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Hepatitis C Virus and Professional Risk in Anesthesia and Intensive Care: A Case Report

To the Editor:

Hepatitis C virus (HCV) is an RNA virus discovered in 1989, which is responsible for most non-A, non-B hepatitis.[1] HCV infection is serious; it becomes chronic in 80% of cases, leads to cirrhosis in 20%, and rarely can lead to a hepatocellular carcinoma.[2-4] Transmission predominantly is parenteral. Infection due to professional exposure is thought to be unusual.[4]

Through the case of a physician infected by HCV while on duty, the authors wish to remind readers of the need for all medical staff, especially emergency room personnel, to take appropriate precautions to avoid exposure to blood-transmitted infectious diseases.

A 33-year-old male Tunisian anesthesiologist was in training abroad. He had no medical or surgical history and was HCV seronegative in April 1995. In May 1996, while on duty in the emergency room, he attended a traffic accident victim. When the patient's anti-shock trousers were taken off, a bleeding wound appeared. The physician, who already had taken his gloves off, instinctively tried to stop the bleeding with his bare hands, but his fingers had minor cuts.

Blood tests for HCV carried out on the patient were positive, and 3 months later the physician developed jaundice, asthenia, and hepatitis with serum transaminases 20 times normal. The liver ultrasound scan was negative.

Serology was negative for A, B, and E hepatitis, as well as for cytomegalovirus, human immunodeficiency virus, and herpes. Hepatitis C antibody was positive for serotype 1, using both enzyme-linked immunosorbent assay and recombinant immunoblot assay techniques with a positive polymerase chain reaction.

Interferon therapy was started in September 1996, with 3 million units administered three times per week. After 6 months of treatment, transaminases failed to return to normal and HCV polymerase chain reaction remained positive. Ribavirine was added but without response, and treatment was interrupted after 1 year.

Blood transmission of HCV is well documented and recognized.[5] For medical personnel, the risk of occupational infection by HCV is low but real. In most cases, it is due to accidental needlesticks. The best prevention consists in strict compliance with Universal Precautions. Healthcare workers should not engage in such hazardous maneuvers as recapping needles; it is important to provide special containers for used needles, use disposable supplies, and wear gloves, glasses, and other protective gear.[4,6]

Hepatitis C is serious and, despite the promising results obtained through treatment by interferon, prevention remains the best and most effective protection since no vaccine is yet available.[4-6]

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Age-Specific Rates of Serological Immunity in Patients With a Negative History for Varicella Infection

To the Editor:

With the licensure of the chickenpox vaccine (Varivax, Merck & Co, West Point, PA) in March 1995, the question of the true population rate of immunity to the varicella-zoster virus (VZV) has become an important issue in designing immunization strategies. This is particularly true in hospital work forces, where a chickenpox exposure necessitates major workforce modifications.

Three recent serological studies have examined populations of hospital workers.[1-3] They found that from 90% to 95% of the workers were immune. They also found that from 72%[1] to 90%[3] of those workers who had no history of varicella had protective antibodies to VZV. McKinney et al found age to be a significant variable.[2] They tested 241 hospital workers, 93 of whom were younger than 35 years. In that age group, 7 (64%) of 11 workers who had no history of VZV infection were in fact immune. All workers over age 35 who were tested were immune, whether they had a history of varicella or not. While this is a limited, nonrandom sample with small size, it would be expected to reflect the general population.

