

Llamas, the world's wonderfully, spitting, pack animal, might be the answer to the illness that resulted in an estimated 80,000 American deaths last winter, which was the highest number in the last four decades, according the Centers for Disease Control (CDC).

Influenza, or more commonly known as the flu, affects an average of 200,000 Americans every year. And even though people have the opportunity to get the flu shot in hopes of preventing the illness, recent studies have shown that flu vaccinations reduces the risk of illness by 40% only if it is the correct strain.

So how do llama's fit into all of this?

Llamas have an array of immune system antibodies that are so microscopic, they can fit into crevices on the surface of an invading virus. Scientists are hoping that this structure of llama antibodies could protect humans from entire families of flu viruses that have seemed unstoppable due to how unpredictable the viruses can be.

In a recent study published in the journal *Science*, a team from Scripps Research Institute in La Jolla made great strides in the goal of developing a universal vaccine against influenza.

When the potential new vaccine was tested with mice, it quickly revealed a complete protection against a large series of human flu strains that had been adapted to mice. The series included strains such as the H1N1, commonly known as "swine flu", as well as B viruses, which occur only in humans.

A dose of the experimental vaccine was able to protect against H1N1 for at least 35 days, which is roughly the same time span in a single flu season.

The study had received funding from the National Institutes of Health, and the organization's director of National Institute of Allergy and Infectious Diseases, Dr. Anthony Fauci, was more than pleased with the study's results.

"From a scientific and technical standpoint, this is really a very elegant study—the highest quality of science," Fauci said. He went on to praise the study and the research team for the progression of developing vaccines that can eliminate an array of viruses, even in people who immune systems are fragile or compromised.

According to the World Health Organization, influenza is responsible for as many as 650,000 deaths each year, which was the motivation for this research team to borrow new techniques from immunology, microbiology, nanotechnology, and genetic engineering labs around the world.

After testing mice, the team moved to llamas, by vaccinating them against a number of A and B strains of influenza. With the blood samples they took, they were able to collect the antibodies the llamas produced in response.

The research team found four uniquely small antibodies that showed an ability to destroy

many different strains of the flu. In relation to the size and function, the scientists called their creations “nanobodies.”

Scientists then were able to engineer a single protein capable of squeezing into spaces on a virus’ surface that are too small for most proteins. The resulting “multidomain antibody MD3606,” with its described impressive breadth and potency, could potentially offer protection against pretty much any strain of influenza that nature could create.

Right now, if a dominant strain in a given flu season suddenly changes, the medical field does not have the appropriate vaccinations ready to fight it. However, with these new antibodies, they could quickly adapt and be ready to fight off the new dominant strain, essentially wiping out the scenario of a pandemic flu.



CDC conducts studies each year to determine how well the influenza (flu) vaccine protects against flu illness

Even though this study is groundbreaking, there are still mountains to climb before humans are able to benefit from it.

The main challenge lies with getting the human immune system to produce this super-protein even when the patient's body is weaker by age, stress, or disease.

The researchers found that trying to take on this task would be nearly impossible, so instead they are devising a way to work around humans' unreliable response to vaccines and building a gene that would be encoded with the powerhouse protein.

The next steps in this study will take years to conduct further tests in animals and clinical trials in humans. However, this is a huge leap in the medical world and will hopefully lead to a universal flu vaccination one day.

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