UBC-developed anti-viral drug enhances immune system

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Vancouver Sun

Scientists at the University of B.C. have created an anti-viral drug that enhances natural immune response by stimulating the production of a virus-killing protein and extending its ability to fight viruses in the bloodstream.

The drug could be a valuable tool against new viruses and pandemics because it allows cells to select which of the many antiviral proteins in its arsenal is best suited to kill an attacking virus, while amplifying its effectiveness, said lead scientist Chris Overall of UBC's Department of Oral Biological and Medical Sciences.

The medical community has relatively few effective ways to combat a novel virus, a fact that was driven home by the deadly 2002 SARS outbreak in southern China that killed almost 1 per cent of its victims. But even a common virus such as RSV, responsible for up to 25 per cent of neonatal infant deaths, flares up every year with nothing to stop it, he said.

Analyzing a new virus and developing an effective treatment or vaccine can take years, said Overall. Because the new drug is not specific to any one virus, it could be deployed against an emerging virus immediately.

A new company is being founded to commercialize the UBC-held patent for the process, and two large pharmaceutical firms have expressed interest in the project, he said.

Overall and Bruce McManus of UBC's department of pathology and laboratory medicine were able to describe for the first time a complex chain of events that leads to the creation of the protein interferon alpha, which is deployed by cells to kill viruses. An enzyme called MMP12 both stimulates interferon production inside cells and destroys it outside of cells. The body usually eliminates interferon alpha very quickly after it is produced, but the new drug blocks the effect of MMP12 in the bloodstream, giving the protein more time to work.

"We've made the compound and administered it to mice and it really boosted the interferon levels in those mice and almost totally shut down viral replication," said Overall.

Mice infected with coxsackievirus type B3, which infects human cardiac tissue, the pancreas and the liver, were treated successfully with the drug.

The new drug has not been used in humans, but dozens of drugs have already been developed based on MMP12-related processes, mainly for applications in cancer treatment.

The study, funded by the Canadian Institutes of Health Research, is published in the current issue of Nature Medicine.