Kelley et al have studied antibody levels to many childhood illnesses in Army recruits.[4] They found that the seronegativity rate for varicella, adjusted to the 15- to 24-year-old US population in 1980, was 6.9%. Varicella susceptibility was significantly greater in females and blacks. In an unadjusted analysis, 11.8% of the female population was seronegative, compared with 7.7% of males. Of the 1,048 recruits who had a positive history of varicella, 27 (2.6%) were negative. Of the 211 recruits who had a negative history for varicella infection, 33 (11.5%) were negative. There was a trend to higher seropositivity with older age in this group. Importantly, Kelley documented that 97.4% of people who believe they are immune to varicella are so. Thus, the issue for assuring immunity within a population or work force is what per-

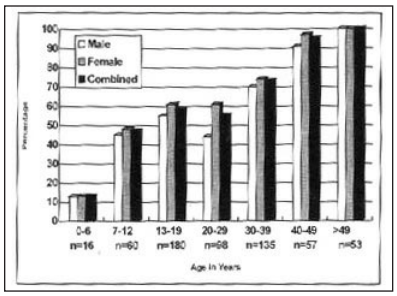

Figure. Percentage of subjects non-immune by history who actually are immune.

centage of those who believe themselves to be not immune to varicella are in fact not immune.

The present study was done in two series of patients with a negative history of varicella infection, to determine age- and gender-specific rates of positive varicella titers. All patients were members of a community-based staff-model health maintenance organization in the Minneapolis-St Paul metropolitan area, HealthPartners.

In spring 1995, a letter was sent to all patients enrolled at the HealthPartners staff clinics encouraging patients who had no history of varicella disease to take action to assure that they were immune. Patients who desired to be immunized for VZV who were 13 years of age or older were offered serological testing for VZV immunity before being immunized. Those who were serologically negative were asked to return for the immunization. Children 12 years of age or younger with a negative history for varicella exposure were tested if parents desired (and quite a few did). The 599 subjects who had sera collected as a part of this systematic immunization program made up the first sample.

All 403 pregnant women beginning obstetric care from January 1, 1994, through May 31, 1995, in HealthPartners Clinics who had a negative or indeterminate history of varicella infection were tested for VZV antibodies as a part of prenatal screening and comprised the second sample. Thus, both study samples were composed of individuals who believed they had no immunity to varicella.

The serology was done with a commercially available enzyme-linked immunosorbent assay (ELISA) kit (Bio Whittaker, Walkersville, MD). This methodology has been described and studied previously by Demmler et al,[5] who found it to have very good agreement with the fluorescent antibody to membrane antigen (FAMA) test, the research standard. In their study, the ELISA test had a sensitivity of 86% and a specificity of 99% compared to the FAMA test. For purposes of the VZV immunization program and this study, intermediate ELISA test results (which were rare) were considered negative.

The primary hypothesis was that immunity to varicella among patients who were non-immune by history increased with age.

One secondary hypothesis suggested by the data also was tested, but is subject to more uncertainty due to the post-hoc nature of the hypothesis. This hypothesis was that women in their 20s who were not immune by history were more likely to be immune than similar men. Univariate analysis was done, and chi-square statistics were used to calculate *P* values.

In the first group, the proportion actually immune increased with age. At 0 to 6 years, 12.5% were immune. By age 7 to 12, 47% were immune. Of subjects in their 20s, 44% of males and 61% of females were immune; in their 30s, 73% were immune; and in their 40s, 95% were immune. At age 50 and older, all were immune ($P<.0001$; Figure). In the second group, of 190 women less than 30 years of age, 81% were immune, whereas of 213 women who were 30 years of age or older, 90% were immune.

In this sample, older subjects had a far higher rate of immunity. The data suggest that immunity is acquired through subclinical infections, primarily between ages 7 and 40. McKinney et al[2] found older age to be significantly associated with higher rates of immunity, and Kelley et al[4] also found a trend in this direction; our data are in agreement.

The data suggest that the secondary hypothesis is correct. In the 20- to 29-year-olds, there was a trend toward a difference between males and females, with 44% of males and 61% of females being immune ($P=.11$; relative risk, 1.38; 95% confidence interval, .90-2.2). The most plausible biological explanation for this suggestion is that females in this age range are more likely to care for young children than males and, due to increased exposure, are having more subclinical infections.

These results suggest that it almost always is going to be worthwhile to test hospital workers with no history of chickenpox before immunizing them.

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