Expanding Options for Preventing Invasive Pneumococcal Disease: The Old Conjugate Vaccine Made New Again

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In December of 2011, the United States Food and Drug Administration (FDA) approved the use of the pneumococcal 13-valent conjugate vaccine (Prevnar 13®, Pfizer, Inc.) for adults 50 years of age and older. This approval was based on the measured immune responses and observed safety profile of the vaccine and not on controlled trials in adults actually demonstrating a decrease in pneumococcal invasive disease. Those trials are ongoing currently and so a recommendation that it be given to all adults 50 or over has yet to be made.

In the world of immunocompromised transplant patients, the use of a conjugate pneumococcal vaccine is somewhat intriguing. The vaccine includes the most common serotypes to cause disease: 4, 6B, 9V, 14, 18C, 19F, and 23F (similar to the previously recommended 7-valent conjugate pneumococcal vaccine in children), as well as six new additional serotypes: 1, 3, 5, 6A, 7F and 19A. Although this may not be as many as the currently widely used 23-valent polysaccharide pneumococcal vaccine (Pneumovax®, Merck, Inc.), the mechanism of immune stimulation is different and has potential benefits. Since polysaccharides from bacterial capsids are not always immunogenic, the conjugate vaccines utilize an inactivated Diphtheria protein coupled to the pneumococcal polysaccharide subunit in order to activate helper T cells and produce more high affinity antibodies against the polysaccharides. Memory B cells made from this process then, in theory, could be boosted by subsequent polysaccharide antigen vaccination. In normal adult populations, use of the conjugate vaccine appears to stimulate levels of antibody that are at least equal to or higher than the polysaccharide vaccine.

In June of this year, a U.S. Centers for Disease Control and Prevention (CDC) advisory panel recommended that adults (19 years or older) with compromised immune systems be routinely administered the conjugate vaccine.¹ Because of the potential “boosting phenomena”, it was still recommended that they receive the 23-valent pneumococcal polysaccharide vaccine as well. This recommendation was primarily based on a randomized control trial of the 7-valent conjugate vaccine in HIV-infected patients which seemed to be beneficial.²

There are several reasons to consider using the 13-valent conjugate vaccine in immunocompromised transplant recipients. Primary among them is the very high incidence of invasive pneumococcal disease...
in adults with immunocompromising conditions. Transplant patients in general have an incidence of pneumococcal pneumonia, bacteremia and meningitis over 10 times that of the normal population.\textsuperscript{3} Other reasons include the safety profile of the vaccine to date and the potential theoretical immunogenic benefits.

Unfortunately, there is not much information in actual solid organ transplant recipients currently. A study in renal transplant patients comparing the 7-valent vaccine to the 23-valent pneumococcal polysaccharide vaccine showed higher titers for some serotypes, though functional antibodies were thought to be no different.\textsuperscript{4} It is also unclear if the boosting phenomenon of administering the polysaccharide vaccine actually translates into any benefit for transplant patients. In a small retrospective study of the 7-valent vaccine given to heart or lung transplant recipients followed by the 23-valent polysaccharide vaccine, no clear benefit was seen in increasing pneumococcal titers.\textsuperscript{5} Similar results were seen in a study of liver transplant recipients in Canada.\textsuperscript{6}

Although there is a lack of information to date on optimal vaccination strategies, it is clear that any kind of strategy is still better than none. Despite extensive guidelines for immunizations of solid organ transplant recipients, vaccines are routinely underutilized in our susceptible heart and lung transplant recipients.\textsuperscript{7} It is hoped that further clinical trials will help us understand ideal dosing and intervals of administration for pneumococcal vaccines as well as others. In the meantime, though, the adequate attempt to immunize these patients should be a primary goal for all of us caring for them.

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References: