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Durability of HBV Vaccination

By Carol A. Kemper, MD, FACP

Source: McMahon BJ, et al. Antibody Levels and Protection After Hepatitis B Vaccination: Results of a 15-Year Follow-Up. *Ann Intern Med.* 2005;142:333-341.

THE DURABILITY OF HEPATITIS B VACCINATION HAS NOT BEEN WELL DELINEATED. While some experts recommend that health care workers receive a single booster vaccination at 8 to 10 years, there are no formal recommendations for this in the health care setting. Furthermore, the durability of vaccination in all these little kids now receiving vaccine is not known, and there are no guidelines for reassessment of titers or repeated vaccination later in life. Although one can measure persistence of anti-HBs antibody, the loss of detectable antibody (> 10 IU/L) over time does not necessarily imply loss of protection, as cellular immunity may provide a sufficiently protective role.

Longitudinal studies suggest that even when anti-HBs antibodies wane over time in heavily vaccinated populations, breakthrough infections are uncommon. McMahon and colleagues examined 1578 Alaskan natives who received 3 doses of HBV vaccine at the age of 6 months or older in 1981-1982. Slightly more than half (53%) were available for re-assessment 15 years later, during which mean plasma levels of anti-HBs decreased from an initial level of 872 IU/L to 27 IU/L. Higher levels of initial anti-HBs antibodies, male age, and age greater than 4 at the time of vaccination were associated with higher antibody levels 15 years later.

During the 15 years of follow-up, 16 documented and 8 possible breakthrough HBV infections occurred (1.26 per 1000 person-years), all of which were asymptomatic. Breakthrough infections were significantly more frequent in vaccine non-responders than responders. Interestingly, 2 persons were infected with wild type HBV and 4 were infected with wild type HBV and HbsAg variants.

Children who received HBV vaccine when they were less than 4 years had the fastest decline in antibody levels—meaning that just as they'll be reaching their late teens and 20s, and becoming sexually active and potentially at risk for transmission of HBV—their titers will have waned. This leaves open the question of whether and when children vaccinated at a young age may require booster vaccination. ■

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Chemical Food-Borne Terrorism Poses Initial Detection Problems

By Gary Evans

COMMONLY AVAILABLE CHEMICALS COULD BE USED TO cause a food-borne disease outbreak that initially might confound investigators looking for a biological etiology, warn epidemiologists at the Centers for Disease Control and Prevention (CDC).

“Chemical agents have been used in the deliberate contamination of food with the intention of causing illness in the past,” said Helen Schurz Rogers, PhD, research scientist with the CDC’s National Center for Environmental Health. “Since the terrorist attacks of 2001, concern has grown about the use of chemical agents in future attacks. Contamination of the nation’s food supply is one major area of concern.”

Indeed, Tommy Thomson, former secretary of Health and Human Services made a point of highlighting the nation’s vulnerable food supply when he stepped down from his post last year. “For the life of me, I cannot understand why the terrorists have not attacked our food supply, because it is so easy

to do,” he said. “We are importing a lot of food from the Middle East, and it would be easy to tamper with that.”

In light of such concerns, the CDC recently conducted a training webcast designed to enhance early recognition, reporting, and clinical management of chemical-associated gastrointestinal (GI) food-borne illness. Signs and symptoms of GI illness include nausea, vomiting, abdominal discomfort, and diarrhea. The cause of such illnesses often remain undetermined, and biological agents are much more likely to be suspected than chemicals. No etiologic agent was identified in 62% of the 1073 food-borne disease outbreaks reported to the CDC in 2003.

“Chemicals are seldom considered early in the differential diagnosis of food-borne GI illness since the majority of these illnesses in which an etiology is identified are caused by biological organisms, such as bacteria, viruses, or parasites,” Rogers said on the program.

Moreover, the variety of possible chemicals that can induce GI illness hinders accurate recognition and diagnosis. When chemicals finally are considered, biologic specimens such as urine and blood often have to be re-collected and may not show evidence of the chemical due to the body’s normal elimination mechanisms, she said. “Furthermore, stool samples, which are commonly used for analysis of infectious food-borne illness are often not

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the ideal specimen to identify chemical etiologies.”

Look for rapid onset of illness

Most chemicals tend to produce GI symptoms within a short time frame, fewer than 12 hours after ingestion. Possible etiologic agents in these short incubation outbreaks include industrial chemicals, drugs, pesticides, and plant toxins. Detection of these agents, however, requires agent-dependent specific biologic specimen collection, prompt collection methods, and testing techniques that are not routinely included in the investigation of many food-borne outbreaks, Rogers said.

