Pertussis Vaccine Update

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One of the most important diseases that vaccines were developed to prevent is pertussis, also known as whooping cough. Before a vaccine was developed, in the 1920's and 1930's, thousands of infants in the U.S. *died* every year from this disease. The vaccine that became widely used starting in the 1940's quickly curtailed the illness and death from pertussis. Until the 1990's, the vaccine was made using the whole germ and frequently caused significant side effects including fever, marked redness and swelling where it was given, and less commonly seizures or scary limp spells. To reduce these side-effects, newer versions of the vaccine with only two to five components of pertussis (compared to the thousands of components with the whole germ) were developed. These did have significantly fewer side effects and were originally thought to be as effective in preventing disease. A couple of those versions went into widespread use in the 1990's.

Unfortunately, within 10 to 15 years, it became apparent that whooping cough was on the rise, and it didn't take much longer for scientists to figure out that the newer "acellular pertussis" (aP) vaccines were not as protective as the older "whole-cell" vaccines. Attempts to curtail the amount of infection included vaccinating11 year-olds, as well as older individuals who would be around babies, with Tdap (containing the same amount of **T**etanus toxoid, but reduced amount of **d**iphtheria and **a**cellular **p**ertussis components). It has always been the infants under 6 to 12 months that were at greatest risk of dying with pertussis.

In recent years, it was discovered that infants could be protected better if their mothers got the Tdap at least a few weeks before the baby was born. That way, the antibodies that the mother produced in response to the vaccine could go directly to the baby before birth and provide some protection for months to come at a time when the baby was most vulnerable to the disease. The reason why the DTaP (**D**iphtheria, **T**etanus, acellular **P**ertussis vaccine) is given at 2, 4 and 6 months of age is to provide protection as soon as possible. Delaying these doses normally only delays protection, thus making the baby more vulnerable to serious disease.

A study just published this summer looked at the effect of vaccination of pregnant mothers on vaccine response by infants born to those mothers.[1] It found that the immune response by those infants was significantly diminished and that later initiation of infant vaccination could improve response. More details will have to be worked out, but it may be that the best protection will come with last trimester maternal vaccination followed by a delayed infant schedule like 4, 6 and 9 months.

Also, a new type of pertussis vaccine has been developed that was recently tested in Southeast Asia and found to offer better prolonged protection for older individuals.[2] This was reported at the annual meeting of the European Society for Paediatric Infectious Diseases. So there is hope that we will get better control of pertussis without the side effects experienced with the older whole cell pertussis vaccines, but it will probably take years before new improved vaccines and schedules become the new standard.

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References:

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2. Sirivichayakul C, Chanthavanich P, Limkittikul K, et al. Safety and immunogenicity of a combined tetanus, diphtheria, recombinant acellular pertussis vaccine (TdaP) in healthy Thai adults. Hum Vaccin Immunother. 2017;13(1):136-143.