

Researchers develop protocol to analyze many cells at once

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Rutgers researchers have developed a new way to analyze hundreds of thousands of cells at once, which could lead to faster and more accurate diagnoses of illnesses, including tuberculosis and cancers.

With the new FISH-Flow protocol, researchers are able to evaluate multitudes of [cells](#) at once for telltale mRNA species and proteins. The blended procedure provides a chance to see how multiple kinds of [immune cells](#) are responding to a foreign substance, making it possible to detect the presence of disease faster and earlier.

"This new process allows us to see how individual immune cells are reacting in real time without using artificial reagents that alter what the cells are doing when they respond to a foreign substance," said Maria Laura Gennaro, a professor of medicine at Rutgers' Public Health Research Institute (PHRI).

Gennaro is the lead author of a paper published in the journal *Nature Protocols*, which details the new method to observe how cells respond to antigens. The protocol could be used to identify telltale indicators of other illnesses. Gennaro said researchers plan to study applying it to early diagnosis and treatment of other infectious and non-infectious lung diseases and certain cancers.

"This powerful diagnostic technology exploits a person's own immune system to assess their potential for developing a wide range of acute and chronic diseases - including those caused by infectious agents and those

resulting from host dysfunction like cancer, asthma or autoimmune disorders," said David Perlin, executive director of Rutgers New Jersey Medical School's Public Health Research Institute.

The procedure will be particularly useful in finding ways to help identify people who are predisposed to developing tuberculosis, making it possible to treat them and help reduce the spread of the disease. Nearly 2 billion people worldwide are afflicted with latent TB, but many never develop full-blown TB. Currently, the only way to determine if latent TB is present is to study the immunological response to TB antigens through skin tests and blood tests. However, treatment is not widely offered to people with latent TB because of the prohibitive cost of treating them all.

"If you can have a method that helps you determine who among the people who are latently affected by TB are predisposed to illness, you can target treatment of latent TB to those people and the risk of spread is reduced," Gennaro said.

The FISH-Flow protocol combines flow-cytometry - a technology used to analyze particles in a fluid as they pass through a laser and are fluorescently labelled so they emit light at varying wavelengths - with a nucleic acid hybridization technology - originally developed for fluorescence microscopy - that marks molecules of mRNA inside cells. Gennaro developed the method with senior colleagues Yuri Bushkin, Richard Pine and Sanjay Tyagi at PHRI.

More information: Riccardo Arrigucci et al, FISH-Flow, a protocol for the concurrent detection of mRNA and protein in single cells using fluorescence in situ hybridization and flow cytometry, *Nature Protocols* (2017). [DOI: 10.1038/nprot.2017.039](https://doi.org/10.1038/nprot.2017.039)

Provided by Rutgers University

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