AMERICAN HEALTH CONSULTANTS® A Medical Economics Company

TRAVEL MEDICINE ADVISOR UPDATE™

A Bimonthly Supplement to Travel Medicine Advisor Looseleaf Service

INSIDE

Volume 9, No. 6
November/December 1999

Travel Medicine Advisor Update is published bimonthly by American Health Consultants, 3525 Piedmont Rd. NE, Six Piedmont Center, Suite 400, Atlanta, GA 30305.
POSTMASTER: Send address changes to *Travel Medicine Advisor,* P.O. Box 740059, Atlanta, GA 30374.
Customer Service: 1-800-688-2421.

Subscription Information: *Travel Medicine Advisor Update* is a bimonthly supplement to *Travel Medicine Advisor* looseleaf service. Price: $399 (includes *Travel Medicine Advisor* looseleaf reference manual plus one-year subscription to *Travel Medicine Advisor Update*.) To subscribe, **call 1-800-688-2421.**

Rotavirus Vaccine

SPECIAL REPORT

The approval of rotavirus vaccine in august 1998 and the subsequent inclusion of this vaccine for universal pediatric immunization[1,2] capped nearly three decades of research.[3] Vaccine approval brought with it the expectation that the leading etiologic agent for severe dehydrating diarrhea could be controlled in the United States and, perhaps, throughout the world.[4] However, the finding of increased numbers of cases of intussusception associated with vaccination initially put vaccine implementation on hold until further study could be completed[5] and, at the end of October, led to removal of the vaccine from the market and the recommendation from the Centers for Disease Control that the vaccine no longer be given to infants in the United States.[6]

Rotavirus is the most common cause of severe diarrhea throughout the world. In the United States, about 70% of children will become ill from rotavirus sometime in their first 5 years of life (2.7 million children per year), resulting in approximately 500,000 physician visits and 50,000 hospitalizations per year.[1,3,7] On a global basis, it may cause 125 million cases of diarrhea annually, account for 25% of deaths due to diarrhea, and 6% of all deaths in children younger than the age of 5.[4] The impact of infection in a developing world setting is illustrated in a recent paper from Lima, Peru. Rotavirus was detected in 52% of children hospitalized with diarrhea, and was particularly associated with those who had severe diarrhea (O.R. = 2.3, 95% C.I. = 1.6-3.2).[8] In adults, rotavirus is an infrequent cause of diarrhea, affecting travelers,[9,10] caregivers of children with rotavirus, and the elderly.

Because the incidence of rotavirus is equally high in both developed and developing countries, it was felt that vaccination would be an important mode in control of infection, rather than just improved sanitation. Also, natural immunity was observed following an episode of rotavirus infection, and subsequent episodes were less severe.[11]

The recently licensed vaccine in the United States was RotaShield (Wyeth-Lederle). It is a live, attenuated, oral, human-rhesus reassortant vaccine, and expresses four rotavirus serotypes, which, based on epidemiologic surveys, are the most common globally. The vaccine is engineered by starting with a rhesus monkey rotavirus strain that has antigenic similarity to human rotavirus serotype G3. By gene reassortment during co-culture with human strains, the monkey virus acquires three human-rhesus reassortants with serotype specificity for human rotavirus surface glycoproteins G1, G2, and G4.[1,3]

Using three doses of 4×10^5 plaque-forming units of vaccine virus per dose, trials in the United States,[12,13] Finland,[14] and Venezuela[15] demonstrated 48% to 68% efficacy in preventing all cases of rotavirus diarrhea, and 69% to 91% efficacy in

preventing severe diarrhea. These trials showing efficacy in developed countries led to inclusion of the vaccine for routine childhood immunization in the United States. It was scheduled to be given to infants at age 2, 4, and 6 months. A cost-efficacy analysis projects that with universal childhood vaccination, 1.08 million cases of diarrhea, 34,000 hospitalizations, and 227,000 physician visits would be avoided in the first 5 years of life.[7] Vaccination would result in net savings to society and cost about $100 to prevent each case of rotavirus diarrhea. These projections improve as vaccine cost declines.

The one study from Venezuela demonstrated efficacy in children living in poor sanitary conditions. However, the World Health Organization (WHO), in its position paper on rotavirus vaccine (one of a new series by WHO on vaccines), has reserved judgment about inclusion of the vaccine in programs of developing nations until more studies have been carried out in developing world settings.[4] In addition, the cost of the vaccine would need to be lowered.

