IgM-specific anti-HBc, may transmit hepatitis B virus (23, 24). Of the 15 patients who developed hepatitis type B in the Transfusion-Transmitted Viruses Study, 8 had received a unit of blood that was positive for anti-HBc alone (24). Thus, a single test might reduce the incidence of two diseases after transfusion, hepatitis B and non-A, non-B hepatitis.

Although anti-HBc screening may have some advantages, its sensitivity for detecting units with a high risk of transmitting non-A, non-B hepatitis was no better than that of screening for ALT. In this study 34.9% of patients who developed non-A, non-B hepatitis received an anti-HBc-positive unit of blood compared with 36.8% of patients who received a unit with an ALT level of 45 IU/L or greater (Table 6). A major disadvantage of anti-HBc as a screening test to prevent transmission of non-A, non-B hepatitis is the high prevalence of this marker in donor populations. If anti-HBc screening was used instead of ALT screening, nearly twice as many donor units would have been discarded to prevent the same proportion of non-A, non-B cases (5.1% versus 2.8%, respectively). Combined screening with anti-HBc and ALT would have increased the sensitivity of screening (53.8% of cases received either a unit that had an ALT level of 45 or greater, was anti-HBc positive, or both) but would have further increased the number of units discarded. Nearly 8% of donor units in our study would have been lost if we had screened for both ALT level and anti-HBc.

If screening had been done, recipients who received an

Table 6. Effect of Donor Screening for Hepatitis B Core Antibody or Alanine Aminotranferase on the Expected Incidence of Non-A, Non-B Hepatitis*

	Efficacy Rate Predicted When Donors Excluded by Screening for		
	Anti-HBc	ALT ≥ 45IU/L	Both
	%		
Type of efficacy rate			
Crude	34.9	36.8	53.8
Corrected†	21.4	29.9	39.2
Adjusted for control rates, then corrected‡	33.3	47.4	61.2
Units discarded	5.1	2.8	7.5

* Data for 1976-1979. Anti-HBc = antibody to hepatitis B core antigen; ALT = alanine aminotransferase.
† Assumes same rate in recipients of positive units as in recipients of negative units.
‡ See text.

anti-HBc-positive unit of blood or blood with an elevated ALT level would still have been at risk of acquiring non-A, non-B hepatitis at a rate similar to that seen in recipients of units negative for the marker. Alter and colleagues (6) have proposed that a correction be made in the crude efficacy rate to account for this factor. For example, applying the incidence of non-A, non-B hepatitis among recipients of anti-HBc-negative blood (7.2%) to the 198 recipients of anti-HBc positive blood suggests that 14.3 cases would be expected to occur if no anti-HBc-positive blood were administered. Thus, only 22.7 of 106 (21.4%) cases of non-A, non-B hepatitis might have been prevented by screening for anti-HBc, rather than the entire 37 (Tables 3 and 6). Similarly, a corrected efficacy rate for ALT screening would be 29.9% rather than 36.8%. When both parameters are used, the corrected efficacy rate becomes 39.2%.

Another factor to be considered when estimating the impact of donor screening on the incidence of non-A, non-B hepatitis is the incidence among nontransfused controls. Such cases cannot be attributed to transfusion and therefore would not be prevented by any method of donor screening. For the portion of the study analyzed in this report, we followed 1235 such patients. The incidence of non-A, non-B hepatitis in these controls was 3.3% (41 cases). To adjust for the rate of non-A, non-B hepatitis in nontransfused controls, we first subtracted the expected number of cases that would not be transfusion-related from the number of cases among recipients of blood with the markers (anti-HBc, ALT ≥45, or both) and the number of cases among recipients of blood that did not have the markers. After this adjustment, we recalculated a corrected efficacy as above. Thus, the calculations are adjusted for the control incidence and should better reflect the potential impact of screening on the incidence of non-A, non-B hepatitis attributable to blood transfusion. Adjusted for the nontransfused control rate, the estimated efficacy of screening increases to 33.3% for anti-HBc, 47.4% for ALT, and 61.2% for both markers. We emphasize that these calculations are only rough estimates of the potential impact of donor screening based on the data presented. Other critically important factors affecting the risk to recipients—the actual prevalence of infection with non-A, non-B hepatitis agents among donors and the susceptibility to infection among recipients—remain unknown in the absence of specific serologic tests and presumably vary among both donor and recipient populations.

