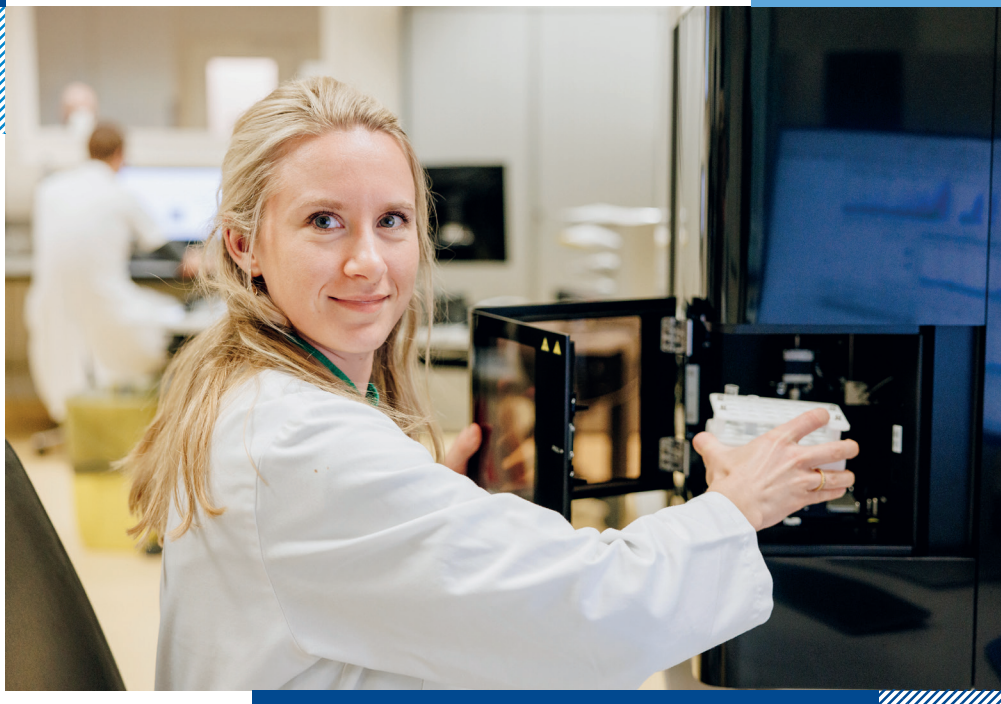
Leids Universitair Medisch Centrum

Flow cytometry Core Facility

Supporting research and diagnostics



© T. Tak, M. Hameetman, on behalf of FCF, LUMC, Leiden, NL

Preface

Welcome to the Flow cytometry Core Facility (FCF) at the Leiden University Medical Center (LUMC).

Since 2016, the FCF has been a key resource for research and diagnostics, **supporting a diverse community of over 500 users annually and more than 100 individuals each week.** The FCF provides state-of-the-art **flow cytometry**, (imaging) **mass cytometry**, and (imaging) **cell sorting services** to researchers, clinicians, and industry professionals alike.

From the start, the FCF was established according to EuroFlow guidelines, with a strong focus on quality, standardization, instrument monitoring, education, and training, while ensuring accessibility and support for all users. In addition, the facility adopted principles of good governance and transparency by providing clear insight into maintenance costs, running costs, and hourly rates. These aspects laid the foundation for the way the FCF operates and continue to guide its activities today.

In 2023, the FCF was honored by the International Society for Advancement of Cytometry (ISAC) for operational excellence and adherence to best practices as outlined by the society.

The FCF is committed to maintaining its position as a center of excellence. Moving forward we aim to:

- Invest in state-of-the art instruments to be able to offer the latest technologies to our users.
- Offer education and training opportunities, including guidance on antibody panel design and advanced data analysis.
- Strengthening the expertise of our team through participation in European exchange programs with other leading flow cytometry facilities.
- Facilitating collaborations across academic, diagnostic, and commercial sectors to foster innovation.

This brochure provides an overview of the latest developments within our Core Facility, including new team members, state-of-the-art instrumentation, and updated services. Whether you are a current user, a new (external) partner, or exploring what we offer, we hope this information inspires you.

We are looking forward to collaborate with you and support your scientific and diagnostic pursuits.

Tamar Tak
Director, Flow cytometry Core Facility

Marjolijn Hameetman
Operational Manager, Flow cytometry Core Facility

October 2025





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1. Welcome and overview

1.1 Introduction to flow cytometry

Flow cytometry is a transformative technology that enables researchers to analyze cells individually as they pass through lasers in a fluid stream. This method provides detailed insights into cellular characteristics such as size, shape, and molecular composition. Widely used in life sciences, flow cytometry supports groundbreaking discoveries and guidance for treatment development in areas such as:

- **Immunology:** Profiling immune responses and identifying cell populations.
- **Oncology:** Detecting cancer markers and monitoring therapies.
- **Infectious diseases:** Understanding host-pathogen interactions.
- **Regenerative medicine:** Studying stem cells and tissue regeneration.
- **Hematology:** Diagnosing blood disorders, characterizing leukemias, and monitoring bone marrow function.
- **Neuroscience:** Investigating neuro-inflammation, glial cell responses, and neurodegenerative diseases.
- **Autoimmune diseases:** Analyzing immune dysregulation, detecting autoantibodies, and monitoring disease progression.
- **Metabolic disorders:** Exploring cellular metabolism, insulin signaling, and obesity-related inflammation.
- **Microbiology:** Identifying bacteria and viruses, analyzing antibiotic resistance, and studying microbial communities.
- **Extracellular vesicles & exosomes:** Characterizing EVs for biomarker discovery, drug delivery, and intercellular communication.
- **Single-cell genomics & multi-omics:** Integrating flow cytometry with transcriptomics and proteomics for deep cellular insights.
- **Environmental & marine biology:** Studying plankton populations, water quality assessment, and ecological monitoring.

