Whooping cough vaccine may be losing its punch: study

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(PhysOrg.com) -- Vaccination programs against whooping cough may not be fully effective because the bacteria that cause the disease have evolved new strains, a new study has found. A team of Australian scientists has ...

Vaccination programs against whooping cough may not be fully effective because the bacteria that cause the disease have evolved new strains, a new study has found.

A team of Australian scientists has shown for the first time that two of the most common strains of the Bordetella pertussis bacteria in Australia have undergone significant genetic changes since 1997, according to a report of the study published in the journal *Emerging* Infectious Diseases .

Those mutations coincided with changes to the type of vaccine used in Australia and with apparent increases in the number of cases of Australians contracting the highly contagious respiratory disease.

Before 1997, a "whole cell" vaccine was used. That was phased out over two years - due to concerns about side-effects - and since 1999 a new "acellular" vaccine has been used.

"A key issue is that the whole cell vaccine contained hundreds of antigens, which gave broad protection against many strains of pertussis," says one of the authors of the study, Associate Professor Ruiting Lan, of

the UNSW School of Biotechnology and Biomolecular Sciences.

"But the acellular vaccine contains only three to five antigens. Our findings suggest that the use of the acellular vaccine may be one factor contributing to these genetic changes."

The team analysed more than 200 samples of the bacterium, collected at various times over the past 40 years or so in Australia, and compared them with samples from Japan, Canada, USA and Finland.

Professor Lan's laboratory team - led by doctoral student Jacob Kurniawan - performed the genetic studies, working with researchers from the Centre for Infectious Diseases and Microbiology at Westmead and the University of Sydney, including Professor Peter Reeves.

Their findings suggest that while vaccination remains effective against some strains circulating in Australia it may no longer protect against two strains in particular, known as MT27 and MT70.

There has been growing concern among public health officials in recent years about the rising incidence of whooping cough, or pertussis, in Australia. Several significant outbreaks occurred last year in western Sydney, for example.

Until this study, researchers had debated whether the increase was a result of improvements in laboratory diagnosis, the use of a different vaccine or because not enough people had been vaccinated recently (since immunity can wane over time).

"Based on our findings, the vaccine change could be a contributing factor," says Professor Lan. "However, more research is required for a definitive proof. If that is the case, the vaccine may need to be modified to give greater protection against the new strains, without increasing side-

effects, or over time it could lose effectiveness as the organism evolves."

The death rate for babies under the age of six months who catch pertussis is one in 200, according to NSW Health, which says adults and adolescents are at particular risk of contracting whooping cough and can pass it on to babies who are too young to be immunised.

It says the vaccine is at least 85% effecting in preventing most strains of whooping cough in Australia. In NSW, vaccinations are routinely given to infants at two, four and six months. Boosters are needed at age four years and again at age 15 years; free vaccine is offered to adolescents in years 7 and 10 of high school. NSW Health also recommends that new parents and carers of young infants receive boosters.

More information:

-- Journal paper: www.cdc.gov/eid/content/16/2/297.htm
-- The NSW Health fact sheet on pertussis is here.

Provided by University of New South Wales