The enthusiasm for the vaccine was well founded based on efficacy studies and its projected role in preventing dehydrating diarrhea in children. In addition, prelicensure studies found the vaccine to be well tolerated with few side effects, further raising hopes of wide acceptance. The most common side effect was fever, which usually occurred 3-5 days following the first dose in about 20% of vaccine recipients.

During these prelicensure studies, however, five cases (among 10,054 doses of vaccine) of intussusception occurred. This was not statistically more frequent than in placebo recipients. Following licensure in the United States, 15 cases of intussusception among 1.5 million doses of vaccine administered were passively reported between September 1998 and the first week of July 1999 to the Vaccine Adverse Experience Reporting System (VAERS, 800-822-7967).[5] Although this number may not be more than expected (there is a normal frequency of about 15 cases/100,000 children), when active surveillance for intussusception was undertaken in California and Minnesota, there was a vaccine-associated frequency of 314 cases/100,000 infant years and 292/100,000 infant years, respectively.

Based on this preliminary analysis, in July 1999 the CDC recommended that all children scheduled to receive vaccine, including those who had started the series, postpone receipt until November 1999. Since this recommendation, the CDC undertook complete analysis of reported cases of intussusception and carried out additional epidemiologic studies attempting to establish a causal relationship between vaccination and this complication. As of Oct. 15, 1999, 57 confirmed and presumptive cases of intussusception with onset within seven days of receipt of vaccine were reported to VAERS (Wharton M., personal communication). Of these cases, 29 (51%) underwent surgery. Based on this information and the strong association of receipt of rotavirus vaccine and the development of intussusception within 1-2 weeks, the CDC recommended on Oct. 22, 1999, that vaccination no longer be given to infants in the United States. In the wake of these findings, the manufacturer removed the vaccine from the market.

The unfortunate loss of RotaShield in the effort to prevent severe diarrhea brings to an end one part of the immense amount of work over 30 years to understand and prevent rotavirus infections. Hopefully, efforts to develop a safer vaccine will proceed using the knowledge generated by experience with RotaShield. For its part, the CDC has initiated a national campaign to educate parents in the management of severe diarrhea. For our part, we should continue to stress the importance of vaccination in the safe and effective prevention of illness. ❖

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Thimerosal and Vaccines

ABSTRACT & COMMENTARY

Synopsis: *Thimerosal is a mercury-containing additive that has been included in many vaccine preparations because of its antibacterial effects. Recent concern about mercury poisoning has prompted an effort to develop effective vaccines that do not contain thimerosal and to avoid the unnecessary use of thimerosal-containing vaccines in young children.*

Sources: Thimerosal in vaccines: A joint statement of the American Academy of Pediatrics and the Public Health Service. *MMWR Morb Mortal Wkly Rep* 1999;48(26):563-565; *Pediatrics* 1999;104:568-569.

In 1997, the food and drug administration (fda) of the United States was charged with reviewing and assessing the risk of all food and drugs containing mercury. This led to concern about the use of thimerosal, a mercury-containing preservative used in vaccines for decades. There is no evidence that any child has been seriously harmed by thimerosal, but efforts are under way to remove the theoretical risk of thimerosal toxicity, especially for young children.

Planned actions include a request for manufacturers to eliminate or reduce the mercury content of their vaccines, an expedited FDA review of new thimerosal-free vaccines, and further studies about the effect of these efforts on vaccine risk and benefit. It is still recommended that children be immunized as previously recommended by the CDC and the American Academy of Pediatrics. The risks of not vaccinating children far outweigh the unknown and much smaller risk of exposure to thimerosal-containing vaccines.