It has become an indispensable tool in modern life sciences, supporting applications from immunophenotyping and cell function analysis to rare cell detection and therapeutic quality control.

1.2 A brief history of the FCF

The complexity and cost of these technologies make it challenging for individual labs to maintain independently. Recognizing the need for centralized access to flow cytometry expertise and resources, the Flow cytometry Core Facility (FCF) was established in 2015 under the direction of Professors Frank JT Staal and Jacques JM van Dongen. At its initiation, the FCF operated with 3 skilled operators and 14 instruments, primarily conventional flow cytometers and supported a user base of 200 researchers.

Since then, the FCF has expanded significantly, growing to 25+ advanced instruments making it one of the largest Flow cytometry Core Facilities in Europe and one of the top 10 facilities in the world[1].

A team of 7 trained and specialized operators ensures expert support for a wide range of users. A vibrant community of over 500 annual users, spanning academia, clinical research, and industry is served by the FCF at the moment.

[1] J.B. Back, K.J. Czymmek, D. Davies, M. Elangovan, A.J. Scott, P.J. O'Toole. Global survey of cytometry facilities. CYTO 2021.

Centralizing flow cytometry through the FCF provides unique advantages:

- **Cost efficiency:** Researchers gain access to high-performance instruments without the financial burden of purchasing or maintaining them independently.
- **Streamlined workflows:** Centralized systems optimize instrument access, data processing, and reporting, saving time and resources.
- **Collaboration opportunities:** The FCF fosters interdisciplinary collaboration, connecting researchers from diverse fields and promoting innovative solutions to complex scientific challenges.
- **Expert support:** A dedicated team of operators provides training, troubleshooting, and experimental guidance to maximize research quality.
- **High standards:** Daily quality control and preventive monitoring ensure reliable and reproducible results for all users.
- **Educational growth:** Comprehensive training programs and regular seminars empower users with the knowledge to advance their research independently.

1.3 FCF's mission and vision

The FCF provides flow cytometry, mass cytometry and cell sorting to a wide range of users as well as education and service, thereby supporting its users' research and clinical needs to generate high-quality data. The team of operators is comprised of highly educated professionals with diverse backgrounds. The FCF operators continuously maintain, monitor, and (when necessary) replace and/or update the FCF instruments. The FCF currently provides courses to users, as well as education to BSc and MSc students. In addition, FCF provides support with:

- Antibody panel design and antibody management
- Cell analysis using state-of-the-art cell sorting instruments
- Analyzing complex and large data sets (multi-hierarchical data analysis)

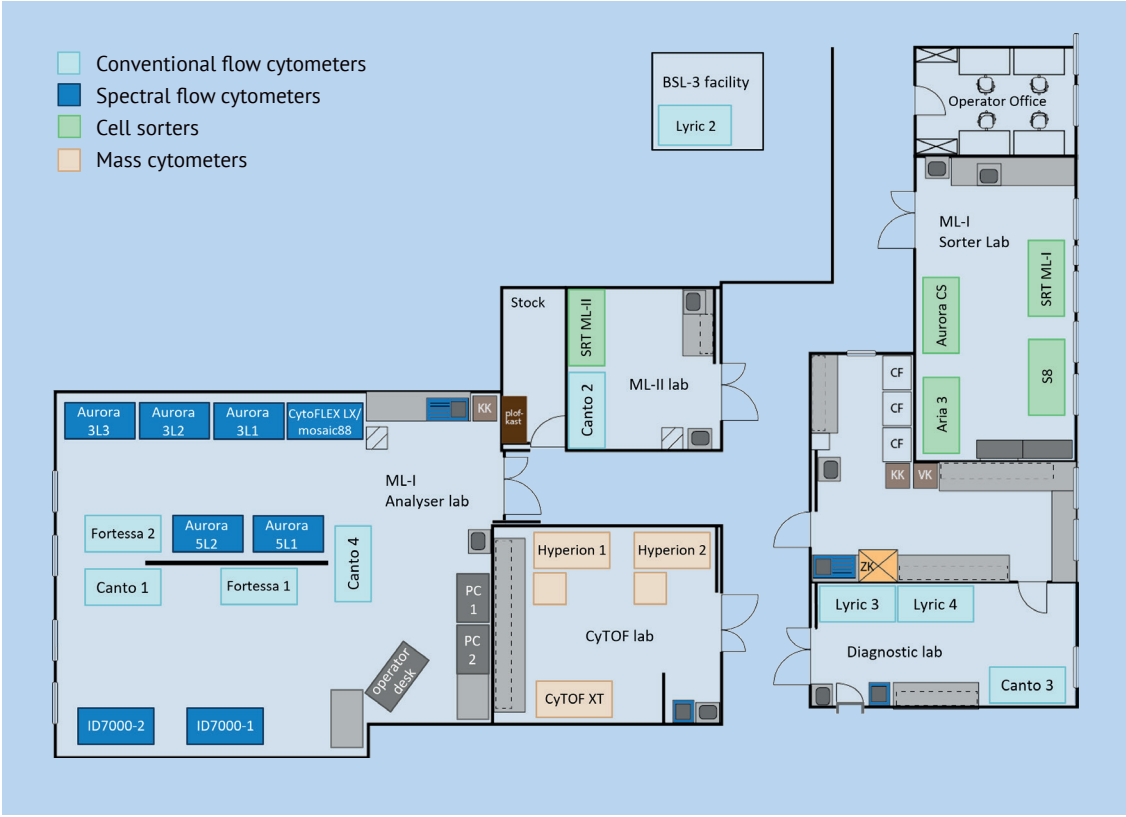
The FCF is an international trendsetter in flow cytometry. By the end of 2025, the FCF aims to support customized cell analysis based on the guidelines of the International Organization for Standardization (ISO) 9001.



