

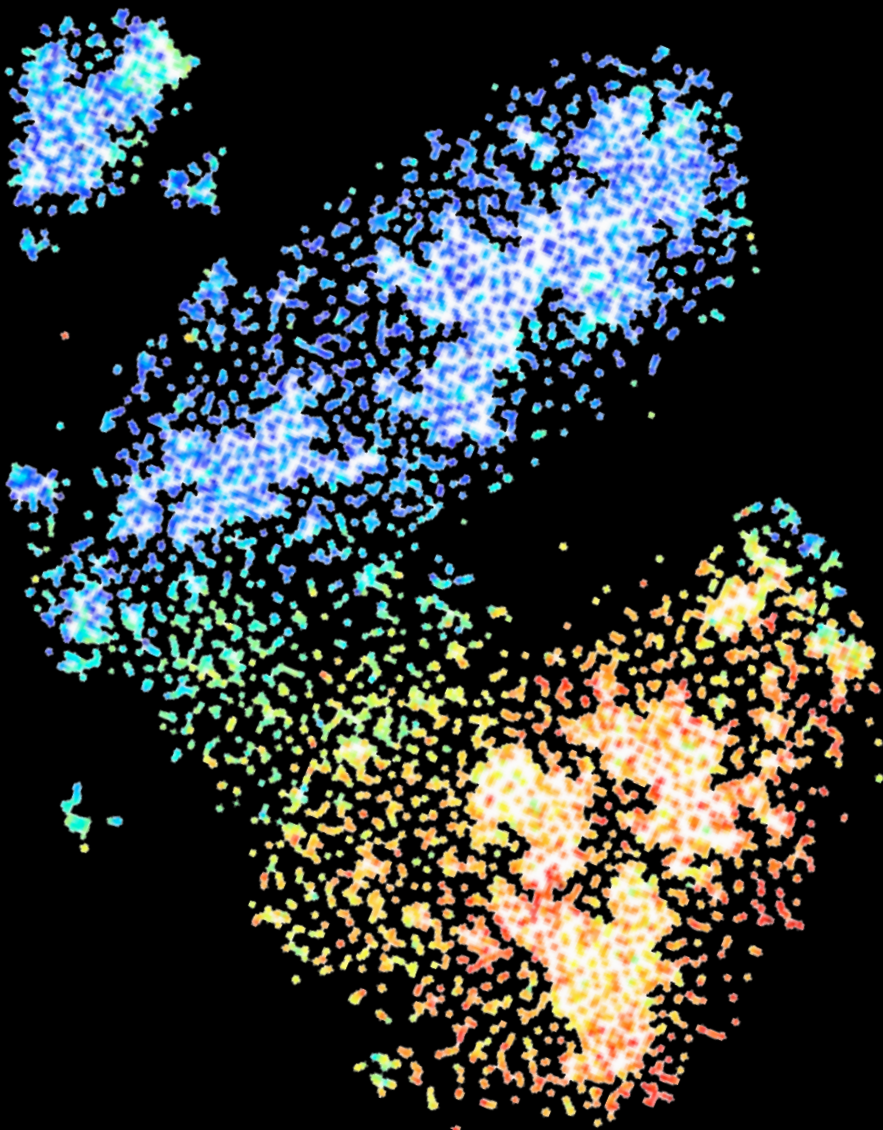


**April 9-13, 2018**

# Paris ISAC cytometry workshop



in partnership with Institut Pasteur



## **PROGRAM BOOK**

Program

Speakers biography

Lists of participants,  
sponsors and exhibitors

[www.alphavisa.com/cytometry-workshop/2018](http://www.alphavisa.com/cytometry-workshop/2018)



International Society for Advancement of Cytometry



## MESSAGE



International Society for Advancement of Cytometry

On behalf of the Live Education Task Force of the International Society for the Advancement of Cytometry, I welcome you to our first workshop in Paris the “the City of Lights”. Our host, Zosia Maciorowski and her team has put together a superb program and invited some of the best faculty from EU, USA, Canada and India to teach applications of laser flow cytometry in biomedical research and diagnostics. Vendors have brought in their latest instruments and technologies along with their technical staff to make this a memorable teaching exercise.

The Cytometry Workshops ([www.cytometryworkshops.com](http://www.cytometryworkshops.com)) were started in 2001 with the express purpose of interfacing experts in flow Cytometry for teaching applications of flow cytometry in bio-medical research. We have conducted flow cytometry workshops in various cities of Egypt, India and China and in Kuala Lumpur, Singapore, Jakarta, Bangkok, Istanbul, Ankara, Antalya, Riyadh, Glasgow, Prague, Warsaw and Miami.