Table

Thimerosal and Vaccines[2,5]

Vaccine	Contains Thimerosal?
DTaP	
Acel-Imune	Yes
Tripedia	Yes
Certiva	Yes
Infanrix	No
DTP, TD, Td	Yes
DTP-Hib (Tetramune)	Yes
DTaP-Hib (TriHIBit)	Yes
Hib	
HibTITER (multidose)	Yes
HibTITER (single dose)	No
ActHIB, Omni HIB, PedvaxHIB	No
PROHIBit	Yes
Hib-HepB (COMVAX)	No
HepB (Recombivax HB, old formulation)	Yes
HepB (Recombivax HB, new formulation)	No
HepB (Engerix-B, old formulation)	Yes
HepB (Engerix-B, pending new formulation)	No
HepA	No
IPV	No
Influenza	Yes
JEV	Yes
Lyme	No
MMR	No
Meningococcal	Yes
Pneumococcal	
Pnu-Imune 23	Yes
Pneumovax 23	No
Rabies	
Rabies Vaccine Adsorbed (Bioport)	Yes
IMOVAX	No
Rabavert	No
Typhoid	No
Varicella	No
Yellow Fever	No

■ COMMENT BY PHILIP R. FISCHER, MD, DTM&H

Thimerosal (sodium ethylmercurythiolate) is a component of several vaccines that are commonly used by travel medicine practitioners for both routine and pre-travel immunization. This mercury-containing additive has several effects[1] but is particularly useful as an antibacterial agent in preserving vaccines, especially those in multiple-dose preparations. The thimerosal status of some US-licensed vaccines is listed by "generic" and brand name in the accompanying Table.

So, what is the risk of using thimerosal-containing vaccines? First, it should be emphasized that the risk of mercury toxicity from routine vaccination is only hypothetical. Millions of children, even small newborn babies, have received thimerosal in their vaccines without adverse effect. To my knowledge, there are no reports of mercury poisoning resulting from routine vaccination. Second, there are some mercury-sensitive atopic children who have exacerbations of their atopic dermatitis following receipt of thimerosal-containing vaccines. Dermatitis, however, does not need to hinder the regular completion of routine vaccination.[3]

What should clinicians do? First, we must continue to vaccinate children and travelers. The risk of vaccine-preventable illnesses greatly outweighs the risk of mercury

toxicity from thimerosal. The CDC has already expressed concern that misinterpretation of recent suggestions is leaving hundreds of American children at high risk of developing hepatitis B infections.[4,5] Second, when equally effective thimerosal-free vaccines are available (as is the case for DTaP, *Haemophilus* influenza type b, and pneumococcal vaccines), practitioners might selectively purchase and use the safer alternatives. Third, while awaiting local availability of thimerosal-free vaccines, the timing of routine immunization might be delayed slightly in small babies as long as it still fits within the routine schedule's planned time ranges. This might happen when waiting on the first hepatitis B vaccination for a baby born to a HBsAg-negative mother until two months of age, when a thimerosal-free vaccine may be used. However, since most travelers present just before their intended departure, travel medicine practitioners will rarely choose to delay needed vaccination. The dose of mercury in thimerosal-containing vaccines makes these concerns even less important in older children and adults. Fourth, we can be grateful for the preemptive, proactive, precautionary action being taken by the FDA and the CDC as they seek to reduce the already low risk of mercury toxicity. ❖

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Lyme Disease Vaccine

ABSTRACTS & COMMENTARY

Synopsis: *The Lyme disease vaccine is effective when given on a 0, 1, and 6 month schedule. The vaccine is currently recommended for persons between the ages of 15 and 70 who may have significant exposure to ticks carrying Borrelia burgdorferi.*

Sources: Van Hoecke C, et al. Alternative vaccination schedules (0, 1, and 6 months versus 0, 1, and 12 months) for a recombinant Osp A Lyme disease vaccine. *Clin Infect Dis* 1999;28:1260-1264; CDC. Recommendations for the use of Lyme disease vaccine: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mortal Wkly Rep* 1999;48(RR-7):1-25.

Lymerix and imulyme are two lyme disease vaccines that have been developed recently using recombinant *Borrelia burgdorferi* lipidated outer surface protein A (rOspA) as immunogen.[1,2] LYMErix is the only one currently licensed by the Food and Drug Administration for use in the United States. The report from *MMWR* reviews Lyme disease and summarizes the recommendations for the use of LYMErix as provided by the Advisory Committee on Immunization Practices. Van Hoecke and colleagues studied the efficacy of the vaccine using a shorter immunization schedule.