1.4 The Flow cytometry Core Facility

The FCF is equipped with over 25 advanced instruments, divided into five main categories:

- **Conventional flow cytometers:** Ideal for routine diagnostics and basic research, offering up to 16 fluorescent parameters. There is one analyser located in biosafety level 2 (BSL-2) laboratories, allowing for safe handling and analysis of biohazardous samples. Additionally, a BD FACSLyric is housed in a biosafety level 3 (BSL-3) laboratory, supporting high-containment applications such as infectious disease research.
- **Spectral flow cytometers:** High-dimensional systems capable of analyzing over 40 parameters simultaneously.
- **Mass cytometers (CyTOF):** Cutting-edge tools for measuring more than 50 markers per cell using metal-based tags. Additionally, two CyTOF systems can be adapted for spatial cytometry (imaging mass cytometry), enabling high-dimensional analysis of single cells within tissue sections (in situ).
- **Cell sorters:** Four are capable of sorting populations based on up to 17 colors, while the fifth combines imaging and spectral sorting capabilities. These instruments enable precise isolation of specific cell populations for downstream applications such as molecular analysis, culturing, or in vivo studies. One sorter is housed in BSL-2 enviroment, ensuring safe processing of infectious or clinical materials.
- **Image cell sorting:** This instrument can construct an image of each passing cell at a rate of 15,000 cells per second, enabling sorting based on morphological features like cell shape, marker co-expression, and expression patterns. As a full spectral sorter, it also allows the detection of over 40 fluorescent parameters.



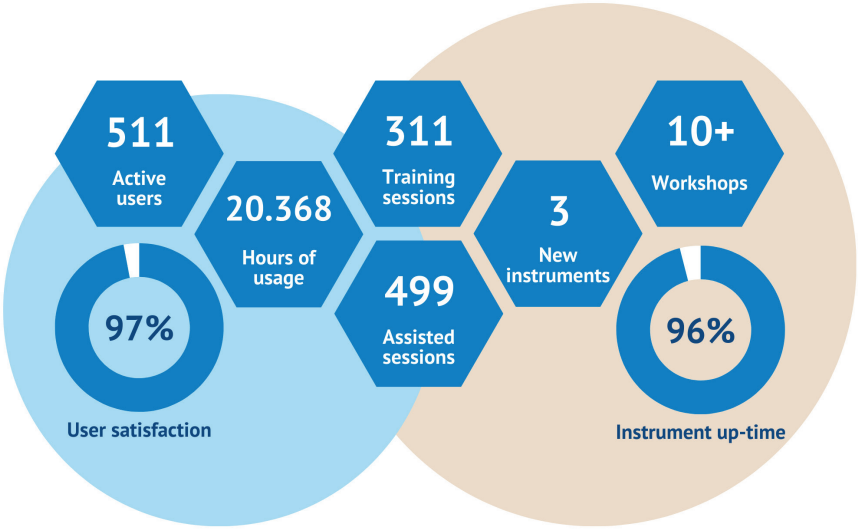
2. Services

The Flow cytometry Core Facility (FCF) at Leiden University Medical Center (LUMC) offers a comprehensive range of services to support cutting-edge research and diagnostics. These include high-parameter flow cytometry, spectral cytometry, mass cytometry, and advanced cell sorting. In addition, the FCF provides expert training, project consultation, and support for panel design and data analysis to ensure optimal experimental outcomes.

