



## 16th International Congress on Infectious Diseases

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### Adult Vaccination: Time for a Paradigm Shift from Infants to Adults

**Cape Town** - A great deal of attention has been focused on pediatric immunization over the years. As a result, society has witnessed resounding success in controlling vaccine-preventable diseases (VPDs) in the young. Success has been less apparent among adults but the same goal should be equally important for adults, among whom morbidity and mortality from VPDs far exceeds that in infants and children. During presentations on adult immunization and vaccines here at the ICID meeting, investigators supported the need to vaccinate older individuals against a variety of infections including herpes zoster and pneumococcal disease. Even if vaccination does not fully protect adults from infection, evidence shows that it will attenuate disease, a viable endpoint in an overall effort to keep older adults productive and healthy.

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Childhood vaccination is so well and widely established that it has almost eclipsed the need to think about vaccination in adulthood. Yet the need to vaccinate adults is evident in US statistics which conclusively show that vaccine-preventable diseases (VPDs) are a common cause of morbidity and mortality in adults. Every year, US authorities estimate that approximately 60,000 adults die—compared to only about 300 children—as a consequence of VPDs, reported Professor Gregory Hussey, Senior Advisor, Research, Faculty of Health Sciences, University of Cape Town, South Africa.

Data from South Africa also indicate that influenza rates are high in early infancy and young toddlers. At the same time, 50% of all influenza in the country occurs in adults from the age of 25 onwards. Wu et al. (*Int J Public Health* 2013;58:865-74) found that two-thirds of 33 high-income countries did not have a comprehensive adult vaccine schedule at the time they were surveyed (2010 to 2011) and most did not measure vaccination coverage in adults.

Prevention of VPDs in adults is important but it's not as easily achieved as it is in infants and children. Using reactivation of the varicella zoster virus (VZV) as an example, Dr. Adriana Weinberg, Professor of Pediatrics, Medicine and Pathology, University of Colorado School of Medicine, Denver, Colorado, reminded delegates that the human host defends itself against viruses by mounting both T-cell and antibody responses to the invading pathogen. "T-cells remove viruses from infected cells while antibody responses prevent free virus from entering new cells," she added.

While antibody responses are extremely important in preventing reinfection, "they do not protect the host against herpes zoster (HZ)—the late manifestation of VZV," Dr. Weinberg said. What does protect the host against the emergence of HZ—better known as shingles—is cell-mediated immunity. And cell-mediated immunity unequivocally declines with age, which is why both the

incidence of HZ as well as the severity and duration of a shingles episode increases as people age, she added.

"HZ is a manifestation of declining VZV-specific cell-mediated immunity in the elderly," Dr. Weinberg emphasized. This means that vaccines cannot be expected to prevent disease in adults with the same degree of success as they do in a pediatric population. At the same time, "we can attenuate disease so even if vaccines fail to prevent all episodes of influenza or pneumococcal disease or HZ, we have a good shot at making these diseases milder for aging patients," said Dr. Myron Levin, Professor of Pediatrics and Medicine, University of Colorado School of Medicine, Denver, Colorado.

#### Attenuating Disease Severity

One of the best examples of a vaccine attenuating disease severity was demonstrated in the Shingles Prevention Study (SPS). Involving some 38,500 subjects 60 years of age and older, Oxman et al. (*N Engl J Med* 2005;352:2271-84) found that the HZ vaccine reduced the incidence of HZ in the overall cohort by 51% compared with placebo. The same vaccine also reduced the incidence of post-herpetic neuralgia (PHN) by 66.5% again in the overall cohort. Breaking vaccine efficacy down according to different age groups, it was clear that vaccine efficacy waned fairly dramatically with increasing age, from a high of 64% in subjects between 60 and 69 years of age, down to about 38% in those 70 years of age and older.

This, however, is not the whole story. "In the elderly, one of our main goals is to attenuate disease rather than prevent it," as Dr. Levin pointed out. Overall, the vaccine prevented 64% of all episodes of PHN across the board. Broken down by age group, the vaccine prevented virtually identical proportions of PHN whether subjects ranged from 60 to 69 years of age or 70 years of age or older. (Vaccine efficacy against PHN did decline in subjects 80 years of age and older but it was still considerably more effective at preventing PHN than placebo).

