Research reveals protective properties of influenza vaccines

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(Medical Xpress)—Collaborating scientists from Nationwide Children's Hospital, Baylor Institute for Immunology Research, and Mount Sinai School of Medicine have identified an important mechanism for stimulating protective immune responses following seasonal influenza vaccinations. The study was published in *Science Translational Medicine*, a journal of the American Association for the Advancement of Science (AAAS).

While seasonal influenza vaccines protect 60 to 90 percent of healthy adults from "the flu," the mechanisms providing that protection are still not well understood.

The study led by Octavio Ramilo, MD, chief of Infectious Diseases and an investigator in the Center for Vaccines and Immunity at Nationwide Children's Hospital and professor of Pediatrics at The Ohio State University (OSU) College of Medicine, and Hideki Ueno, MD, PhD, an investigator at the Baylor Institute for Immunology Research at Baylor University, demonstrates how certain T cells in the blood are stimulated to provide protective antibody responses with seasonal flu vaccines.

Antibodies are produced by specific white blood cells or B cells, which serve as an immune defense against foreign bodies such as the influenza virus. Helper T cells, another type of white cell, are essential for the generation of B cells.

Blood samples before and after influenza vaccination from three groups

of healthy study participants were analyzed for antibody responses. The groups included two sets of adults, one receiving flu vaccines during the 2009-2010 winter and the other receiving vaccination during the 2011-2012 winter. The third group included children receiving the flu vaccine during the 2010-2011 winter.

Analyses show that a temporary increase in a unique subset of helper T cells expressing the co-stimulator molecule ICOS adds to the immune response by helping B cells produce influenza-specific antibodies.

Results indicated that at day seven following the administration of a flu vaccine in all groups, stimulated T cells were evident, contributing to the development of the immune response.

The T cells positively correlated with increased antibodies against each flu virus strain examined, with the exception in the children's group against the swine-origin H1N1 virus.

"Given that seasonal influenza vaccines induce antibody responses mainly through boosting the recall response of the immune system, this lack of correlation might reflect the lack of H1N1 specific immunity in some children," explains study co-author Emilio Flano, PhD, a principal investigator in the Center for Vaccines and Immunity at Nationwide Children's and an associate professor of Pediatrics at OSU College of Medicine.

"This is consistent with the fact that these children had not been vaccinated or naturally exposed to the H1N1 virus prior to being vaccinated during the 2010-2011 winter," said study co-author Santiago Lopez, MD, a postdoctoral research fellow in the Center for Vaccines and Immunity and a resident at Nationwide Children's.

Further experiments demonstrated that this unique subset of helper T

cells can boost production of existing antibodies that fight flu by stimulating memory B cells, but do not help production of new antibodies by naïve B cells.

"We're gratified that our study provides evidence of one of the essential events associated with the immune response following seasonal influenza vaccination," says Dr. Ramilo. "Understanding these processes is a key step toward developing more effective vaccines."

Provided by Nationwide Children's Hospital