2.1 How we support your research

The FCF offers a wide range of services to help users maximize the potential of our advanced instruments:

- **Autonomous instrument use:** After completing comprehensive training, users can independently access and operate FCF instruments 24/7, allowing for maximum flexibility in experimental planning.
- **Training programs:** We offer hands-on and theoretical training sessions tailored to different user levels, preparing researchers for independent use of instruments and fostering best practices.
- **Daily start-up and quality checks:** Every morning, FCF operators ensure that all instruments are cleaned, calibrated, and fully functional by 10:00, enabling reliable and reproducible data generation.
- **On-site operator assistance:** During office hours, our expert operators are available to assist with troubleshooting, maintenance, and experiment optimization.
- **Assisted sessions:** For complex workflows such as high-speed cell sorting, CyTOF acquisitions, or troubleshooting difficult samples, users can book operator-supported sessions.
- **Educational opportunities:** We host regular user meetings, webinars, and seminars covering topics like panel design, spectral



The FCF continues to grow and evolve, serving as a cornerstone for research at the LUMC. In 2024, we expanded our offerings and enhanced user experience, driven by our commitment to excellence. The numbers in the figure highlight not only the progress we've made but also the impact we've had on our diverse community of researchers, all while maintaining a high standard of service.

cytometry, data analysis, and emerging technologies. Users can also receive one-on-one consultancy on experimental design.

- **Technology pilots:** Through collaborations with industry partners, the FCF offers early access to innovative technologies. Users may participate in pilot programs that allow evaluation of new platforms, reagents, or workflows at reduced or no cost.
- **Data analysis support:** To facilitate high-dimensional data interpretation, we offer **discounted access** to advanced analysis tools like **OMIQ** and **FlowJo**, helping users explore clustering, dimensionality reduction, and automated gating in a user-friendly environment.
- **Streamlined resources:** Our **Antibody Management System (AMS)** powered by eLabNext helps users organize, track, and share antibody inventories across departments. The FCF also manages **centralized purchasing** of CyTOF polymers to reduce costs and improve consistency.
- **Data transfer:** Internal and external users are provided secure access to network drives. Access is restricted to researchers within the same group, ensuring both **data security and traceability**.
- **Timely updates:** Users receive regular communications with essential updates on instrument availability, software improvements, new training opportunities, and changes in facility guidelines.

2.2 PPMS booking system

Since March 2019, the FCF has used the PPMS booking system to streamline operations and enhance user experience. This platform provides a user-friendly interface for booking instruments, requesting training, tracking usage, managing reporting, billing and information about the instruments and guidelines. PPMS ensures seamless access to resources while maintaining transparency and efficiency for both the FCF team and its users.

2.3 FCF service charges and budgeting

The FCF operates under a hybrid funding model, with institutional support and user fees covering operational costs. Our charges are designed to ensure fair access to state-of-the-art flow and mass cytometry services while maintaining sustainability. On average, internal customers pay 40% of the running costs of the instruments, academic customers pay 100% of the running costs, while commercial companies pay 100% of the running costs and instrument depreciation with a 26% overhead surcharge.

- Transparent pricing: Users are charged based on instrument booking time and service type (autonomous or operator-assisted).
- Fair distribution: Rates reflect overhead, instrument maintenance, consumables, and support staff costs.
- Flexible access: Discounts are available for academic collaborations and internal users.

Upon request, an accountant-certified accountability document is available for reporting to funding agencies.

2.4 Antibody management with eLabNext

A robust system for managing antibody stocks is necessary for the increasing diversity of antibody clones targeting numerous epitopes for immunophenotyping, combined with the growing number of fluorochromes for multi-color flow cytometry and metals for mass cytometry. The FCF provides licenses to eLabNext, a cloud-based platform designed to optimize the management and storage of antibodies across various departments. eLabNext allows users to see the stocks of different departments, allowing them to ask for test samples and experiences. This not prevents reinventing the wheel but also reduces the costs for research groups by reducing the need to order antibody vials that might not work in their experiment.

3. Education

At the FCF, we are committed to empowering users and operators alike through continuous learning and collaboration. The FCF team keeps track of the newly launched instruments and regularly evaluates new instruments to assess whether they might meet the users' needs.

3.1 Training for users

We offer tailored training programs to help users at all levels confidently operate our instruments and design effective experiments:

- **Instrument training:** Learn the basics of flow/mass cytometry, get hands-on experience, and become an independent operator.
- **Specialized workshops:** Focused training on topics like antibody panel design, data analysis, and advanced applications.
- **User group meetings:** Monthly meetups of users using the same technologies, where users and the FCF team share tips, updates, practical issues, new applications, and (recent) developments on instruments and applications.
- **Webinars and seminars:** Stay updated on the latest trends with accessible online sessions, connecting users and industry experts.

3.2 Training for operators

To ensure consistent high-quality service, FCF operators undergo rigorous and continuous training:

- **Advanced skills development:** Specialized programs to enhance expertise in troubleshooting, complex instrument operation, and experimental support. Each operator specializes in specific areas of flow and mass cytometry, offering expert guidance on complex applications. To maintain high service standards, operators participate in advanced training programs focused on technical skills and troubleshooting, allowing them to quickly diagnose issues, minimize downtime, and keep instruments fully operational.
- **Cross-training:** This ensures all operators are familiar with each instrument, allowing for seamless coverage and support. This collaborative approach ensures that the facility can continue to operate smoothly, regardless of individual operator availability, providing users with reliable and uninterrupted service.