Lyme disease is the most frequently reported tick-borne disease in the United States,[4] primarily occurring in the Northeast, mid-Atlantic, and North Central regions, as well as some areas in northern California. It is transmitted by *Ixodes scapularis* in the eastern United States, and by *Ixodes pacificus* in the western United States. The majority of the disease results from bites by infected nymphs. Transmission occurs usually only after the tick has been attached for 36 hours.[5] The incubation period ranges from 3 to 30 days, but is usually 7 to 14 days.

Lyme disease involves multiple systems and may manifest at different stages. In its early stages, Lyme disease is frequently diagnosed by characteristic lesions, erythema migrans, and may be associated with nonspecific symptoms such as fever, malaise, myalgia, arthralgia, fatigue, and headaches. Later manifestations include secondary erythema migrans rash, neurologic symptoms (lymphocytic meningitis, cranial neuropathy, and radiculoneuritis), musculoskeletal symptoms (arthralgia and myalgia), and cardiac symptoms (myocarditis and atrioventricular block). Diagnosis is based primarily on clinical findings in the setting of known exposure to ticks. Serologic testing with ELISA and confirmatory Western immunoblot test (WB) may be helpful. Early diagnosis and treatment are effective in preventing late-stage complications such as Lyme arthritis or encephalopathy.

LYMErix is made from recombinant lipidated outer surface protein A (rOspA) of *B. burgdorferi*. The protein is expressed in *E. coli*, then purified, and adsorbed onto aluminum hydroxide adjuvant. *B. burgdorferi* residing in tick gut at the start of feeding expresses mainly OspA. As feeding continues, the expression of OspC increases and the expression of OspA decreases. The rOspA induces antibodies that kill the spirochetes within the tick gut, thereby providing protection against *B. burgdorferi*.[6] Administered by the intramuscular route, the vaccine should be given before the start of *B. burgdorferi* transmission season, which usually begins in April. The vaccine-induced antibodies to rOspA cause false-positive ELISA tests for Lyme antibodies. However, WB results can differentiate between immuunization and actual infection, because anti-rOspA antibodies do not develop after natural infections.

Using a 0, 1, and 12 months schedule, the vaccine provided 49% protection after two doses and 76% protection

after three doses against definite Lyme disease. For asymptomatic infection (WB seroconversion without symptoms of Lyme disease), the efficacy rates were 83% after two doses and 100% after three doses.[1]

The recommendations for the vaccine are based on assessed risks, which include the geographic distribution of Lyme disease and the activities of the person considering the vaccine. The vaccine should be considered for persons aged 15-70 years residing, working, recreating in, or traveling to areas of high or moderate risk whose exposure to tick-infected habitat is frequent or prolonged. The vaccine should also be considered in persons aged 15-70 years with previous uncomplicated Lyme disease who are at continued high risk. The vaccine is not recommended for children younger than the age of 15 years, pregnant women, persons with treatment-resistant Lyme arthritis, or persons whose exposure to tick-infested habitat is minimal or none.

In the study by Van Hoecke et al, the efficacy of LYMErix administered on a schedule of 0, 1, and 6 months was compared to that of 0, 1, and 12 months. The study was performed at two centers, one in Belgium and one in the Czech Republic. Eight hundred volunteers, aged 15-50 years, were randomized to receive the vaccine with either schedule. Adverse reactions were assessed. IgG antibodies to rOspA were measured by ELISA, and geometric mean titers (GMTs) were derived. One month after the third dose, 91% of recipients in the 6-month group developed protective levels of antibody for one tick season compared to 93% in the 12-month group. Seventy-five percent of vaccine recipients reported at least one local symptom, most commonly pain at the injection site. Nineteen percent reported systemic symptoms such as headache and malaise.

■ COMMENT BY LIN H. CHEN, MD

The ACIP recommendations are clear and concise, and Van Hoecke et al showed comparable efficacy when LYMErix is given at 0, 1, and 6 months vs. 12 months. Nevertheless, some concerns and questions remain regarding LYMErix. The risk for possible immunopathogenicity of rOspA vaccine is foremost among these, as summarized in the report in *MMWR*. In chronic Lyme arthritis patients, the levels of antibody to OspA have been noted to correspond to the severity and duration of the arthritis.[7] Also, persons who express certain MHC II molecules are more likely to develop refractory Lyme arthritis along with high levels of antibody to OspA in serum and synovial fluid after *B. burgdorferi* infection.[8] Given the unclear relationship between immune reactivity to OspA and refractory Lyme arthritis, the vaccine is not recommended in persons with a history of chronic Lyme arthritis.

