UC SANTA BARBARA

THE Current

October 21, 2008
George Foulsham

UCSB Researchers Develop Cross-Protective Vaccine

Doctors have always hoped that scientists might one day create a vaccination that would treat a broad spectrum of maladies. They could only imagine that there might be one vaccine that would protect against, say, 2,500 strains of Salmonella.

And what if that same vaccine could help protect the elderly?

UCSB scientists Douglas Heithoff and Michael Mahan –– along with University of Utah scientists Elena Enioutina, Diana Bareyan, and Raymond Daynes –– believe their recent research suggests that might be possible in the not-too-distant future. In a paper to be published in the November edition of the journal Infection and Immunity, the researchers detail the path to creating a vaccine that confers protection against multiple strains of bacteria.

"Vaccines are great," Mahan said in an interview. "Second to water sanitation, they are the best medical invention of mankind."

The problem with conventional vaccines is that they only protect against a limited number of closely related strains. "That is why flu vaccines need to be administered every year because different flu strains arise every year," Mahan said.

This is what prompted the researchers to begin their quest for a more powerful vaccine that conferred protection against many strains.

The team focused on developing a vaccine against Salmonella, which causes food and blood poisoning –– with over 1.5 million cases in the United States each year.

"It's endemic worldwide," Mahan said. "It's not a carnivore issue –– it's everybody's issue since fruits and vegetables are often the source of infection."

By disarming a "genetic switch," the research team has developed a vaccine that protects against many strains of Salmonella.

The new vaccine stimulates the production of antibodies and immune cells that work together to kill bacteria.

Also, the vaccine does not induce a specific class of inhibitory immune cells that are known to contribute to immune declines in cancer patients. This lack of "immune suppression" is an advantage of the new vaccine over conventional vaccines.

The researchers also showed a link between the immune declines observed in cancer patients and those occurring as part of the normal aging process.

"This may explain why the elderly are more susceptible to infection and why they are more difficult to effectively vaccinate," Mahan said. "Protocols that remove these inhibitory cells may boost vaccine effectiveness in the elderly."

The impact on human health may come in the near term.

The new vaccine is currently being tested in livestock –– the main source of human infection.

"The immunization of livestock can help human health by promoting food safety," Heithoff said. "Of course, the three principal issues for vaccines will always be safety-safety-safety –– and we've put a lot of effort into it."

Funding for this research came from the National Institutes of Health, the United States Department of Agriculture, and The G. Harold & Leila Y. Mathers Foundation.

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary

collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.