3.3 Teaching

The FCF offers internships to secondary vocational (MBO) students and students of the university of applied sciences (HBO) on either the practical work in a core facility and bio-informatics. For university students, the FCF gives lectures on the theory of blood analysis and flow cytometry to Biomedical Sciences students as well as during the half-minors Cellular Therapies, Infections in Health and Disease for Medical and Biomedical students. In addition, the FCF gives practical lessons on the analysis of (high-dimensional) flow cytometry data using R.

3.4 National and international community engagement

The FCF actively engages in national and international networks to advance flow cytometry technologies, training, and community collaboration. These partnerships allow the FCF to stay at the forefront of developments and ensure best practices in service delivery, diagnostics, and research support.

4. Instrumentation

The FCF at LUMC currently serves more than 500 users per year and houses over 25 instruments, making it one of the largest flow cytometry core facilities in Europe and one of the top 10 facilities in the world[1]. To ensure that the facility maintains this leading global position, the FCF has high standards for quality, service, education, and training.

4.1 FCF advanced technology

The LUMC FCF is equipped with over 25 advanced research and diagnostic flow cytometry instruments, including five cell sorters, three mass cytometers, and CE-IVD certified Canto and Lyric systems for diagnostics and clinical trials. The facility also features specialized flow cytometers capable of analyzing biohazardous samples within ML-II laboratories and the BSL-3 research facility, providing cutting-edge technology to support a wide range of research and clinical needs.

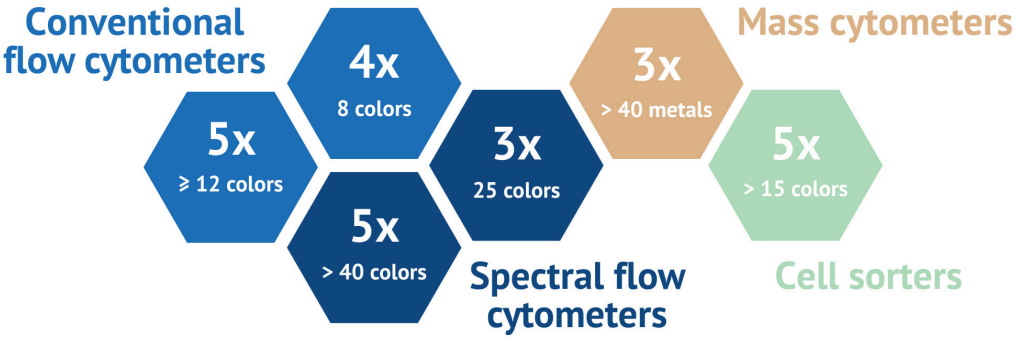
The FCF team starts, and quality-checks all booked instruments daily, ensuring they are clean, calibrated, and **ready for use by 10:00 a.m.**, minimizing downtime and ensuring reliable results.

4.2 Instrument monitoring and maintenance

To ensure the highest standards of performance and reliability, the FCF employs rigorous corrective and preventive monitoring processes across all its instruments. These measures guarantee consistent, high-quality results for every user.

4.2.1 Preventative monitoring and maintenance

- **Daily quality checks:** All instruments undergo comprehensive quality control (QC) each morning to ensure they are clean, calibrated, and functioning optimally.
- **Weekly quality checks:** In addition to performing manufacturer provided QC procedures, most instruments undergo additional QC procedures to track instrument performance over time and assess crucial parameters not covered by standard QC procedures.
- **FlowMonitor:** This in-house developed software allows tracking key performance indicators, such as signal stability, sensitivity, and fluorescence consistency.



- **Preventative maintenance:** The FCF team schedules regular preventive maintenance based on instrument usage data, minimizing downtime and extending instrument lifespan.
- **Maintenance contracts:** The FCF stays in close contact with its suppliers and service providers. Cost-effective service contracts with guaranteed on-site times ensure that the instruments are kept in prime working condition, thus maximizing their employability with high uptime and low downtime.

4.2.2 FlowMonitor

Flow cytometers are highly sensitive instruments that require regular quality control (QC) to ensure accurate and reliable data. While most manufacturer-provided QC modules give a simple pass/fail outcome, they are limited in data visualization, trend analysis, and cross-platform compatibility.

To overcome these limitations, we developed FlowMonitor, an R-shiny application that allows detailed monitoring of QC data from multiple instruments and vendors (BD Biosciences,

List of instruments in the FCF.

