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### Health

#### Research: Vaccine Ingredient Can Disrupt Immune System

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In a study sure to fuel the controversy about the role of childhood vaccines in autism, scientists at UC Davis have found that a preservative used in some vaccines can disrupt the immune system, at least in mice. Study authors caution the findings do not specifically link use of thimerosal, which contains mercury, to autism and other neurodevelopmental disorders.

"This is not a smoking gun," said Isaac Pessah, the University of California, Davis toxicologist who led the study for the university's MIND Institute and the National Institute of Environmental Health Sciences. "This provides a framework, but not the answer."

Pessah's study, part of a large, federally funded research effort exploring the role of environmental toxicants autism and other disorders, will be published this morning in the online edition of Environmental Health Perspectives, a peer-reviewed publication of the NIEHS.

"This is important because it does add to our knowledge of the potential effects of thimerosal," said Cindy Lawler, a program administrator for the NIEHS in charge of the UC Davis research grant. "It provides a good clue for other studies that can be conducted in other animals or in biological samples from humans." The results come seven years after the Centers for Disease Control and Prevention and the American Academy of Pediatrics asked drug makers to remove thimerosal from childhood vaccines. Except for trace amounts used in vaccine production, thimerosal is no longer used in childhood vaccines. The exception is the flu vaccine; although manufacturers are now producing a thimerosal-free version of the flu shot, the lion's share of vaccine supplies still contain the preservative.

Concerns about the safety of the preservative grew after the Food and Drug Administration concluded that babies up to 6 months old were getting more mercury than considered acceptable by the Environmental Protection Agency. Several large-scale studies failed to establish a link between mercury-containing vaccines and autism. That has not deterred parents who believe their child was developing normally until receiving the recommended childhood immunizations.

Researchers now believe that autism is a disorder -- or group of disorders -- with many possible causes. A prevailing theory is that autism is caused by several genetic abnormalities, which may be the basis for a heightened susceptibility to certain chemical exposures. The UC Davis study is not likely to settle the matter, but does indicate that the preservative may leave the immune system vulnerable in susceptible groups.

Based on earlier and yet-to-be published studies establishing differences in the immune systems of autistic children from children without the disorder, Pessah looked for clues to those discrepancies. He focused on a type of cell called a dendritic cell, which is responsible for marshalling the body's response to invaders such as bacteria, viruses or other antigens such as vaccine ingredients. "They take up those foreign substances and process them," he said. "Once they do that, they migrate to the lymph nodes to present their information to the other immune cells, which can activate a global immune response."

For his research, Pessah used a mouse strain not particularly sensitive to mercury or other heavy metals, and introduced concentrations of thimerosal comparable to those attained in childhood vaccinations that contain the preservative. "What we found was rather unexpected," he said. "In fact, the dendritic cells seemed to be extremely sensitive to the effects of thimerosal."

Specifically, the thimerosal disrupted the normal biological signals that take place in cells, Pessah said. At lower concentrations, the signal disruption caused an inflammatory response; at higher concentrations it

caused cell death. "One could imagine that as concentrations of thimerosal vary in the organisms, you could get a plethora of unwanted or uncontrolled effects," Pessah said. And those effects could vary depending on the organism's genetic background, he said.

Many children diagnosed with autism experience immunological problems including gut disorders, allergies and frequent infections. "We now understand one of the ways in which thimerosal could adversely impact the immune system," Pessah said. "We have a target that provides a framework for now studying this in autistic children."

Pessah, who directs the Children's Center for Environmental Health and Disease Prevention at UC Davis, hopes now to determine whether dendritic cells from children with autism are particularly sensitive to the effects of thimerosal, various forms of mercury and other environmental toxicants.

Rick Rollens, the father of an autistic boy who has been active in advocating for autism research, said he is pleased that UC Davis has taken on the issue of the potential role of thimerosal. Rollens, recently appointed by the California State Legislature to a blue ribbon commission on autism, noted that after years of surges in new autism cases, the numbers of new cases reported to the state have dropped since 1999, when vaccine makers were asked to remove the chemical from their products.

Still, Rollens is cautious about the implications of this and other ongoing research. "Until the good science is done, we need to withhold our judgment on what exactly is the cause," he said. "I am very encouraged by this study."

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