Medical Xpress

Researchers develop E. coli vaccine

April 14 2009

A Michigan State University researcher has developed a working vaccine for a strain of *E. coli* that kills 2 million to 3 million children each year in the developing world.

Enterotoxigenic *E. coli*, which is responsible for 60 percent to 70 percent of all *E. coli* diarrheal disease, also causes health problems for U.S. troops serving overseas and is responsible for what is commonly called traveler's diarrhea.

A. Mahdi Saeed, professor of epidemiology and infectious disease in MSU's colleges of Veterinary Medicine and Human Medicine, has applied for a patent for his discovery and has made contact with pharmaceutical companies for commercial production. Negotiations with several firms are ongoing.

"This strain of *E. coli* is an international health challenge that has a huge impact on humanity," said Saeed, who has devoted four years to develop a working vaccine at MSU's National Food Safety and Toxicology Center. "By creating a vaccine, we can save untold lives. The implications are massive."

ETEC affects millions of adults and children across the globe, mainly in southern hemisphere countries throughout Africa and South America. It also poses a risk to U.S. troops serving in southern Asia and the Middle East.

Saeed's breakthrough was discovering a way to overcome the miniscule

molecular size of one of the illness-inducing toxins produced by the *E. coli* bug. Since the toxin was so small, it did not prompt the body's defense system to develop immunity, allowing the same individual to repeatedly get sick, often with more severe health implications.

Saeed created a biological carrier to attach to the toxin that once introduced into the body induces a strong immune response. This was done by mapping the toxin's biology and structure during the design of the vaccine.

After creating the carrier in a lab at MSU, Saeed and his team tested it on mice and found the biological activity of the toxin was enhanced by more than 40 percent, leading to its recognition by the body's immune system. After immunizing a group of 10 rabbits, the vaccine led to the production of the highest neutralizing antibody ever reported for this type of the toxin.

Saeed hopes that human clinical trials could begin late in the year.

There also are several other human health implications for the vaccine, besides providing immunity against most *E. coli* disease, according to Saeed. Many patients who undergo anesthesia during a medical procedure surgery suffer from post-operative paralytic ileus, or an inability to have a bowel movement. A small oral dosage of the vaccine could act as a laxative, which often aren't prescribed after a surgery for fear of side effects, Saeed said. A small dose also could help with urinary retention.

The vaccine will be available for animals as well, Saeed added. He pointed out the *E. coli* bug also is a major cause of sickness and death for newborn animals such as calves and piglets, which in the United States alone causes $300 million in loss of agricultural products each year.

Saeed's work was funded in part by a $510,000 grant from the National Institutes of Health.

Source: Michigan State University (news : web)

Citation: Researchers develop E. coli vaccine (2009, April 14) retrieved 5 May 2024 from https://medicalxpress.com/news/2009-04-coli-vaccine.html

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