'Protecting virus' offers instant flu protection and converts flu infections into their own vaccines

October 4 2006

Professor Nigel Dimmock

Research led by Professor Nigel Dimmock at the University of Warwick is developing an entirely new method of protecting against flu. This has been shown to protect animals against various strains of flu, and could offer protection against the full range of influenza A infections, including H5N1 and any new pandemic or epidemic strains infecting humans.

The 'protecting virus' provides instant protection, and completely prevents flu symptoms developing by slowing influenza infection rates to such an extent that the harmful infection becomes a vaccine against that very form of influenza. It can also counter an actual infection and offer

protection if given up to 24 hours after first infection (and possibly longer).

Existing vaccination methods depend on stimulating the body's immune system, so that white blood cells produce antibodies that attach to the surface of the virus and start the process of killing it. This works well for many diseases, such as smallpox, polio and measles, but is much less effective with influenza, as the coat of the flu virus is continually changing. Vaccination against one strain of flu, for instance H3N2, is totally ineffective against another, such as H5N1. This is especially problematic when a new pandemic strain emerges, as all existing vaccines are likely to be totally ineffective.

Professor Dimmock has spent more than two decades investigating an entirely new method, that uses a 'protecting virus'. This has now been shown to provide instant protection against all flu symptoms and to slow the development of an influenza infection to such an extent that harmful infections are transformed into a vaccine against that form of influenza.

'Protecting virus' has a significant alteration to one of the virus's genes. The genetic material of a flu virus consists of 8 individual segments of single stranded RNA. Professor Dimmock's protecting influenza virus has a huge but specific deletion of around 80% of the RNA of one of these 8 strands.

This deletion makes the virus harmless and prevents it from reproducing by itself within a cell, so that it cannot spread like a normal influenza virus. However, if it is joined in the cell by another influenza virus, it retains its harmless nature but starts to reproduce – and at a much faster rate than the new influenza virus. This fast reproduction rate – spurred by the new flu infection – means that the new invading influenza is effectively crowded out by the 'protecting virus'. This vastly slows the progress of the new infection, prevents flu symptoms, and gives the body

time to develop an immune response to the harmful new invader. In effect the protecting virus converts the virulent virus into a harmless live vaccine.

Research indicates that the 'protecting virus' would have the same beneficial effect whatever strain of influenza is infecting you. This is because the coat of the virus is irrelevant to the protection process – the effect works on the virus genes inside the cell. It thus promises to be a highly effective tool when combating the spread of any new strain of virus, as well existing strains. One could give it as a preventive measure without the need to tailor it to a particular flu strain or mutation. This has obvious benefits when dealing with the sudden outbreak of a major epidemic, as one would not need to know the exact make up of the new strain before deploying the protecting virus making it much more useful than vaccines, which are effective only against particular existing strains of virus. In addition it protects instantly, whereas protection generated by conventional flu vaccination takes 2-3 weeks to become fully effective. Experiments so far show that a single dose of protecting virus can be given 6 weeks before an infection with flu virus and be effective. This could also have a substantial advantage over anti-viral drugs that only give less than 24-hour protection. Another advantage is that influenza virus does not appear to become resistant to 'protecting virus', although drug-resistance is a serious problem with many microbes.

'Protecting virus' also protects when given up to 24 hours after infection (and possibly longer). It is thus able to counter an actual infection. It could therefore also be used as a treatment for family and other direct contacts of infected individuals.

'Protecting virus' is easy to administer as it targets the same cells as any other flu virus and uses the same method to enter the cell. Laboratory work to date has used a drop of saline containing the protecting virus, squirted up the nose. Aerosol administration, used already for some

vaccines, would be another way and is more user-friendly than injections.

The protecting virus could also be a useful treatment for domestic animals. Ducks get a gut infection and chickens a combined gut and respiratory infection, so it may be possible to simply deliver the protecting virus to them in their drinking water. One dose should protect a chicken for weeks. Flu is a major problem in the horse racing industry and in domestic horses. It also has very recently become a problem in domestic dogs in the USA and domestic cats are susceptible to H5N1 virus.

The Warwick research team has now filed a patent on the protecting virus and they are exploring ways of taking 'protecting virus' through human clinical trials and testing on birds. The University has established a company – ViraBiotech – to help advance those aims. This may involve venture capital support, and collaborations with pharmaceutical companies, to enable this novel technology to be rigorously tested in a wide range of animals and humans, and using a wide range of influenza strains.

Source: University of Warwick