MedicalXpress

Lung inflammation from influenza could be turned off with new discovery

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A new discovery could lead to treatments which turn off the inflammation in the lungs caused by influenza and other infections, according to a study published today in the journal *Nature Immunology*.

The symptoms of influenza, such as breathlessness, weight loss and fever, are made much worse by the immune system responding in an exaggerated way to the virus, rather than by the virus itself. The virus is often cleared from the body by the time symptoms appear and yet symptoms can last for many days, because the immune system continues to fight the damaged lung.

The immune system is essential for clearing the virus, but it can damage the body when it overreacts if it is not quickly contained. Such overreaction occurs in a number of diseases as well as influenza, such as asthma and inflammatory conditions in the gut.

During influenza infection, the immune system's prolonged response causes the lungs to become inflamed and this can clog the airways and cause difficulty breathing.

The new study, led by researchers from Imperial College London, reveals how the activity of immune cells in the lung is normally kept under control by a receptor known as CD200R, working with another molecule called CD200.

CD200R is found in high levels in the lungs and the new research shows

that it is able to limit the immune system's response and to turn off inflammation once it has started.

Influenza overrides the CD200 molecule and without CD200 to bind to, CD200R cannot work to prevent the immune system from overreacting, so the lungs become inflamed.

In the new study, the researchers gave mice infected with influenza a mimic of CD200, or an antibody to stimulate CD200R, to see if these would enable CD200R to bring the immune system under control and reduce inflammation.

The mice that received treatment had less weight loss than control mice and less inflammation in their airways and lung tissue. The influenza virus was still cleared from the lungs within seven days and so this strategy did not appear to affect the immune system's ability to fight the virus itself.

Following these results in mice, the researchers hope that a therapy could be developed for people which can quickly work with the CD200R receptor and stop the immune system from fighting when it is no longer needed. They believe this would quickly reduce symptoms and reduce the damage that the immune system causes in the lungs and elsewhere.

Professor Tracy Hussell, the lead author of the research from the National Heart and Lung Institute at Imperial College London, said: "The immune system is very sophisticated and much of the time it does a fantastic job of fighting infection, but it has the ability to cause a lot of damage when it overreacts. Our new research is still in its early stages, but these findings suggest that it could be possible to prevent the immune system going into overdrive, and limit the unnecessary damage this can cause."

Dr Robert Snelgrove, a Sir Henry Wellcome Postdoctoral Fellow at Imperial College London and another author of the research, added: "Although flu is just an inconvenience for some people, it can be dangerous and even fatal in the very young and elderly. We hope our research could ultimately help to develop treatments which fight the effects of this sometimes lethal virus."

The researchers hope that in the event of a flu pandemic, such as a pandemic of H5N1 avian flu that had mutated to be transmissible between humans, the new treatment would add to the current arsenal of anti-viral medications and vaccines. One key advantage of this type of therapy is that it would be effective even if the flu virus mutated, because it targets the body's overreaction to the virus rather than the virus itself.

In addition to the possible applications for treating influenza, the researchers also hope their findings could lead to new treatments for other conditions where excessive immunity can be a problem, including other infectious diseases, autoimmune diseases and allergy.

Source: Imperial College London