Next, the main European and Asian genospecies that cause Lyme disease are *B. garinii* and *B. afzelii*, which are antigenically different from *B. burgdorferi* sensu stricto, and vary in their expression of OspA.[9] It is speculated that combinations of immunogenic proteins may be needed to develop a vaccine that is effective against multiple genospecies.[10] While the Van Hoecke study was conducted in Europe, it did not specify whether OspA was protective against all genospecies that cause Lyme disease in the region.

Finally, it appears that boosters may be needed, but there are no recommended schedules yet. As with all new vaccines, more information regarding the long-term vaccine efficacy and safety is needed.

In summary, travelers to high- or moderate-risk areas and who may have potentially frequent or prolonged exposure to ticks should consider the Lyme disease vaccine. The schedule of 0, 1, and 6 months provides reasonable protection during the first year, compared to the 0, 1, 12 months schedule. The vaccine is currently approved for use in persons aged 15-70 years only, and the efficacy in genospecies outside the United States is unknown. The primary defense against Lyme disease and other tick-borne infections remains avoidance of tick-infested habitat, use of personal protection measures, and checking for and removing ticks. ❖

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Bartonellosis Beyond the Andes

ABSTRACT & COMMENTARY

Synopsis: *Bartonellosis is an infectious disease that has been well recognized since the time of the Incas. Documented bartonellosis outbreaks have been rare since the beginning of the 20th century; however, endemic regions include remote Andean villages in Peru, Ecuador, and Colombia situated at elevations of 500-3000 meters. Recent foci of bartonellosis have been reported from lower elevations of Ecuador, Colombia, and in the Pomabamba Province, Peru, in 1987.*

Source: Ellis BA, et al. An outbreak of acute bartonellosis (Oroya fever) in the Urubamba region of Peru, 1998. *Am J Trop Med Hyg* 1999;61:344-349.

This interesting article is a case-control study conducted in collaboration with the Peruvian National Institutes of Health as an emergency response outbreak investigation. In all, 357 participants from 60 households were interviewed during an outbreak of bartonellosis, which occurred in a region not previously considered endemic for this disease. Both human blood and local insect specimens were evaluated and environmental assessments were performed. Most documented cases occurred in children who had fever, anemia, and characteristic coccobacilli observed in thin smears. Case patients reported sandfly bites more recently than control individuals of neighboring households, greater than 5 km away. *Bartonella bacilliformis* isolates from blood were confirmed by nucleotide sequencing. Specificity of blood smears was 96% using identification of bacterial isolates as the microbiological standard. Given that Peru is host to more than 700,000 tourists yearly, most of whom visit the Cuzco area, both visitors and travel medicine consultants must be aware of the risk of bartonellosis, as well as the disease manifestations. Preventive measures should include protection against sandfly exposures in endemic areas.

■ **COMMENT BY MARIA D. MILENO, MD**

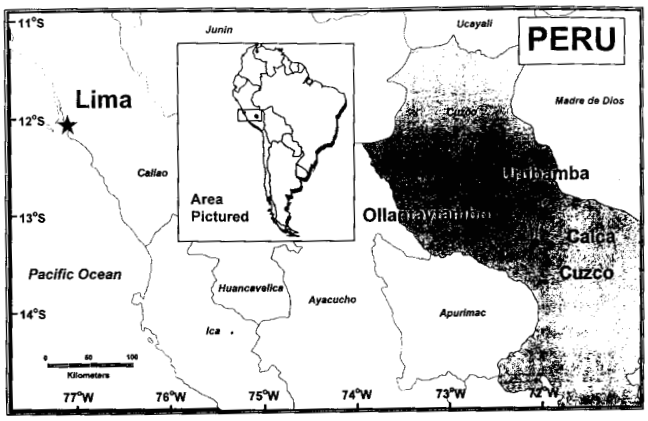
B. bacilliformis is the etiologic agent of the ancient sandfly-transmitted febrile hemolytic anemia (Oroyo fever) and chronic cutaneous angiomatosis (verruga peruana) found in Andean tropical Peru, Ecuador, and Colombia. The organism is a facultative 1 to 3 micron intracellular pleomorphic bacillus, with a poorly staining gram negative cell wall and 2-16 unipolar flagellae conferring a high degree of bacterial motility. Representations of bartonellosis can be seen in pottery and stone from the pre-Colombian era, as well as in lesions observed in a mummy. Chronicles of the Spanish conquistadors in Ecuador (soldiers sent to quell the rebellion of Diego de Almagro) detailed their illnesses, which were characterized by systemic symptoms and numerous cutaneous lesions that persisted for months.

