

# Sonia Gavasso's Visionary Call to Action

Researcher Sonia Gavasso, PhD, from the Neuroimmunology Lab at Haukeland University Hospital in Bergen, Norway anticipates that mass cytometry, or cytometry by time-of-flight mass spectrometry (the technology used in Fluidigm's Helios™ system), will help to align diagnostics with current biological understandings of diseases where therapies are directed at immune system modulation.

By Fluidigm, edited by Sine Bak Hansen, AH diagnostics

## Defining immunotherapy approaches

Sonia Gavasso and her team are interested in getting a view of the immune system and how it behaves during therapy. "One out of three people die from cancer and it's increasing, so something has to happen. There's a real need for single-cell analysis technologies that revolutionize what we can do in research to translate into clinical diagnostics and monitoring. With CyTOF® technology," she continued, "we can go much deeper into whole system immunophenotyping to see where the medications actually work and where the antibody binds and has an effect. This is a completely new, holistic way to look at and monitor the immune system."

"We believe new and emerging technologies will allow us to move from mostly empirical decisions to tailored treatments enabling fast and early decisions regarding response. It would be the holy grail, even before treatment starts."

"We have had a Helios™ system since 2015 and it's running really well." Gavasso holds great hopes for mass cytometry, citing around 20 major cryobanks collecting cell samples for mass cytometry applications in cancer, rheumatic, neurological and central nervous system diseases and advanced therapies like cryoimmunotherapy and stem cell transplantation. "We have just invested in Hyperion™ Imaging System to expand our mass cytometry capabilities with imaging mass cytometry."

## Helios' advantages over flow cytometry

The visualization in mass cytometry data is a major plus for Gavasso. "With mass cytometry, we're finally getting a view of the elusive immune response in immune therapies. Disease systems are so complex. It's great that we can look at a certain cell but not lose information about what other cell types are doing, or where they are within the immune system," she said.

"Previously, this type of information was difficult to obtain in a single analysis with flow cytometry, and mass cytometry clearly expands our horizon," she noted, "so we can monitor complexity." Her team reported debulking in leukaemia during kinase inhibitor treatment as early as seven days after starting. They also saw where a medicinal antibody binds and in which cell subtype. "It is unprecedented. We would not do this on



Sonia Gavasso

the flow cytometer. There are too many tubes that are difficult to combine, and you need a lot of controls."

"Mass cytometry has amazing potential. I don't want to use the word 'revolutionize', but it's close to it. This is the first time we can clearly monitor the whole immune system for a really broad view of what's going on and what we should do."

Gavasso works collaboratively with bioinformaticians to develop novel methods of analyzing data from the Helios™. Her group works closely with lab mathematicians on topology, studying spatial properties preserved through stretching, crumpling, bending and twisting of objects to verify methodological usability.

Cytobank™ is a boon, especially for studying the clinical dataset needed to integrate with information from the mass cytometer. "In previous clinical studies, we had to manually select cells and parameters of analysis. With the CyTOF® technology,

we have made exciting improvements in our analysis pipeline," she added. "Mathematicians here in Bergen actually come to us now asking for datasets."

## A new perspective

Mass cytometry for higher-parameter analysis of precious samples offers a number of advantages. "Personally, I was excited

to let go of the two-dimensional flow cytometry approach," she said. "Mass cytometry is amazing, but some people find change difficult and are reluctant to go high-dimension, saying, 'We've been doing things this way forever. It works, so why change now?'" Gavasso's answer: "Mass cytometry is not just equal to the methods they've been using, it's actually much, much better."

## Helios Mass Cytometer

### Helios™

In Mass Cytometry (Cytof), cellular targets are labeled with metal isotope-tagged antibodies and detected as well as quantified by time-of-flight mass spectrometry. Metal isotopes provide minimal background noise from signal overlap or endogenous cellular components compared with traditional fluorochrome-based Flow Cytometry. 135 available detection channels ensure an ongoing ability to add more parameters, enabling you to fully study the functional complexity of biological systems at the single-cell level.

- **Comprehensive:** Accelerate insight into mechanisms with a comprehensive view of cell phenotype and function
- **Powerful:** Obtain the most actionable information from your sample
- **Proven:** Trusted by translational and clinical study researchers around the world to power life-changing insights into human health



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