Yet the rapid and accurate identification of a chemical etiology in food-borne illness outbreaks is necessary for many reasons, emphasized Joshua Schier, MD, a medical toxicologist in the National Center for Environmental Health.

“Those include proper patient management, risk assessment for long-term adverse health effects, and outbreak control,” he said. “In a true chemical terrorism event, this is even more important.”

Historically, of course, most chemical-associated food-borne GI illnesses have been unintentional. However, there have been several notable cases of intentional poisoning through food contamination.

For example, an employee at a Michigan supermarket intentionally poisoned 200 pounds of beef with a nicotine-containing insecticide in 2003. He subsequently was arrested but not before the action caused considerable illness and disruption.

Epidemiologists began investigating when 18 people from 4 families became ill after eating ground beef. Symptoms included nausea, vomiting, and a burning sensation in the mouth.

One patient developed atrial fibrillation, but none had to be hospitalized. Officials recalled approximately 1700 pounds of ground beef.

Overall, 120 people returned the recalled product, and 36 more people reported being ill. Eventually, it was discovered that the product was contaminated at a single store rather than at the processing plant. The local health department alerted hospital emergency departments and local medical practices. In all, 92 people had an illness consistent with nicotine poisoning after eating the contaminated beef.

Of course, chemical food-borne illness also can occur without the actions of a terrorist. In another case that occurred in July 2004, 10 people reported they became ill at a restaurant. They were not part of a large group that ate together at the restaurant, and local hospitals did not report any rise in community illness, Rogers explained.

Some of the people who became ill had consumed food, while others only had consumed fountain drinks. Nausea and vomiting were the most common symptoms, and, the average incubation period was 10 minutes.

Two people also developed diarrhea the following day. A health inspection of the restaurant did not indicate any

obvious etiologies or health code violations.

“Further investigation, however, found that 7 out of the 10 cases had consumed fountain drinks,” Rogers said. “Ice, water, and carbonated beverages from the fountain machine were collected for testing. Test results indicated that copper was almost 7 times higher in the fountain drinks than the acceptable limit for human consumption. This was ultimately determined to be the etiology of the illnesses.”

Copper may leach out into the water when acidic solutions enter copper pipes. In a soda machine like those found in fast-food restaurants, carbonation of the water occurs after the water leaves the copper piping. A faulty valve allowed the carbonated water to enter the copper pipe in the restaurant outbreak.

“Most often, the leaching occurs overnight when the dispenser is not operated,” Rogers said. “The first users in the morning, typically the restaurant workers, are the ones who become ill—hence copper poisoning has been called the ‘restaurant worker syndrome,’” she added.

Neurologic symptoms raise red flag

In general, neurologic symptoms are more indicative of a chemical or biological toxin exposure than a bacterial one. These symptoms may include paresthesias, numbness, weakness in extremities, visual disturbances, or dizziness.

“The presence of symptoms like these can be an important clue that a chemical exposure has occurred,” Schier said. “Comments that describe a quality of the food having to do with taste, smell, or visual appearance can be important clues.”

Key questions for investigating epidemiologists include: Did the food have an odd taste? Was it metallic, acidic, burning, alcoholic, or bitter? Was there an excessive amount of flavor, such as sweet, salty, or sour? Were there any strange odors associated with the food, such as a chemical or metallic odor? Did the food look different? Was there a strange color or texture? Was it oily or viscous?

“Once a chemical exposure is suspected, it’s vitally important to collect proper samples so that the agent can be identified,” Rogers said. “This may mean that several types of samples need to be collected initially.”

If a chemical food-borne illness is suspected, it is best to collect urine and other appropriate biological specimens as soon as possible—preferably within the first 24 hours, she noted. An early or first vomit sample may sometimes be very helpful in identifying the chemical. Some agents also are identifiable in blood samples.

“It’s also important to collect urine samples from non-symptomatic people who shared in the meal or food item,” Rogers said. “The reason for this is that these individuals provide an important control sample that is helpful when evaluating laboratory results. Whenever possible, samples of the implicated food or beverage should also be obtained for analysis.”