Similarly, the ability of the vaccine to prevent loss of activities of daily living usually due to PHN did not change significantly with increasing age, ranging from a vaccine efficacy of 0.73 for subjects between 60 and 64 years of age to 0.62 for subjects between 75 and 79 years of age. "Since severity of HZ increases with age, the vaccine's effect on disease severity becomes increasingly important in terms of preserving quality of life in vaccinees who develop HZ," Dr. Levin emphasized. "The attenuation effect is more important in older people."

Conversely, prevention of HZ in individuals between 50 and 59 years of age is more successful than it is in older recipients. With approximately 20% of all HZ occurring in those between 50 and 59 years of age, Schmader et al. (*CID* 2012;54(7): 922-8) reported that the HZ vaccine prevented almost 70% of HZ episodes compared to placebo and was well tolerated in this patient group. Dr. John Litt, Associate Professor in General Practice, Flinders University, Adelaide, Australia, reported that just over half of 1330 general practice patients said they were likely to get the HZ vaccine without needing any prompting from their GP.

On the other hand, if their GP recommended the vaccine, they were over 20 times more likely on an unadjusted analysis to say they would get the vaccine. "Especially if patients were ambivalent or perhaps even negative about the vaccine, if their doctor said, 'I think it's a good idea for you to get the vaccine', it gives patients a personal element they can relate to and they are far more likely to get it," Dr. Litt said.

### Pneumococcal Disease

In addition to the annual influenza shot, the pneumococcal vaccine is also recommended for adults 65 years of age and older to prevent pneumococcal-associated disease. This includes community-acquired pneumonia (CAP)—only a small subset of which is related to pneumococcal infection; pneumococcal pneumonia and invasive pneumococcal disease (IPD). As discussed by Dr. Eddy Bresnitz, Professor of Epidemiology, University of Medicine and Dentistry of New Jersey, New Brunswick, New Jersey, a Cochrane review (*Cochrane Summaries*, published online January 31, 2013)

evaluating the impact of the 23-valent polysaccharide pneumococcal vaccine (PPV23) on IPD prevention showed that the vaccine was 74% effective against IPD.

Vaccine efficacy against all-cause pneumonia was low at 26% but as Dr. Bresnitz pointed out, most cases of pneumonia are not caused by pneumococcus. A recent study by Spanish investigators (*CID*. First published online February 14, 2014) found that among subjects 60 years of age and older who had been vaccinated less than 5 years prior to study entry, the PPV23 reduced the risk of bacteremic pneumococcal CAP by 62% and both non-bacteremic and overall pneumococcal CAP by approximately 50% each compared to non-vaccinated controls. The same vaccine also reduced all-cause CAP by 25%.

Also at this meeting, Bonten and colleagues presented results from the Community- Acquired Pneumonia Immunization trial in Adults (CAPiTA) in which investigators showed that vaccinating adults 65 years of age and older with the 13-valent pneumococcal conjugate vaccine (PCV13) prevented approximately 45% of both vaccine-type pneumococcal CAP as well as nonbacteremic/non-invasive vaccine-type pneumococcal CAP compared with placebo.

The same vaccine was 75% effective at protecting recipients from vaccine-type IPD again compared with placebo. As Dr. Bresnitz observed, widespread use of the 7-valent pneumococcal conjugate vaccine (PCV7) in the pediatric population has led to a "tremendous herd protection effect" in the older population.

### Summary

Immunosenescence is a fact of aging and as individuals age, cell-mediated immunity in particular is affected. Vaccines are less likely to offer full protection against disease in the elderly because of waning immunity. Importantly, however, vaccination at least against HZ has been shown to attenuate both the severity and duration of an infection and reduce the risk of PHN more or less independent of age—in and of itself a viable goal in the maintenance of health as the population ages. □

Based on presentations during the ICID 2014 scientific sessions:

J. C. B. Litt et al. - Australian zoster study: GP and patient views about herpes zoster (shingles), its complications, and the likely acceptance of a zoster vaccine. Saturday, April 5, 2014 - Session 63 (Abs #63.015)

M. Bonten - Community-acquired pneumonia immunization trial in adults (CAPiTA). Thursday, April 3, 2014 - Session 9 (Abs # 09.004).

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