

WSU files for patent on researcher's vaccine technology for chlamydia

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A Wayne State University School of Medicine researcher has developed a potential first ever vaccine for Chlamydia, the world's most prevalent sexually transmitted disease and the leading cause of new cases of blindness.

Judith Whittum-Hudson, Ph.D., professor of immunology and microbiology, internal medicine and ophthalmology, has identified three [peptides](#) that have demonstrated a [vaccine](#) effect to inoculate against Chlamydia successfully in an [animal model](#). Those findings could soon result in a vaccine for humans.

Patent applications on the technology have been filed by Wayne State University and licensed to a start-up company.

While Chlamydia infection can be readily addressed with a regimen of antibiotics, the treatment does not prevent re-infection. Treatment with antibiotics too early after infection may interfere with the natural development of immunity to Chlamydia, Whittum-Hudson said, and significant portions of the world lack access to basic health care infrastructure that could offer treatment through antibiotics.

"There is no vaccine and the disease is widely rampant," Whittum-Hudson said. "Antibiotics, while effective in treatment, offer no protection against re-infection."

The technology developed by Dr. Whittum-Hudson consists of novel

peptide immunogens selected from a random phage display library by an antibody against a Chlamydial glycolipid exoantigen, or GLXA, or peptides that correspond to antigen-binding regions of an anti-idiotypic antibody mimic of GLXA. The peptides comprising the vaccine would induce antibodies and other immune responses to the entire spectrum of genus-wide Chlamydia. Whittum-Hudson said colleagues have developed a method to encapsulate the vaccine, so that it can be delivered orally rather than through injection, a boon to developing nations that lack the infrastructure to support inoculations through needle injection.

Chlamydial infections are the leading cause of [pelvic inflammatory disease](#) (PID), because Chlamydia infects the lower genital track and then may ascend into the fallopian tubes. PID can lead to infertility, ectopic pregnancy and chronic pelvic pain. The U.S. Centers for Disease Control and Prevention estimates that in the United States 750,000 women annually experience acute PID because of Chlamydia infection, and as many as 15 percent of those women may become infertile. Because an estimated 85 percent of women infected with Chlamydia are asymptomatic, the disease can wreak its permanent damage before they even become aware of the infection. Pregnant women can pass the infection to their infants during birth, leading to eye infections, including conjunctivitis and bronchial infections.

Chlamydia trachomatis is the leading cause of infectious blindness in humans. Worldwide, according to the World Health Organization (WHO), as many as 25 percent of people infected with this form will develop permanent blindness. More than 140 million people are infected with C. trachomatis, leaving 6 million blinded in Africa, the Middle East, Asia and Latin America. At least 85 million eye infections annually are attributed to the disease, the WHO estimates. With the lack of access to basic health care in many of these regions, a vaccine would substantially reduce, if not eliminate, blindness due to Chlamydia in

these areas.

A vaccine would have significant impact on health care around the world. The WHO estimates that 92 million people are infected with the sexually transmitted disease form of *Chlamydia trachomatis*, and the numbers continue to increase. *Chlamydia trachomatis* is the most commonly reported disease in the United States and has been the most prevalent of all sexually transmitted diseases reported to the CDC since 1994. The numbers of Chlamydial infections in the United States continue to rise. In 2009, the last year for which statistics are available, 1,244,180 cases of Chlamydia infection were reported to the CDC, a rate of 409.2 cases per 100,000 Americans, and a 2.8 percent increase over 2008 reported cases.

In rankings of states with the highest number of reported cases in 2009, Michigan placed 13th with 457 cases of infection for every 100,000 people. Mississippi ranked first (802.7 per 100,000) and New Hampshire ranked last (159.7 per 100,000). Some studies estimated that in the United States alone there are 4 million to 5 million new cases of Chlamydia infection annually.

Another chlamydial species, *Chlamydia pneumoniae*, is responsible for 10 percent to 20 percent of community-acquired pneumonia in adults. Chlamydiae also have been associated with arthritis, atherosclerosis, stroke, myocarditis, chronic obstructive pulmonary disease, late-onset Alzheimer's and temporomandibular joint disease.

Whittum-Hudson noted that animals in which the prototype vaccine has been tested showed a decrease in joint inflammation, reducing the reactive arthritis-inducing effect of disseminated Chlamydia.

She said the vaccine may require boosters delivered at various stages of life. For instance, infants or children may be vaccinated, and then

receive a booster immunization as they approach sexual maturity. A booster could be administered as a patient reaches age 40 to assist in warding off potential cardiovascular effects of Chlamydia. Another booster might prove beneficial at an older age to combat the effects of Chlamydia-associated late-onset Alzheimer's disease.

Another potential benefit of the vaccine lies in the livestock and poultry industries. Cattle, sheep and some poultry can contract [Chlamydia](#), leading to illness and the self-aborting of fetuses, and respiratory infections in poultry. A viable vaccination could save the livestock industry untold millions of dollars and protect workers in the poultry industry who can contract the disease from infected animals.

Whittum-Hudson said that while her vaccine technology shows promise, she needs to conduct further testing in animals and then in humans. A viable vaccine, she said, could become available in 10 to 15 years.

Provided by Wayne State University

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