

Getting it Right the First Time

Biotech innovations using flow cytometry

For close to a century, flow cytometry has been a bedrock analytical technique for measuring everything from protein expression to a cell's health status. In fact, it's hard to imagine a biotech laboratory functioning productively without it.

In today's biotech field, moving quickly and getting things right the first time is imperative to successful research and discovery (R&D). That's where even trusty flow cytometry can run up against some big asks, including the need to reduce errors, ensure reproducible results, and maximize throughput so as to minimize hands-on time with confidence.

Fortunately, moving quickly and getting things right the first time are also the driving forces behind emerging innovations in flow-cytometry instrumentation. We sat down with Jolene Bradford, flow cytometry senior product manager at Thermo Fisher Scientific to discuss how these novel instrument solutions are suited to meet today's biotech needs to make lab life that much easier—and more productive.

BIOPHARM: How is flow cytometry being used in the biotech field today?

BRADFORD: Flow cytometry is a powerful tool that can be used in many cell analysis applications, from immunophenotyping to other cell-based assays such as proliferation, differentiation, cell death, and viability.

Key advantages of flow cytometry are the ability to analyze single cells—measuring many targets on individual cells at the same time—and the ability to collect information from millions of cells relatively quickly.

In biotech today, enhancing process productivity with advanced high-throughput solutions is essential.

BIOPHARM: What are other important considerations when using flow cytometry in biotech today?

BRADFORD: Cells are the heart of biotechnology, and the ability to examine thousands of single cells reveals cellular heterogeneity and the ability to examine biology in greater detail.

In biotech, it's all about production, productivity, and efficiency—that is, maintaining uptime and having the ability to scale, all while maintaining high-quality data and ensuring regulatory compliance.

It's also about keeping costs down while minimizing risk. So the ability to move forward quickly with confidence is important.

One major headache for traditional flow cytometry users has been clogging of the instrument, which causes downtime as well as issues



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with reliability. Another challenge is having platform flexibility, and knowing how best to automate the flow cytometry workflow.

BIOPHARM: How is Thermo Fisher Scientific working to address these priorities?

BRADFORD: The Invitrogen™ Attune™ NxT flow cytometer is an innovative instrument that's efficient, flexible, and transformative.

The differentiating feature of the Attune NxT cytometer is the use of acoustic sound waves to align cells directly with the laser. This gives a high degree of precision and consistency and enables the use of higher acquisition rates. Decreased runtime means more data per day, and acoustic focusing provides faster time to results.

The Attune NxT also has a clog-resistant design to boost success. The sample is delivered by a positive-displacement syringe pump. Along with the acoustics and fluidics design, this gives the instrument stability and clog resistance so you can run difficult samples and even walk away without fear of clogging. The result is reliability and uptime.

Flexible options are available with multiple instrument configurations that are upgradable so that users can futureproof their investment. The Attune NxT can also add automation with the CytKick™ Max Autosampler for 96-well or 384-well plate processing. The autosampler device has effective sample mixing that's gentle to cells, while also having robust rinsing between sample wells to reduce carryover. And for those needing regulatory-compliant electronic records and signatures, Thermo Fisher offers 21 *Code of Federal Regulations* Part 11-compliant software.

Finally there are options to add full robotic integration with the Orbitor RS2 microplate mover and Cytomat 2 automated incubator, which include the Momentum workflow software. Customers can partner with Thermo Fisher to optimize systems to their specifications, workload, and objectives.

BIOPHARM: What are the main benefits of using automation in flow cytometry?

BRADFORD: Automation enables faster runtimes, so data is available more quickly. That means that data analysis can be performed by a scientist who isn't burdened with hands-on running of samples. In fact, reducing the time in which a user has to

perform manual tasks is often cited as the most beneficial outcome of automation.

While there's been a common misconception that to justify automation there must be a certain throughput need, what we now realize is that even in low-throughput environments—running only a few plates per day—there's still value in allowing scientists to focus on other more meaningful tasks, like analyzing data. So even some level of automation helps.

Ultimately, we see better data quality. This comes from uniform sample handling, with greater reproducibility and reduction in errors—and that means the ability to deliver robust results quickly in less time. With this comes the ability to make those critical data-driven decisions quickly.

Finally, automation allows for flexibility to scale for different stages in the pipeline, from early R&D all the way through to commercialization.

BIOPHARM: What partnership opportunities does Thermo Fisher offer?

BRADFORD: We're committed to helping every lab achieve success to ensure its system integration is optimized for accuracy, productivity, and performance. We have experts who will collaborate with you, and who understand your needs and can help guide you to a solution that fits. Our priority is finding exactly the right solution to suit each customer.

In addition to robotics and instruments, Thermo Fisher offers the unique advantage of providing automation-friendly reagents and consumables for an even more unified solution.

BIOPHARM: How do you envision flow cytometry being used in the future?

BRADFORD: We'll continue to see innovation in instrumentation to detect more targets and perhaps offer new ways of looking at cells. And I see innovation in the development of newer reagents to accompany these instrument advances.

I also see having the ability to provide benefits beyond the products—such as technical and educational support from experts to help customers accelerate their innovation and productivity.