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Lack of Interference by Zoster Vaccine With the Immune Response to Yellow Fever Vaccine

David M. Stier, MD[*], **Ingrid B. Weber, MBChB**[†], and **J. Erin Staples, MD, PhD**[†]

[*]Communicable Disease Control and Prevention Section, San Francisco Department of Public Health, San Francisco, CA, USA

[†]Arboviral Diseases Branch, Centers for Disease Control and Prevention, Fort Collins, CO, USA

Abstract

Concerns exist about the serologic response to yellow fever (YF) vaccine when given within 28 days of another live virus vaccine. We report the case of a healthy adult who received 17D YF vaccine 21 days following administration of another live viral vaccine, and developed a protective level of immunity against YF virus.

In its general recommendations on immunization, the Advisory Committee on Immunization Practices (ACIP) of the US Centers for Disease Control and Prevention (CDC) cautions that "the immune response to one live-virus vaccine might be impaired if administered within 28 days … of another live-virus vaccine."[1] Therefore to minimize the potential risk for interference, it is recommended that injectable or nasally administered live vaccines should be given on the same day or ≥4 weeks apart. If the live vaccines are administered non-simultaneously and within 4 weeks, it is recommended that the second vaccine administered should be repeated. We report the successful vaccination and generation of a protective immune response to yellow fever (YF) vaccine that was administered to an adult traveler 21 days after receiving another live viral vaccine.

Case Report

A 60-year-old female was seen at the Adult Immunization and Travel Clinic of the San Francisco Department of Public Health 6 days prior to departing on a 2-week visit to western Uganda. She was born and resided in the United States, was in good health, and had no history of prior flavivirus infection, receipt of YF or Japanese encephalitis vaccinations, or travel to a YF endemic area. The CDC recommends that all travelers ≥9 months of age visiting Uganda be vaccinated against YF.[2] Furthermore, at the time of consultation there was even greater concern about the risk of natural infection because of an outbreak of YF occurring in the northern part of the country.[3] The client reported receiving an injection of zoster vaccine (Zostavax, Merck Sharp&Dohme, Whitehouse Station, NJ, USA), a live-

Corresponding Author: David M. Stier, MD, Communicable Disease Control and Prevention Section, San Francisco Department of Public Health, 101 Grove Street Room 204, San Francisco, CA 94102, USA. david.stier@sfdph.org.

Declaration of Interests

The authors state that they have no conflicts of interest to declare.

attenuated viral vaccine, at a pharmacy 21 days earlier. We informed her that the live zoster vaccine could affect her response to YF vaccine, and that she could be at increased risk of an adverse reaction to YF vaccine due to her age.[4] Despite these considerations, and in light of the ongoing outbreak, she agreed with our recommendation in favor of vaccination against YF. We administered YF vaccine (YF-Vax; Sanofi Pasteur, Swiftwater, PA, USA) as well as inactivated vaccines against typhoid, meningococcal infection, and polio (Typhim Vi, Menactra, and IPOL; Sanofi Pasteur). We also prescribed a regimen of daily malaria chemoprophylaxis with atovaquone–proguanil, and instructed her to use prevention measures to reduce her mosquito exposure.

She returned to our clinic 5 weeks later, in preparation for a 6-month trip to the same region in Uganda. According to published CDC recommendations, she should have been given a second dose of YF vaccine. However, because her age was a precaution to initial vaccination, and since there was sufficient time to do so, we opted to check her immunity to YF before administering a second dose of the vaccine. A serum specimen was obtained and analyzed at the CDC Division of Vector-Borne Diseases in Fort Collins, Colorado, for neutralizing antibodies against YF virus. At CDC, a 90% endpoint plaque reduction neutralization test ($PRNT_{90}$) titer of ≥20 is considered protective against YF virus infection.[4] Our client had a titer of 1,280 in her serum obtained 35 days after vaccination.

Discussion

Infection with YF virus, a mosquito-borne flavivirus, most commonly is asymptomatic or causes mild febrile illness. However, it can cause severe disease with jaundice, hemorrhagic diathesis, and multiorgan failure. The case-fatality rate for severe YF with hepatorenal failure is 20% to 50%. YF-Vax contains the 17D substrain of YF virus and is highly immunogenic; at 28 days following a single dose, over 99% of healthy persons develop neutralizing antibodies to YF virus.[4]

Relatively little is known about the serologic response to YF vaccine when administered within 4 weeks of another live vaccine, and the few published studies examining such interactions report disparate findings. One study showed that 9-month-olds immunized with YF vaccine showed similar rates of YF seroconversion, regardless of the timing of recent vaccination with live-attenuated measles vaccine (>27 d before YF vaccine vs ≤27 d before).[5] A more recent study with 12- to 23-month-olds has suggested that lower rates of conversion to YF seropositivity are induced by administering YF vaccine and a combined live virus vaccine against measles, mumps, and rubella concomitantly, compared with administration 30 days apart.[6] No data have been published regarding possible interference between YF vaccine and several other live vaccines, including varicella-zoster virus-containing vaccines.

Although this is a single case report which might not be generalizable to a larger population, our findings indicate that it is possible for a healthy adult to generate a robust antibody response to a dose of YF virus vaccine administered only 3 weeks after immunization with live zoster vaccine. Additional studies are warranted to more thoroughly examine the immune response to YF vaccine when administered non-simultaneously and within 4 weeks

of another live vaccine; however, it is unlikely that randomized trials would be undertaken due to both the theoretical risk of impairing immunity in recipients and the risks associated with vaccination. Thus for persons who receive YF vaccine within 28 days of another live vaccine, either inadvertently or because the benefits are deemed to outweigh the potential risks of impaired immune response, practitioners are encouraged to test for an appropriate neutralizing antibody response and report their findings. These data will help to improve our understanding of potential interference, if any, that might occur between YF vaccine and other live vaccines administered non-simultaneously.

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