Several investigators have recently reported the development of tests for a non-A, non-B hepatitis agent, but none of these tests has yet been confirmed as specific (18). Even if a specific test were developed today, it is unlikely that it would become commercially available for several years. In the interim, the use of nonspecific tests to screen donors might be considered as a means of preventing at least some post-transfusion non-A, non-B hepatitis. Cost-benefit analyses of screening for ALT have indicated that the cost would most likely be recovered through the amount saved because of hepatitis prevention, even when these analyses did not consider data on severity of hepatitis or adjust for the incidence of non-A, non-B hepatitis in nontransfused controls as discussed here (19-22). The data presented indicate that anti-HBc screening of donors might prevent about one third of the cases of non-A, non-B hepatitis attributable to transfusion compared with nearly one half for ALT screening. Moreover, an important disadvantage of anti-HBc screening is that more units of blood would be discarded than if ALT screening were used. For these reasons, the consensus of the study group is that ALT screening of donors is favored over anti-HBc screening.

ACKNOWLEDGMENTS: Supported under a contract (N01-HB 42972) with the National Heart, Lung, and Blood Institute, National Institutes of Health.

Dr. Szmuness has died.

The Transfusion-Transmitted Viruses Study Group consists of the following: Participating Institutions: the Lindsley F. Kimball Research Institute of The New York Blood Center, the New York Hospital, and the Hospital for Special Surgery, New York; Washington University School of Medicine-Barnes Hospital, and the Missouri-Illinois Regional Red Cross, St. Louis; Baylor College of Medicine, Ben Taub General Hospital, Jefferson Davis Hospital, and Methodist Hospital, Houston; and the UCLA Center for the Health Sciences, Los Angeles. Coordinating Center: University of Southern California School of Medicine, Los Angeles. Advisory Committee: Dr. Paul V. Holland, chairman; Dr. William H. Bancroft; Dr. Lawrence Shaw; and Dr. Hyman J. Zimmerman.

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Sporadic Cases of Hemorrhagic Colitis Associated with *Escherichia coli* 0157:H7

Clinical, Epidemiologic, and Bacteriologic Features

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During a 6-month period in 1983, *Escherichia coli* 0157:H7 was isolated from 19 (15%) of 125 patients with grossly bloody diarrhea and 1 sibling with non-bloody diarrhea in the Calgary area. There was no clustering of the cases geographically or in time. All but 1 had clinical manifestations typical of hemorrhagic colitis associated with *E. coli* 0157:H7. The illness appeared to be associated with consumption of hamburgers by 15 patients. The diarrheal illness was usually self-limited, but 3 children developed the hemolytic-uremic syndrome shortly after onset of illness. The organism was excreted in the stools very briefly in adults, although bacterial shedding continued for a longer period in children. All isolates produced verotoxin, and cytotoxic activities were present in stool filtrates. The results suggest that the incidence of sporadic cases of hemorrhagic colitis due to *E. coli* 0157:H7 may be higher than has been suspected, and that patients with grossly bloody diarrhea should be studied promptly for *E. coli* 0157:H7 infection. Specific techniques for identifying this serotype must be applied to the stool cultures. Detection of free cytotoxin in stool filtrates may be an effective diagnostic procedure.

ESCHERICHIA COLI 0157:H7 has recently been recognized as a cause of hemorrhagic colitis (1, 2), a diarrheal illness that is characterized by severe crampy abdominal pain, initially watery diarrhea followed by grossly bloody diarrhea, and little or no fever. Since the etiologic role of this rare serotype of *E. coli* was first established by the study of two outbreaks that occurred in the United States in 1982 (1), infections due to organism have been reported with increasing frequency (3-5). However, most data available are retrospective and derived from outbreaks. Little is known of sporadic infections regarding the epidemiologic and clinical characteristics and optimum procedures for laboratory diagnosis.

From June to December 1983, stool specimens submitted for routine cultures were examined selectively for *E. coli* 0157:H7 at three hospitals in Calgary. During the 6-month study period, 20 patients with *E. coli* 0157:H7 infection were identified. We report the clinical, epidemiologic, and laboratory features of sporadic cases of hemorrhagic colitis.

Materials and Methods

During the 6-month period from 6 June to 9 December 1983, stool specimens submitted for routine culture at the Foothills Hospital, Alberta Children's Hospital, and Calgary General

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