	Instruments	Number of Instruments	Number of Lasers	Number of Parameters	Special Features	Biosafety Level
Conventional	BD Canto-II	4	3	8	96 well plate reader, CE-IVD	ML-I, ML-II
	BD LSRFortessa (X20)	2	4-5	16	NIR laser	ML-I
	BD Lyric	3	3	12	CE-IVD	Unclassified, BSL-3
Spectral	Cytek Aurora	5	3/5	25/>40	96/384 well plate reader, ESP	ML-I
	Sony ID7000	2	5	>40	96/384 well plate reader	ML-I
	Beckman Coulter CytoFLEX LX + mosaic88	1	6	>40	96 well plate reader, IR laser	ML-I
Cell Sorters	BD FACSAria III	1	4	15		ML-I
	BD FACS Discover S8	1	5	>40	Imaging	ML-I
	Cytek Aurora CS	1	5	>40	ESP	ML-I
	Beckman Coulter CytoFLEX SRT	2	4	15		ML-I, ML-II
CyTOF	Standard Biotools CyTOF XT	1	-	50		Unclassified
	Standard Biotools Hyperion	2	-	50	Spatial information	Unclassified

NIR = near-infrared, ESP = enhanced small particle detection, IR = infrared

Beckman Coulter, Cytek Biosciences). The app provides full visualization of performance parameters over time, enabling early detection of issues and prediction of instrument failures. FlowMonitor has become an essential tool in our Shared Resource Laboratory, increasing instrument uptime and safeguarding data quality. FlowMonitor is publicly available via our Github page.

4.2.3 Corrective maintenance and replacement

- **Incident logging:** Any deviations or issues are logged in to our PPMS system, allowing swift identification and resolution. The booking and incident-reporting features included in PPMS allow efficivent use of the available instruments. In case of technical issues or urgent repairs, the scheduled users are quickly informed, and their booking is rescheduled as efficiently as possible at a later stage or redirected to another instrument.
- **Rapid repairs:** Operators are trained to diagnose and resolve issues promptly, ensuring minimal disruption to users. Service contracts with suppliers guarantee on-site times of less than 48 hours for repairs that cannot be performed by FCF operators.
- **Replacement and upgrades:** Instruments are replaced or upgraded as needed to maintain cutting-edge performance fitting our users' needs, guided by monitoring instrument and booking data and user feedback.



FlowMonitor ensures instruments perform optimally by tracking key metrics like signal stability, sensitivity, and fluorescence consistency. This proactive monitoring allows the FCF team to detect and resolve issues early, minimizing downtime and ensuring high-quality, reliable results. By addressing concerns before they impact data, the FCF helps users maintain research integrity and confidence.

5. Quality assurance

To ensure the FCF delivers high-quality services, guidance, and technical support while maintaining instruments in optimal condition, the FCF operators undertake a broad range of responsibilities. These tasks span technical, managerial, and logistical tasks, as well as education, training, and user support.

In addition to maintaining and operating the instruments, the operators are also deeply involved in:

5.1 Quality management: ISO 9001 certification and Good Research Practices

To guarantee consistent, reliable, and reproducible results, the FCF is actively pursuing ISO 9001 certification, the internationally recognized standard for quality management systems. This commitment aligns with Good Research Practices (GRP), ensuring standardized workflows that enhance research quality, efficiency, and transparency. A dedicated quality assurance team oversees all processes, including comprehensive documentation, risk assessments, incident reporting, and the development and enforcement of Standard Operating Procedures (SOPs) for instrument usage, quality control, monitoring, and preventative maintenance. These measures collectively safeguard optimal instrument performance and data integrity.

5.2 Regulatory compliance

The FCF addresses the European In Vitro Diagnostic Regulation (IVDR) (EU Regulation 2017/746), effective May 26, 2022. This includes evaluating its impact on CE-marked in vitro diagnostic devices such as flow cytometry equipment, diagnostic assays, analysis software, and in-house laboratory-developed tests. By staying updated on EU and national guidelines, the FCF supports users in developing, validating, and applying diagnostic assays. Regular contact is maintained with relevant companies to monitor their CE-marking strategies and timelines for CE-IVD products.

5.3 Awards

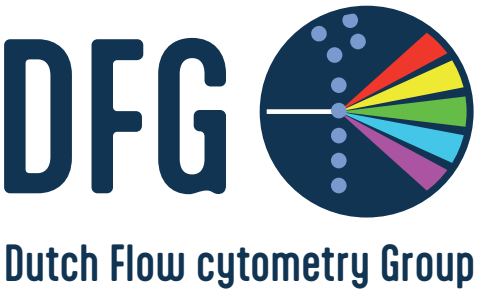
We are committed to maintaining and achieving the highest standards in flow cytometry. By prioritizing collaboration and certification, the FCF continues to set the standard for excellence in flow cytometry research and diagnostics.

ISAC Recognition: In 2023, the FCF was recognized by the International Society for Advancement of Cytometry (ISAC) for operational excellence and adherence to best practices.



ISAC RECOGNIZED
Shared Resource Laboratory

6. Collaborations



6.1 Dutch Flow cytometry Group (DFG)

The FCF plays a central role in the **Dutch Flow cytometry Group (DFG)**, a national network that includes all University Medical Centers (UMCs), academic institutions, and several private research organizations. The DFG hosts **biannual member meetings** to promote knowledge exchange, technical discussion, and collaboration.

Each year, the DFG also organizes a **Technical Symposium** in partnership with industry vendors, showcasing the latest innovations in cytometry instruments, reagents, and software. Additionally, the DFG coordinates **working groups** on specialized topics and maintains a **national depot of spare parts** from decommissioned instruments to reduce downtime across facilities. FCF team members hold positions on the **DFG Board**, co-organize all DFG meetings, and lead several of these national working groups, demonstrating our ongoing commitment to strengthening the Dutch flow cytometry community.