Humans are the important reservoir hosts for *B. bacilliformis*. Bacteremia may persist for months after clinical recovery. A wildlife reservoir is thought to exist; however, no isolations of *B. bacilliformis* have ever been obtained from fauna of endemic areas. More than 500 different species of sandflies have been described, and *Lutzomyia verrucarum* is considered to be the actual vector in Peru. In endemic areas more than 6% of the population may have been infected, and 10% of these individuals are bacteremic at any given point. The majority of infections occur in children. Mothers in endemic areas are quite familiar with the skin lesions and know the risks of fever, severe complications, and death that may follow. Epidemics occur when immunologically naive persons are exposed to infection because of population migrations or the introduction of infected sandflies.

In terms of clinical manifestations of the disease, the incubation period for South American bartonellosis is approximately 21 days. The two clinical forms of the disease, Oroya fever and verruga peruana, may occur sequentially or at times with an intervening period that is clinically silent. Alternatively, either form may occur alone. In Oroya fever, the organism is introduced into the skin by the bite of a sandfly and is taken up by endothelial cells of capillaries, sinusoidal lining cells, and red blood cells. Bartonella species use a protein, deformin, to induce invaginations in the erythrocyte cell membrane and enter the red blood cell. Flagellar motility aids entry of the organism into cells. Systemic symptoms such as malaise, somnolence, anorexia, myalgias, headache, arthralgias, chills, dyspnea, and fever accompany erythrocyte parasitization, which may approach 100%. The mononuclear phagocytic system removes and destroys a large portion of infected red blood cells, resulting in severe anemia, hepatosplenomegaly, generalized lymphadenopathy, and jaundice. *B. bacilliformis* can invade endothelial cells in skin and lymph nodes. Severely infected patients may experience pericardial effusions, myocarditis, coma, convulsions, delirium, acute respiratory distress, and anasarca. The duration of bartonel-

Figure

Bartonellosis in the Urubamba Region of Peru



Location of the bartonellosis case-control study in the Cuzco area, Peru, May 1998. Reprinted with permission from: Ellis BA, et al. Figure 1. *Am J Trop Med Hyg* 1999;61(2):344-349.

losis during pregnancy is between one and six weeks, with a spectrum of illness that may range from mild to fatal. During pregnancy there may be transplacental infection, spontaneous abortions, and maternal deaths.

In the preantibiotic era there was a 40% mortality rate associated with acute bartonellosis. That figure is currently 8% in hospital settings and 88% for outbreaks that occur in remote rural areas. Death often occurs due to the frequent appearances of subsequent opportunistic infections. Salmonellosis has been the most frequently recognized fatal complication observed in hospitalized patients. Other infections, such as amebiasis, malaria, tuberculosis, and systemic infections by various enteric pathogens, complicate up to 45% of cases and contribute significantly to mortality. Without any preceding illness, or between two and 20 weeks after recovering from either a febrile illness or a syndrome of arthralgias and fever, a crop of skin lesions (verrucae) appears. These are painless erythematous 0.2 to 4 cm papules, nodules, or large angiomata appearing on the head and extremities. Occasionally they occur on the nasal, conjunctival, or oral mucosa, but have never been described within internal organs. A component of *B. bacilliformis* stimulates proliferation of human endothelial cells *in vitro*, and the formation of new blood vessels *in vivo*. Individual verrucae dry up and slough in a few weeks, leaving no scars. Crops of verrucae can occur for months or, exceptionally, for years.

For treatment, chloramphenicol is preferred for Oroya fever because of its activity against salmonellosis, which is a frequent, life-threatening secondary infection. Penicillin, fluoroquinolones (ciprofloxacin and norfloxacin only), erythromycin, and tetracyclines have also been used. Severe anemia, requiring transfusions, occurs in approximately 10% of patients; however, once the infection is controlled, the recovery from anemia is surprisingly rapid. Short courses of dexamethasone have been used for severe cerebral complications (coma, convulsions, and cerebral edema). Oral rifampicin (10 mg/kg/day for 14-21 days) is the most effective treatment for verrucae. Interestingly, patients in the current Peruvian outbreak did not manifest verrucae.

