# Bird flu isn't spreading in humans for now—but there are vaccines in the pipeline if that changes

July 17 2024, by Paul Griffin

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Since May, a number of poultry farms around Australia have faced outbreaks of avian influenza, or bird flu. These outbreaks have been devastating for the poultry farms affected, necessitating large-scale culls,

and have caused knock-on effects for the country's egg supplies.

The poultry farm outbreaks have been linked to bird flu strains beginning with H7 (such as H7N3 and H7N8). But the strain causing most concern at present is arguably a different strain—H5N1.

This strain is spreading rapidly around the world, and can cause more serious illness and death in poultry, birds and mammals.

Experts are warning H5N1 could soon reach Australia. And while bird flu isn't currently spreading between humans, this could change in the future.

So where are we at with vaccines for bird flu?

## More about bird flu

H5N1 first emerged in southern China in 1996.

Strains like H5N1 are further broken down into variants called clades. Since emerging in 2020, clade 2.3.4.4b has spread around the world, giving experts cause for concern. Recently, it has been causing outbreaks not only in wild birds and poultry, but also in dairy cows, notably in the United States.

While H5N1 is yet to be detected in birds or other wildlife in Australia, as it continues to spread in other regions, there are concerns we're likely to see it here soon. CSIRO experts have this week warned the risk of H5N1 being imported is higher this year compared with previous years.

Fortunately, cases in humans remain rare. Five human cases of H5N1 clade 2.3.4.4b have been reported in the US since 2022, all of whom had close contact with dairy cows or poultry, and around ten others

elsewhere in the world.

There was a single imported human case of H5N1 in Australia in a child who returned from overseas earlier this year, but of a different clade.

One of the biggest challenges with influenza viruses is that they can change fairly easily. There's a possibility that some of these changes may give the virus the ability to transmit more readily from person to person. This could lead to widespread transmission worldwide, or a pandemic.

## We have some vaccines already

Given H5N1 viruses have been around for a while, we actually already have a few vaccines designed to protect against this bird flu strain in the event of sustained transmission in humans. The US approved one from Sanofi Pasteur back in 2007, the European Union approved one from GSK in 2008, and Australia approved one from CSL Limited in the same year.

Older H5N1 vaccines were traditional egg-based vaccines, which work by growing the virus in fertilized chicken eggs and deactivating it, then injecting it into the muscle so our immune system can be trained to respond.

More recently, CSL Seqirus has created a cell-based H5N1 vaccine. This shot is based on technology already used to manufacture their seasonal flu vaccines, where the virus is grown in cultured cells of mammalian origin (rather than in eggs). Developing a vaccine that doesn't require chicken eggs to make is sensible in the context of bird flu, which can limit the availability of eggs.

While the risk in humans remains low, the World Health Organization has suggested humans don't need to be vaccinated against bird flu at this

stage.

That said, Finland plans to roll the CSL Seqirus shots out imminently to those at highest risk (people routinely exposed to animals who may be infected), making them the first country to vaccinate against H5N1.

While research has suggested existing vaccines produce immune responses that will provide sufficient protection against the currently circulating strains, vaccines based on older versions of H5N1, or even those made more recently, may not be an ideal match for future strains of bird flu.

## What about mRNA vaccines?

mRNA vaccine technology is now well established for COVID, while an mRNA vaccine against RSV (respiratory syncytial virus) was recently approved in the US.

mRNA (messenger RNA) vaccines essentially work by giving our immune system instructions to make proteins, usually bits found on the surface of viruses. Our immune system then recognizes and responds to these proteins to protect us if we encounter the virus.

This technology also offers promise for bird flu vaccines. Moderna began clinical trials for mRNA vaccines against both H5 and H7 strains in 2023 and recently secured funding to continue late-stage development. Other companies including GSK and Pfizer are also working on mRNA vaccines against H5N1.

One of the benefits of this technology is that if the virus changes significantly from the version circulating at a given time, mRNA vaccines can be adapted to these changes quite quickly.

Other approaches are also being investigated, including "universal" flu vaccines that could protect from all types of flu. But these are unlikely to be available soon.

Being a virus primarily of birds, another strategy is to vaccinate the birds themselves. In some countries where bird flu is consistently found in birds such as Egypt and China, vaccinating poultry in particular has been routine for some time.

## What next?

With the ever-increasing global spread of H5N1 and the growing number of species infected, there are concerns about the potential for this strain to cause a pandemic.

If we were to see a bird flu pandemic, fortunately we are perhaps in a better position than ever before to respond. Not only have we learnt a lot in recent years from responses to other infectious diseases, particularly COVID, but technology and capacity to be able to make vaccines rapidly has also come a long way.



Provided by The Conversation

Citation: Bird flu isn't spreading in humans for now—but there are vaccines in the pipeline if that changes (2024, July 17) retrieved 17 July 2024 from https://medicalxpress.com/news/2024-07-bird-flu-isnt-humans-vaccines.html