6.2 European and global partnerships

At the European level, the FCF is actively developing collaborations with other major flow cytometry core facilities to establish **operator exchange programs** and a **shared educational training curriculum**. These efforts are aimed at professionalizing cytometry operations and supporting technological innovation across Europe.

The FCF is also a co-organizer of the **European Flow Core Meeting**, which fosters collaboration between facilities and promotes the advancement of cytometry expertise through shared learning.

On a global scale, the FCF is recognized by the **International Society for Advancement of Cytometry (ISAC)** as a **Shared Resource Laboratory (SRL)**. This designation, awarded in 2023, reflects our operational excellence and adherence to international best practices. Our Operational Manager, Marjolijn Hameetman, also serves as an **SRL Emerging Leader**, actively contributing to ISAC's global knowledge-sharing initiatives and leadership development.

6.3 Internal and national core facility collaboration

Within LUMC, the FCF contributes to institutional strategy through its participation in the **Research Facility Assembly (RFA)**, a network of 23 core facilities. The RFA meets eight times a year to streamline workflows, address joint infrastructure needs, and advise institutional leadership on research facility policy and funding.

FCF is also a founding member of **SPACEFORCE**, a collaboration between core facilities and researchers focused on **spatial omics technologies**. Through shared seminars and strategic development, SPACEFORCE promotes integration of spatial techniques in translational research.

At the national level, the FCF joins forces with **core facilities at other UMCs**, participating in

annual meetings to discuss shared challenges such as financial sustainability, organizational structure, professional development, and the role of core facilities in academic environments. These efforts help to shape policy and best practice for Dutch core facilities as a whole.

6.4 Vendor collaborations

To remain at the forefront of the field and provide valuable user feedback to vendors, the FCF has participated in (Beta)-testing new instruments and new instrument functions and contributed to provided data for application notes for instruments including:

- Cellular Highways Highway1 Microfluidic Vortex-Actuated Cell Sorter
- Beckman Coulter mosaic spectral detection module
- Milteny MACSQuant® Tyto® microfluidic Cell Sorter.

In addition, FCF personnel are actively engaged in testing reagents before they are released on the market or soon after they are released on the market to assist our users. These reagents include:

- Bio-Rad StarBright fluorochromes
- BD RealBlue and RealYellow fluorochromes
- ProteinTech FlexAble Antibody Labeling Kits
- Core Quantum Technologies MultiDots.



7. Looking forward

7.1 Instruments

Looking forward, the FCF aims to enhance its services by integrating new technologies, expanding its training portfolio, and fostering partnerships with academic, clinical, and commercial entities. By continuing to provide cutting-edge solutions and expertise, the FCF remains a critical driver of scientific progress at the LUMC and beyond.

To ensure the facility remains at the forefront of technological advancements, the FCF evaluates user needs and instrument usage as recorded through the PPMS booking system, to guide decisions on acquiring, replacing, or upgrading instruments. Before acquisition of new instrumentation, the FCF performs extensive testing on suitable instruments. In the recent past, the LUMC has allowed the FCF to invest heavily in new instruments to offer an up-to-date instrument portfolio.

Looking ahead, the FCF will continue its modernization by replacing another Aria cell sorter with a high-end spectral cell sorter, ensuring the facility remains equipped with the latest technology to meet user needs. For 2026 and onwards, the FCF plans to replace several conventional flow cytometers and invest in a microfluidics sorter.

7.2 Data analysis support

Data from high-end spectral flow cytometers and mass cytometers is challenging to analyze. Several user-friendly platforms are available for visualizing and performing statistical analyses on high-dimensional data. The FCF organizes seminars with providers of analysis tools like FlowJo and OMIQ to assist users with complex datasets from spectral and mass cytometry. These courses, open to all users, focus on the specifications and availability of these platforms. In addition, data processing and analysis is discussed during user group meetings and the FCF provides consultancy on best practices.

7.3 Expanding lab space

The FCF was designed to house 14 instruments. As the FCF currently houses 25 instruments, floor space is becoming limited. The FCF aims to acquire additional lab space to be able to house additional instruments for testing and collaborations. In addition, the FCF aims to obtain a small wet lab to be able to offer additional services, including end-to-end solutions from sample preparation to data analysis.

7.4 Size of the FCF operator team

The FCF believes it is essential to expand their team of operators for continuous high-quality service. Currently, the FCF has 7 operators to serve approximately 500 regular users. The goal is to expand the team to 10 - 12 operators to support the increased number of users, handle the more complicated instruments and offer more data analysis services. A team of 10 operators (director not included) is fully in line with the recent results of the world-wide survey among around 150 large flow cytometry facilities by J.B. Back et al[1].

7.5 External collaborations

The FCF aims to attract an increasing number of external users, including researchers from Leiden University, other academic institutions, and companies both within the LBSP (Leiden Bio Science Park) and beyond. Additionally, the FCF will strengthen its international collaborations with industry partners, particularly those providing flow cytometry instruments and reagents, by testing and striving for continuous improvement of new products and new

instruments. The FCF envisions that personnel will have protected time for these research initiatives, supported through external funding opportunities.

