Researchers discover new way to boost vaccines, seeks patent

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As the medical community searches for better vaccines and ways to deliver them, a University of Rochester scientist believes he has discovered a new approach to boosting the body's response to vaccinations.

Richard P. Phipps, Ph.D., found that the same molecules used in drugs that treat diabetes also stimulate B cells in the immune system, pushing them to make antibodies for protection against invading microorganisms.

The University of Rochester Medical Center has applied for international patent protection for this discovery.

Phipps believes further research will show that low doses of insulin-sensitizing drugs might be useful as vaccine adjuvants, particularly for people with weakened immune systems who cannot produce a proper antibody response. This would include some infants, the elderly, and patients with chronic health problems that lower immunity.

Currently the only widely approved vaccine adjuvant in the United States is alum. A vaccine adjuvant is a substance added to a vaccine to improve the body's immune response. Various forms of aluminum salts have been used for 70 years. (Adjuvants are added to some vaccines but not all. For example, live viral vaccines given during childhood and seasonal flu vaccines do not contain adjuvants.)

"The search is always on for new adjuvants and safe adjuvants," said

Phipps, a Dean's Professor of Environmental Medicine and professor of Medicine, Oncology, Ophthalmology, Microbiology and Immunology, Pediatrics and Pathology and Laboratory Medicine. "We are excited that we've identified a potentially important new and effective adjuvant."

Phipps' discovery grew from years of NIH-funded research investigating a protein called PPAR gamma and its ligands, which are present inside B cells and are involved in inflammation and in regulating the properties of immune cells and cancer cells. The way B cells evolve, or differentiate, is central to the body's immune response.

A closer examination of the role of PPAR gamma in relation to B cell function showed that PPAR levels increase upon B cell activation, according to a study published in 2009 by Phipps' laboratory in the Journal of Immunology.

Thus, researchers theorized that any molecule that binds to and activates PPAR gamma would, in turn, improve B cell secretion of antibodies. Researchers tested both natural and synthetic PPAR gamma ligands and discovered that the synthetic molecules used to create anti-diabetic drugs such as Actos and Avandia stimulated human and mouse B cells to better produce antibodies.

The drawback, Phipps said, is the possibility that too much stimulation would cause the immune system to overreact, triggering autoimmune diseases such as rheumatoid arthritis or lupus. Additional research is needed to better understand this process.

Provided by University of Rochester Medical Center