A vital part of the investigative process in a food-borne outbreak is a standardized food history questionnaire. One of the goals of such a questionnaire is to look for common theme among the ill. Once a food or meal has been implicated, pertinent questions to ask include:

- What were the predominant symptoms?
- What was the latency of illness?
- What food items were available to the patient, which ones were consumed, and how was the food prepared?

For chemical food-borne illnesses, it is helpful to keep in mind the following questions, and then include these in the final questionnaire:

- Were there neurologic symptoms in addition to GI complaints?
- Were there other types of symptoms not commonly associated with food-borne illness, such as sore throat?
- What do the patients think made them ill? ■

Influenza in Travelers

ABSTRACT & COMMENTARY

Synopsis: *Influenza is the most frequently encountered vaccine-preventable infection in travelers to the tropics and subtropics.*

Source: Mutsch M, et al. Influenza Virus Infection in Travelers to Tropical and Subtropical Countries. *Clin Infect Dis.* 2005;40:1282-1287.

MUTSCH AND COLLEAGUES PROSPECTIVELY EVALUATED the incidence of influenza virus infection among 1450 visitors to tropical and subtropical countries who attended the University of Zurich Travel Clinic. Among these travelers, 289 (19.9%) reported a febrile illness and 211 of these provided paired serum samples. Paired samples were also obtained from 321 matched controls from among the remaining travelers who did not develop a febrile illness. Only 12% had evidence of pre-travel immunity to circulating influenza viruses.

Forty travelers had serological evidence of acute influenza virus infection, with 22 having antibody titer increases of 4-fold or greater (probable cases) and the remaining 18 having 2.0- to 3.9-fold increases (possible cases). The infection was asymptomatic in 13 of the 40 subjects. Approximately two-thirds of infections occurred in individuals 20 to 39 years of age. The overall attack rate was 2.8% (1.2% if only probable cases are considered). Travelers to Africa, Asia, and Latin America were affected; only travel to the Indian subcontinent appeared to constitute an excess risk of influenza virus infection relative to all other destinations. Infections were acquired throughout the year in all seasons.

■ COMMENT BY STAN DERESINSKI, MD, FACP

I recently was called to a local hospital Emergency Department to see a previously healthy 38-year-old male who presented with a sore throat, fever, and severe headache that had started 36 hours after return from a one-month trip

to rural Vietnam and Thailand. The immediate concern was that he had avian influenza, which, fortunately, proved to not be the case. He did, however, have acute influenza virus infection (PCR repeatedly detected both influenza A and B while only influenza B was recovered on culture). He had received no vaccinations prior to travel. Influenza vaccination could have prevented the entire costly episode.

The results of the study under review indicate that influenza is the most frequently encountered vaccine-preventable infection in travelers to the tropics and subtropics, where influenza cases may occur throughout the year. In temperate regions of the Southern Hemisphere, the influenza season occurs from April through September. In temperate climates of either hemisphere, exposure to influenza may occur when groups from various geographic areas congregate, as on cruise ships.

The US CDC recommends that pre-travel influenza vaccination be recommended for “persons at high risk for complications of influenza” who did not receive the vaccine during the preceding fall or winter if:^{1,2}

- travel is planned to the tropics,
- travel is planned with large groups of tourists at any time of year, or
- travel is planned to the Southern Hemisphere during April-September.

The receipt of pretravel vaccine does not eliminate the recommendation for vaccination the following autumn, since the duration of protection may potentially proved inadequate in some cases and, more saliently, because vaccine composition is likely to have changed. Vaccine composition is, to some extent, a wild card in general for travelers, since the available vaccine may not contain appropriate components protective against the virus encountered.

There are no data available regarding benefits of revaccination of individuals before summer travel who were vaccinated during the previous fall or winter.

Two-thirds of cases of influenza detected by Mutsch et al occurred in individuals 20 to 40 years of age, with presumably most being healthy enough to not qualify as being at high risk of complications of influenza and, therefore, not included in the group for whom the CDC recommends pretravel influenza immunization. It seems to me that pretravel influenza vaccination should not be restricted to high risk individuals, but should be considered for many others as well. ■

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- o present the latest data regarding the diagnosis and treatment of various travel-related diseases.
- o present new data concerning recommended precautions and prophylaxis for patients traveling to specific areas of the world; and
- o alert the readers to recent disease outbreaks and epidemics

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Brenda Mooney
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A handwritten signature in black ink that reads "Brenda L. Mooney". The signature is written in a cursive style with a large, flowing "B" and "M".