7.6 European Center of Excellence for Standard BioTools

The FCF at LUMC is proud to serve as a European Center of Excellence. As a recognized hub for showcasing the latest cytometry technologies, the FCF provides hands-on access to cutting-edge platforms for researchers, clinical users, and industry partners. Through this role, we facilitate instrument demonstrations, comparative technology assessments, and prototype testing under real-world conditions.

In addition to demonstrations, the FCF also accepts samples from external academic hospitals and industry partners to perform analyses on their behalf. This service allows external users to leverage our expertise and state-of-the-art instruments without needing to maintain the infrastructure themselves, supporting collaborative projects, validation studies, and early access to new technologies.

Being a Center of Excellence also enables our operators to receive early training on new systems, ensuring a high level of expertise and readiness when these technologies are introduced. This unique position strengthens our mission to remain at the forefront of cytometry innovation and to support the broader scientific community through knowledge sharing, training, and collaboration.



8. Our team

8.1 Operators

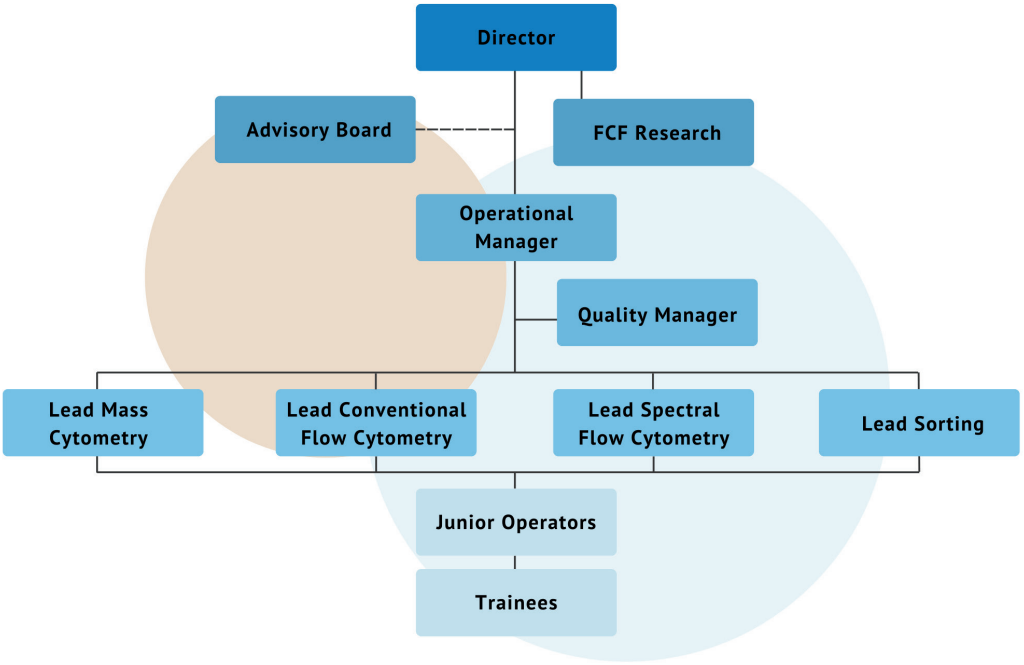
The FCF operators are highly qualified professionals with expertise in flow cytometry, mass cytometry, and cell sorting, as well as in immunology and hematology. Many of our operators also have industry experience and are well-versed in Good Research Practices (GRP). Their technical proficiency and research knowledge enable them to provide expert guidance and highest-level support across various applications.

To ensure continuity, all operators are cross trained to operate multiple instruments while developing individual specializations. Each instrument has a designated lead operator and a trained backup, ensuring seamless support at all times.

Operators receive ongoing education and training to stay up to date with advancements in the field. Additionally, we are establishing a European network with major flow cytometry facilities to facilitate an exchange program and a collaborative training initiative, ensuring our operators remain at the forefront of technology and best practices.

8.2 Management

The management and strategic direction of the FCF are overseen by the management team and its Advisory Board Committee. Dr. Tamar Tak serves as the FCF Director, providing leadership and vision for the facility's operations. Marjolijn Hameetman holds the position of Operational Manager, playing a key role in day-to-day operations and coordination.



8.3 Advisory board

The management team is further supported by the Advisory Board Committee, which consists of seven members representing the major departments that utilize the FCF services. This collaborative approach ensures that the facility remains responsive to the needs of its diverse user base and continues to evolve in alignment with current research trends and technological advancements.

8.4 Embedding in LUMC

The FCF is embedded in the LUMC as a separate organizational unit directly under the supervision of the board of Cluster 6. This means that the FCF can operate independently of the different departments and ensures that all FCF customers are treated equally.







FCF Team



Tamar Tak, PhD
Director



Marjolijn Hameetman
Operational manager/
Mass cytometry specialist



Simone van de Pas
Operator/
Cell sorter specialist



Deborah Lowie
Operator/
Quality manager



Ruben Douwes
Operator/
Cell sorter specialist



Jackelien van Scheppingen, PhD
Operator/
Mass cytometry specialist



Yen Nhi Nguyen
Operator/
Spectral specialist



Merjem Mededovic, PhD
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