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# Novel 3D 'Lung-On-A-Chip' Model to Test New COVID-19 Therapies

COVID-19 is the most recent, but certainly not the only condition to affect and cause serious damage to the lung. Asthma, COPD, influenza and pneumonia, among other respiratory diseases often lead to lung failure — one of the leading causes of death globally. Researchers are in a continuous struggle to understand the mechanisms related to these severe conditions and aid the development of new therapeutic medications for patients who are inflicted.

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Understanding and developing treatments for emerging contagious diseases such as COVID-19 requires human clinical trials, which are time- and resource-intensive. With better laboratory models, researchers may be able to evaluate drugs much faster and help select the drug candidates most likely to succeed in clinical trials.

To answer this call, investigators from Brigham and Women's Hospital designed a 3D "lung-on-a-chip" model of the distal lung and alveolar structures, which are the tiny air sacs that take in oxygen as you breathe. This innovative new model allows researchers to actively study how COVID-19 viral particles travel through airways and impact pulmonary cells. The impact of various notable COVID-19 therapies, such as remdesivir, on replication of the virus is also an area of study for researchers, who published their recent findings in *Proceedings of the National Academy of Sciences*.

"This is a first-of-its-kind in vitro model of the human lower lung that can be used to test many of the biological mechanisms and therapeutic agents, including anti-viral drugs for COVID-19 research."

said Y. Shrike Zhang, PhD, associate bioengineer in the Brigham's Department of Medicine and Division of Engineering in Medicine.

Zhang and colleagues developed this technology to mirror the biological characteristics of the human distal lung by utilising materials which are more representative of human alveolar tissue than the flat, often plastic materials used in previous models. In testing the model's effectiveness, researchers found that the 3D alveolar lung effectively grew cells over multiple days and successfully stimulated breaths of air at the normal human frequency.

Outside of studies centred on combating COVID-19, Zhang's research team intends to use this model technology to study lung cancers and a broad range of other pulmonary conditions. Zhang also hopes that in the future, this technology could be implemented to urgently understand and develop treatments for emerging contagious diseases. "In terms of COVID-19, we've had very minimal timelines for developing therapies. In the future, if we have these models ready in hand, we can easily use them to study and test therapeutics in urgent situations where clinical trials are limited," said Zhang.

Source: Brigham and Women's Hospital
Photo: iStock

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