Antibodies produced in the lung can prevent respiratory infections from becoming severe

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Only a small subset of people who get a lung infection go on to become very sick yet who will become severely ill or why is unclear. This is now widely recognized in the context of COVID-19, where most people have

mild or no illness while others with the same infection become extremely sick or even die.

Researchers now have discovered that after recovering from a respiratory infection, new cells get deposited in lung tissue, persist there and then become antibody secreting cells very quickly if the lungs later get re-infected by something similar.

"It is increasingly clear that our lungs contain their own specialized immune system, different from the immune system throughout the rest of the body," explained corresponding author Joseph Mizgerd, ScD, professor of medicine, microbiology and biochemistry at Boston University School of Medicine.

Mizgerd and his team studied a combination of infections in experimental models and analyses of cells collected from human lungs. "We found lungs that had recovered from infections had new cells that were not there before infection, capable of quickly producing antibodies when stimulated. We showed that antibodies in the lungs helped fight microbes and removing the cells making these antibodies compromised lung defense against respiratory pathogens," Mizgerd said.

According to the researchers, differences in lung-specific antibodies and antibody-secreting cells may be one of the important factors determining who will become very ill or instead experience mild or even no symptoms when infected by a respiratory pathogen. "With a better understanding of the components of lung immunity that prevent severe infections, we will be able to identify who is prone to severe disease when infected," he added.

Mizgerd believes that immunity that is lung-localized differs from more conventional types of immunity in that it tends to prevent severe disease instead of preventing infection altogether and it tends to be effective

against a wider range of microbes instead of against only one single virus or bacteria. "Leveraging this knowledge may provide opportunities to develop novel types of vaccines that prevent severe disease caused by a broader spectrum of microbes, such as for all coronaviruses or all influenza viruses."

These findings appear online in the *Journal of Clinical Investigation*.

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