**** Embargoed to 00:01 [UK time]**
Thursday 12 September 2013**

Study of meningitis A mass vaccination campaign in sub-Saharan Africa shows dramatic impact of new vaccine

No cases of serogroup A meningococcal meningitis following vaccination of almost 2 million people; incidence of all cases of meningitis reduced by 94%

Evaluation of the effectiveness of a mass vaccination campaign with a new meningitis serogroup A vaccine, PsA-TT, in sub-Saharan Africa found that it had a dramatic impact on cases of serogroup meningitis and on carriage of the disease-causing bacteria in the throat, according to new research published in *The Lancet*.

Authors from Africa and Europe, led by the London School of Hygiene & Tropical Medicine and Centre de Support en Santé Internationale (CSSI) in Chad, evaluated the effectiveness of a mass vaccination campaign in Chad in 2011 by measuring the incidence of meningitis during the 2012 meningitis season and the number of people carrying the bacteria that cause the disease in their throat.

Infants, children and young adults are most at risk of meningitis, an inflammation of the membrane around the brain and spinal cord that can cause death or disability, including deafness, paralysis and limb infection leading to amputation. The bacteria are passed from person-to-person through droplets from the throat via coughing, sneezing or other close contact.

Meningitis can be caused by several species of bacteria but one of the most important is the meningococcus. Several groups of meningococci can cause meningitis but serogroup A is the predominant one in a region of sub-Saharan Africa stretching from Senegal in the west to Ethiopia in the east known as the African meningitis belt. Outbreaks of meningococcal meningitis in this region are regular and deadly. The largest recent outbreak was in 2009 involving 14 countries, with over 88,000 suspected cases and more than 5,000 deaths.

Approximately 1.8 million people aged 1-29 years received a single dose of PsA-TT (also known as MenAfriVac ®) in three regions of Chad in December 2011. The incidence of meningitis of any kind in these regions during the 2012 meningitis season was 2.5 per 100,000 people, compared to an incidence of 43.6 per 100,000 in regions where mass vaccination had not been undertaken – a difference of 94%. No cases of serogroup A meningococcal meningitis were detected in the three vaccinated regions.

Carriage of the disease-causing bacteria was also dramatically reduced. Two to four months prior to vaccination, 32 serogroup A carriers were identified in 4,278 people tested through throat swabs. Four to six months following vaccination, only one out of 5,001 people tested in the same community was found to be carrying serogroup A.

Study author, Professor Sir Brian Greenwood from the London School of Hygiene & Tropical Medicine, who has studied meningococcal meningitis in Africa since the early 1970s, said: "This is one of the most dramatic outcomes from a public health intervention that I have seen during a long career of research in Africa. There are now real prospects that the devastating effects of this infection in Africa can be prevented.''

In response to the enormous public health, social and economic burden of meningitis A in Africa, the affordable PsA-TT vaccine was developed by the Meningitis Vaccine Project (MVP) – a partnership between the World Health Organization (WHO) and PATH – with funding from the Bill & Melinda Gates Foundation. The vaccine was rolled-out first in Burkina Faso in 2010, but evaluation of the impact of the vaccine in that country was difficult as there were few serogroup A infections occurring at the time that the vaccine was introduced. This is the first study to demonstrate unequivocally the high level of effectiveness of PsA-TT in preventing serogroup A epidemic meningococcal meningitis and carriage.

Dr Doumagoum Moto Daugla, Director of CSSI and first author of the study, said: "The study emphasises the importance, effectiveness and benefit of this vaccine on the population of Chad, where the epidemic of meningitis A has stepped back over the past two years. We can now focus our resources on integrating the vaccine into the routine immunisation programme as well as strengthening surveillance for early detection of this and other diseases."

Dr Marie-Pierre Préziosi, Director of the MVP, said: "The quality of the work and results presented here is unprecedented. We now have impressive evidence in hand that this vaccine stops transmission of meningitis A. Over 100 million people have already been vaccinated. They are protected themselves and they protect others against disease. We have a real opportunity over the next few years to make meningitis A epidemics a thing of the past."

Steve Davis, PATH President and CEO, said: "This landmark study is further evidence of what a success story this public private partnership has become in the arena of global health. When we began this project in 2001, we knew that developing the vaccine was only half the battle. It required intense work to meet rigorous regulatory and technical requirements; to test the vaccine's safety and efficacy; and to strengthen the countries' capacity to administer it for the long haul. We are deeply grateful for all the institutions and the individuals who have made this vision a reality."

Dr Jean-Marie Okwo-Bele, Director of the WHO Department of Immunization, Vaccines and Biologicals, said: "This is an extremely encouraging signal for those countries that have yet to introduce the vaccine. We are not even half-way done with introducing this revolutionary new vaccine across the meningitis belt of Africa, yet we already have extraordinary results."

Dr Keith Klugman, Director of the Pneumonia programme at the Bill & Melinda Gates Foundation, said: "This is a triumph for collaborative partnerships in public health to assist those with the least resources to receive a much needed vaccine. In order to assure the people living in the meningitis belt that the vaccine effectiveness remains high, the Bill & Melinda Gates Foundation is pursuing opportunities to partner with affected countries to develop a surveillance program so that future vaccine requirements can be evaluated and updated."

The authors say several more years of surveillance are needed to establish how long the vaccine remains effective in preventing epidemics and whether other groups of meningococci replace the ousted serogroup A meningococcus.

The study was funded by the Bill & Melinda Gates Foundation, the Wellcome Trust, and Médecins sans Frontières. Oxford University researchers designed and led the molecular characterisation of the bacterial specimens for the study.

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For further information or to request interviews with Professor Greenwood, please contact the London School of Hygiene & Tropical Medicine press office on +44(0)207 927 2802 or press@lshtm.ac.uk.

Notes to Editors:
Doumagoum M Daugla et al. The impact of a serogroup A meningococcal conjugate vaccine (PsATT) on serogroup A meningococcal meningitis and carriage in Chad. The Lancet. DOI 10.1016/S0140-6736(13)61612-8

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