

# Infant-friendly flu vaccine developed with key protein

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According to the World Health Organization, influenza causes serious

illness among millions of people each year, resulting in 250,000 to 500,000 deaths. Those most at risk include infants younger than six months, because they cannot be vaccinated against the disease. Now, researchers at the University of Missouri School of Medicine have identified a naturally occurring protein that, when added to the flu vaccine, may offer protection to babies during their first months of life.

"Influenza vaccine works by stimulating a person's immune system to make antibodies that attack the flu virus," said Michael Sherman, M.D., professor emeritus in the Department of Child Health at the MU School of Medicine and lead author of the study. "However, infants younger than six months do not make antibodies when given flu vaccine. This is because the immune systems of these very young babies do not respond to the adjuvant, or additive, within the vaccine that boosts the body's immune response when confronted with a virus."

The adjuvant used in most vaccines is aluminum hydroxide, or ALUM. ALUM is an additive that essentially acts as an irritant to attract [white blood cells](#) called neutrophils to the vaccination site. Neutrophils secrete the protein lactoferrin, which works with the immune system to impede the virus's ability to survive in the body. However, in premature and term infants, ALUM does not make immature immune cells work better. In this very young group, only the smaller amount of naturally occurring lactoferrin found near the vaccination site improves the immune response.

"It is well documented that infants obtain protection against certain infections from nutrients found in breast milk," Sherman said.

"Lactoferrin is the major protein in a mother's milk and boosts her infant's [immune system](#) to fight infection. In theory, we felt that we could create a vaccine by replacing ALUM with lactoferrin as an additive."

To test their hypothesis, Sherman's team studied mice vaccinated with either the adjuvant ALUM or lactoferrin. The mice, whose ages approximated those of human infants younger and older than six months, received the H1N1 influenza virus. The results indicated that lactoferrin worked slightly better than ALUM as an adjuvant. Lactoferrin also provided four to five times the protection against influenza, compared to the control group that received an [influenza vaccine](#) without an adjuvant.

"Currently, the best protection for neonatal babies is to vaccinate the mother and all those who will have close contact with the infant," Sherman said. "Our recent study was meant to test the possibility of creating a safe and effective [flu vaccine](#) for very high-risk premature infants. Now that we have, we feel that the use of a natural protein would make immunization not only possible but more accepted."

Through future studies, Sherman and his team will study lactoferrin's ability to prevent secondary infections such as pneumonia, as well as the possibility that the protein could be used as an adjuvant in other vaccines.

The study, "Lactoferrin Acts as an Adjuvant during Influenza Vaccination of Neonatal Mice," recently was published in the journal *Biochemical and Biophysical Research Communications*.

Provided by University of Missouri-Columbia

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