Study Utilizing Imaging Mass Cytometry Details Changes in Lung Tissue Architecture at the Single-Cell Level in Patients with COVID-19

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Weill Cornell Medicine Researchers Utilize Fluidigm Hyperion Imaging System to Identify a Phenotype of Immune Cell Activity Distinct from Other Lung Infections

A Framework for Data-Driven Spatial Understanding of Lung Pathology to Inform New Treatment Approaches for COVID-19

SOUTH SAN FRANCISCO, Calif., Nov. 19, 2020 (GLOBE NEWSWIRE) -- Fluidigm Corporation (Nasdaq:FLDM), an innovative biotechnology tools provider with a vision to improve life through comprehensive health insight, today announced that researchers at Weill Cornell Medicine have identified a phenotype of immune cell activity in the lungs of patients infected with SARS-CoV-2, the virus that causes COVID-19, that is distinct from activity observed with other respiratory infections. This phenotype has been identified based on spatial analysis of lung tissue at the single-cell level throughout the disease continuum. The analysis was conducted using Imaging Mass Cytometry™ (IMC™) on the Fluidigm® Hyperion™ Imagin System.

Results of the study, which have not yet been peer-reviewed, are available online through the *medRxiv* pre-print service.

“The unique spatial aspects of Imaging Mass Cytometry enabled us to view not only the structure of the tissue but also the interplay between infected cells and the immune system in COVID-19 patients,” said Olivier Elemento, PhD, Director of the Englander Institute for Precision Medicine and Cornell University Professor of Physiology and Biophysics, a lead researcher of the study. “The diverse range of tissue samples offered incredible insight into the mechanisms of disease progression in these patients, and the rich dataset provided our computational biologists with an opportunity to interpret changes in tissue architecture as well as detect and understand patterns that may provide insights into future approaches to therapies.”

This study utilized the Fluidigm reagents portfolio to label antibodies in a custom-designed panel of 36 biomarkers to capture different immune and stromal compartments of the lung. These antibodies were then used to label lung tissue sections obtained from patients who had died with acute respiratory distress syndrome (ARDS) following influenza, bacterial pneumonia, or COVID-19 respiratory distress syndrome, and also from healthy individuals for whom lung tissue was available.

Samples from COVID-19 patients were categorized as early or late depending on whether death occurred 16–30 days or 31–44 days after the onset of respiratory symptoms, respectively. The Hyperion Imaging System analysis generated 237 highly multiplexed images identified across all specimens.

Among key findings of the study:

- A significant reduction in alveolar lacunar space, increased immune infiltration, and apoptosis-mediated cell death were observed in all diseased samples compared with those from healthy lungs.
- Neutrophil infiltration was increased in ARDS and early COVID-19 compared with normal lung, but appeared to be a hallmark of bacterial pneumonia, while a high degree of inflammation, infiltration of interstitial macrophages, complement activation, and fibrosis was characteristic of COVID-19.
- While late COVID-19 disease specifically displays hallmarks of tissue healing, the high COVID-19 mortality rate suggests that complement-activation-induced damage to the lung in concert with other immunological factors may lead to abnormal blood clotting in the lungs, which can lead to death.

Study findings agree with other recent studies suggesting that a type of pathophysiological response found in patients with ARDS due to influenza or bacterial pneumonia is similar to that found in those with COVID-19. However, in contrast with those studies, the Weill Cornell Medicine findings suggest that the hyperinflammatory phenotype as assessed by cytokine levels in peripheral blood is specific to COVID-19.

These findings suggest that early interventions that reduce off-target immune response or activators of the complement cascade could improve outcomes for COVID-19 patients.

“Understanding the pathology of COVID-19 lung disease is essential for developing interventions and treatment regimens that can improve patient outcomes and reduce mortality,” said Chris Linthwaite, President and CEO of Fluidigm. “This study adds to a growing body of data underscoring the importance of tissue architecture and three-dimensional cell-to-cell interactions in critical biologic and pathophysiologic process.

“Our robust IMC platform is uniquely suited to exploring these interactions with single-cell resolution. Significantly, in this study, IMC analyses uncovered novel interactions and cellular phenotypes that add important new insights into mechanisms of COVID-19 pathology, and these insights may help drive clinical practices that can improve patient outcomes.”

About Imaging Mass Cytometry

Imaging Mass Cytometry is setting a new standard in tissue imaging, significantly simplifying high-multiplex panel design and eliminating the impact of tissue autofluorescence by using highly pure metal tags for which signals are separated by mass instead of by wavelength. Incorporating an easy-to-use immunohistochemistry workflow that simultaneously detects many proteins in a single scan, IMC is ideal for uncovering new insights in health and disease and empowering the development of better diagnostics and more effective therapies.

About Fluidigm
Fluidigm (Nasdaq:FLDM) focuses on the most pressing needs in translational and clinical research, including cancer, immunology, and immunotherapy. Using proprietary CyTOF® and microfluidics technologies, we develop, manufacture, and market multi-omic solutions to drive meaningful insights in health and disease, identify biomarkers to inform decisions, and accelerate the development of more effective therapies. Our customers are leading academic, government, pharmaceutical, biotechnology, and plant and animal research laboratories worldwide. Together with them, we strive to increase the quality of life for all. For more information, visit fluidigm.com.

Forward-Looking Statements for Fluidigm
This press release contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, including, among others, statements regarding the benefits of Fluidigm technology for research and development of COVID-19 therapies. Forward-looking statements are subject to numerous risks and uncertainties that could cause actual results to differ materially from currently anticipated results, including but not limited to risks relating to company research and development, sales, marketing, and distribution plans and capabilities; reductions in research and development spending or changes in budget priorities by customers; potential product performance and quality issues; intellectual property risks; and competition. Information on these and additional risks and uncertainties and other information affecting Fluidigm business and operating results is contained in Fluidigm's Annual Report on Form 10-K for the year ended December 31, 2019, and in its other filings with the Securities and Exchange Commission. These forward-looking statements speak only as of the date hereof. Fluidigm disclaims any obligation to update these forward-looking statements except as may be required by law.

Available Information
We use our website (fluidigm.com), investor site (investors.fluidigm.com), corporate Twitter account (@fluidigm), Facebook page (facebook.com/Fluidigm), and LinkedIn page (linkedin.com/company/fluidigm-corporation) as channels of distribution of information about our products, our planned financial and other announcements, our attendance at upcoming investor and industry conferences, and other matters. Such information may be deemed material information, and we may use these channels to comply with our disclosure obligations under Regulation FD. Therefore, investors should monitor our website and our social media accounts in addition to following our press releases, SEC filings, public conference calls, and webcasts.

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