



## Get ready, some medical experts are predicting the worst flu season in history

- Medical experts are bracing for one of the worst flu seasons in history.
- The main flu strain for 2017-18 is known as the H3N2 virus, and it is more deadly than the swine flu.
- The flu is now widespread in about 46 states, reports the CDC.
- The National Institute of Allergy and Infectious Diseases and other organizations are calling for the development of a universal vaccine.

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Get ready, the worst flu season in history may be coming 1:32 PM ET Tue, 9 Jan 2018 | 00:54

Medical experts in the United States are worried that this year's flu season could be a nasty one that may be lethal. That's because this year's main flu strain, the influenza A virus, known as H3N2, is worse than the swine flu in 2009. To put it in perspective, back when the swine flu was making headlines it infected just 51,000 people in Australia. This year's H3N2 sickened over 215,000 and the illness has hit our shores. It's a situation that has led the [Centers for Disease Control and Prevention to do a collaborative study with global health partners](#) in an effort to make addressing the situation a global priority.

Reported cases in some states, like Arizona, are up more than 758 percent over this time last year, and the CDC reports the flu is in widespread conditions in 46 states, including California, Connecticut, Massachusetts, New York and Virginia, as of Dec. 30, 2017. To make matters worse, the flu vaccine is not proving to be very effective against this year's main strain, because of a virus mutation. In Australia it has been effective in only 10 percent of cases, [reports The New England Journal of Medicine](#). The vaccine now being administered to Americans uses the same formulation.

With news mounting of this season's flu being a particularly virulent one — evidenced by overcrowded emergency rooms and an uptick in related deaths across the country — it's eerily ironic that this year marks the 100th anniversary of the 1918 global influenza pandemic. Also known as the Spanish flu, the worldwide outbreak infected an estimated 500 million people, nearly a third of the planet's population then, and killed between 50 million and 100 million victims. More than 25 percent of the U.S. population was sickened, and about 675,000 Americans died.

While no public health officials are declaring the current flu to be a pandemic, this strain is historically more difficult to fight than others. Australia, for instance, just came through its flu season, reporting record-high numbers of cases of the same H3N2 virus and higher-than-average numbers of hospitalizations and deaths.

A string of bad flu seasons has Dr. Fauci and other medical experts calling for the development of a universal influenza vaccine that would save lives. Each year, on average, 5 percent to 20 percent of the U.S. population contracts the flu, tens of thousands are hospitalized, and between 3,000 and 49,000 Americans die from flu-

related illness, according to the CDC. The flu strikes indiscriminately, but young children, the elderly and the chronically ill are most vulnerable.

Caring for the sick is costly. The CDC estimates that the flu costs the United States \$10.4 billion a year in direct medical expenses and another \$16.3 billion in lost earnings annually. A chunk of those billions is spent formulating, growing and distributing millions of doses of the annual flu vaccine, which from year to year reduces the risk of illness by 40 percent to 60 percent at best. The flu vaccine is the only one that has to be reformulated and administered every year. Most of the vaccine is grown in eggs, an arduous process that takes around six months.

### **The race to make a universal vaccine**

The definition of a universal flu vaccine is somewhat flexible. Ideally, a single injection would protect against all known and emerging influenza A strains and last a lifetime, said Peter Palese, a microbiologist at the Icahn School of Medicine at Mount Sinai in New York. More modest proposals envision a one-shot vaccine that would protect against getting the flu for anywhere from three to 20 years.

Palese's laboratory is one of three different research groups at Mount Sinai exploring a universal flu vaccine and one of numerous efforts under way mostly in academia, biotech firms and NIH. A handful of major pharmaceutical companies are supporting universal flu vaccine research, including [GlaxoSmithKline](#); Janssen Vaccines, a division of [Johnson & Johnson](#); and [Sanofi](#).

Palese's team has developed a universal flu vaccine that is now in the first phase of testing in humans, with support from GSK and the Gates Foundation. "What changes in the influenza virus from year to year is the hemagglutinin (HA)," Palese explained, "which is the major protein against which we make an immune response."

The HA comprises a head and a stalk. "When our immune system sees a flu virus, it makes antibodies against the head," he said. Palese's vaccine aims to stimulate antibodies that bind to the more "conserved" areas on the stalk and which remain the same every year and are common to most seasonal flu viruses. "We want to redirect the body's immune response to the stalk."

**A different approach to the universal vaccine is under way at FluGen, a biotech firm in Madison, Wisconsin. Backed by both government and VC funding, the company is working with technology first discovered at the University of Wisconsin-Madison by Dr. Yoshihiro Kawaoka and Dr. Gabriele Neumann and exclusively licensed to FluGen. "Our vaccine, called RedeeFlu, is based on a premise that says what happens if you take a [naturally occurring] 'wild type' of flu virus and modify it to infect the human body but don't allow it to replicate and cause illness," said Boyd Clarke, executive chairman of FluGen. (Coincidentally, his maternal grandfather died in the 1918 pandemic.)**

**Last October, FluGen announced that it was awarded \$14.4 million by the Department of Defense to conduct human clinical challenge trials with RedeeFlu. In those studies, half of the participants will be vaccinated and half will receive a placebo, but all will subsequently be infected with an influenza virus. "We want to see if the vaccine prevents illness and replication of the virus," Clarke said. "Based on pre-clinical trials, we have reason to be optimistic."**

On another front, this year the [Human Vaccines Project](#), a New York-based nonprofit consortium of academic, government and industry medical researchers, is launching the Universal Influenza Vaccine Initiative. "The goal is to understand immunity to the flu and then convert that into a universal flu vaccine," said Dr. James Crowe, a

pediatric infectious diseases physician at Vanderbilt University Medical Center in Nashville, Tennessee, and the director of UIVI. Similar to Palese's approach, UIVI is targeting the more stable stalk region of the HA protein.

Although Crowe is dedicated to the eventual discovery of a universal vaccine, he also wants to focus on improving current vaccines. "The excitement in the field is making better vaccines for strains that are killing people right now," he said. "Even modest improvements would save thousands of lives."

— *By Bob Woods, special to CNBC.com*