Prevention and pretravel advice should include information regarding repellents, insecticides—similar to prevention measures for malaria. However, fine-mesh netting is required and it must be small enough to exclude sandflies (3 mm), which are smaller than mosquitoes. Biting tends to occur at dusk. While travelers may not care to learn the gory details concerning bartonellosis, emphasis can be placed upon personal protection measures in order to avoid this disease, in addition to malaria. ❖

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Peanut Allergy

CONFERENCE COVERAGE

Synopsis: *At the Travel Medicine meetings in Montreal, a symposium on food and water issues featured a presentation by one of our Associate Editors, Phil Fischer, who is a pediatrician recently translocated to the Mayo Clinic. Conference organizers asked him to provide a perspective on the peanut allergy issue and airlines policy in addition to its place in the consideration of food allergies in general.*

Source: Symposium S9, Safe Food, Safe Water. Philip R. Fischer. Pediatric Allergies and Travel. Abstracts of the 6th Conference of the International Society of Travel Medicine. S9.3 p 58, 1999.

The quest for safe food usually focuses on the avoidance of food contaminated by infectious pathogens. Disease, however, results from the interaction between external agents and host responses. Some symptoms in travelers, 6th CISTM participants were reminded, result from hypersensitive or allergic reactions to foods uncontaminated with such pathogens.

Foods most commonly known to trigger allergic reactions include milk, eggs, peanuts, tree nuts, and seafood. Milk and egg sensitivities usually subside or resolve over a period without exposure, but "nut" allergies (which

may be related to the peanut, a legume, or to tree nuts) and seafood sensitivity are usually lifelong.

Peanut allergy has frequented headlines of the lay press in recent years. While some 15% of children experience some sort of allergic disease, about 1% of people are allergic to peanuts. Most people who react to peanuts are also atopic or asthmatic and have other food sensitivities as well.

Reactions to peanuts often occur on the occasion of the child's first known exposure to peanuts. It is not clear if the child had intrauterine sensitization, was exposed to peanut allergen via breastfeeding, or had previously unknowingly ingested peanut-containing foods. The mean age of the first reaction to peanuts is two years.

While peanut reactions can be mild, anaphylaxis also may occur. Some individuals are so sensitive that they may respond to extremely small exposures of peanut allergen via either the inhalational or transcutaneous routes.

Published series of fatal and near-fatal food-induced anaphylaxis are instructive. First, essentially all severely affected individuals reacted to a food to which they were already known to be allergic. Even after anaphylactic reactions, it is not unusual to "accidentally" ingest the anaphylaxis-provoking food. Second, in most all fatal cases of food-induced anaphylaxis, epinephrine was not given within the first 25 minutes of the beginning of symptoms of anaphylaxis. Thus, travel medicine practitioners should warn food-sensitive travelers to be particularly vigilant about checking food contents and avoiding the ingredients to which they are sensitive. Food-allergic travelers should always travel with readily available epinephrine and with someone who could administer it.

What about peanuts on airplanes? Some airlines now offer "peanut-free flights" on request from peanut-allergic flyers. Nonetheless, there is no way to completely prevent the presence of allergens in carry-on luggage, and many peanut-sensitive individuals are also allergic to other foods. Individual travelers should monitor their foods, but there is no feasible way to fully legislate completely safe, allergen-free flights. The best approach to peanut allergy in travelers seems to be to focus more on individual education and the provision of epinephrine than on policy or legislative measures to regulate airline food. ❖

References

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CME Questions

14. Peanut allergy:

a. affects about 20% of the population.
b. is uniformly fatal.
c. is usually outgrown by age 5 years.
d. is impossible on "peanut-free" flights.
e. can occur the first time someone eats peanuts.

15. Rotavirus vaccine is:

a. indicated for all children aged 2 months to 12 years.
b. accepted by WHO for universal childhood vaccination.
c. temporally associated with intussusception.
d. an oral, whole-cell, killed human vaccine.
e. administered to overseas travelers.