We are thankful to the local organizing committee which has organized an excellent program of lectures and wet labs using latest protocols and instruments. We are thankful to vendors for continuous support of our workshops with donation of seed funds, instruments and technical staff.

I hope you enjoy positive interactions with the faculty and continue your association with the Cytometry workshops in future.

Yours truly,

*Awtar Krishan*

Awtar Krishan, Ph.d  
Emeritus Professor  
Pathology Department  
University of Miami School of Medicine  
Miami, Fl. USA  
Chair, Live Education Task Force  
International Society for Advancement of Cytometry

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ACEA Biosciences, Inc.  
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E-mail: [jdarakdjian@aceabio.com](mailto:jdarakdjian@aceabio.com)

## WELCOME

On behalf of the Organizing Committee, we are pleased to welcome you to the 1<sup>st</sup> Paris ISAC Cytometry Workshop. This workshop is jointly organized by the International Society for the Advancement of Cytometry (ISAC), the Institut Curie and the Institut Pasteur, and is part of an collaboration initiative between the Institut Pasteur and the Institut Curie, in particular between our Flow Cytometry Core Facilities. We express our thanks to our co-organizers, the Association Française de Cytometrie (AFC) and Ciphe in Marseilles. The AFC and their Executive Committee have been very helpful, particularly in the early stages of this initiative. Hervé Luche and his team at Ciphe are essential to the High Dimensional Data Analysis aspect of the workshop.

We have been overwhelmed by the response to this workshop from you, the participants, who have come not only from France and Europe but also from Africa, Asia and North America. We have done our best to put together a program to suit your different levels and varied interests, with a good grounding in the basics up to the latest techniques in flow cytometry. We have highly knowledgeable and enthusiastic faculty, some of the best in their field, who are very approachable. Do not hesitate to ask questions and engage them in conversation inside or outside of the sessions!

This workshop, and all of our ISAC Cytometry workshops worldwide, could not take place without the generous support and involvement of our sponsors. Their funding allows us to bring you outstanding faculty from around the world, and to give you access to the latest instrumentation. Their application specialists are an important fund of knowledge we all should tap into. Please visit their tables, and take advantage of their lunchtime talks.

We also take this opportunity to thank those here at the Institut Curie, in particular Jean Louis Duployé, our régisseur, and our amazing Training Unit team, Jacqueline Legras and Jennifer Henry Lemoine, who made the organization much less painful with their generous help and advice.

And of course, deepest thanks to the faculty who have come from afar to donate their time and expertise to teach us. Learn, enjoy the workshop and « Go with the Flow » !

Zosia Maciorowski, Institut Curie  
Milena Hasan, Institut Pasteur  
Sophie Novault, Institut Pasteur  
Awtar Krishan, University of Miami  
Hervé Luche, Ciphe, Marseilles  
Tomas Kalina, Charles University, Prague

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## TABLE OF CONTENTS

	Page
Access to the venue .....	7
<b>Program</b>	
Monday 9 <sup>th</sup> April .....	9
Tuesday 10 <sup>th</sup> April .....	11
Wednesday 11 <sup>th</sup> April .....	15
Thursday 12 <sup>th</sup> April .....	18
Friday 13 <sup>th</sup> April .....	20
<b>Speakers biography</b> .....	21
List of participants .....	40
Lists of sponsors and exhibitors .....	43
<b>Student planning module assignment</b> .....	44

## Organizing Committee

Zosia Maciorowski - Institut Curie  
 Sophie Novault - Institut Pasteur  
 Milena Hasan - Institut Pasteur  
 Hervé Luche - Cipe, Marseille  
 Awtar Krishan - University of Miami  
 Tomas Kalina - Charles University, Prague

## Administrative secretariat

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 Fax: +33 4 67 45 57 97  
 E-mail: [cytometryworkshop2018@alphavisa.com](mailto:cytometryworkshop2018@alphavisa.com)



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## VENUES

### BDD: Institut Curie - Bâtiment Biologie du Développement et Cancer

Use Entry to Institut Curie Campus at 11-13 rue Pierre et Marie Curie

- Amphitheatre : ground floor
- Salles Annexes 1, 2, 3 and 4: ground floor
- Salles Anglaises 1 and 2: basement

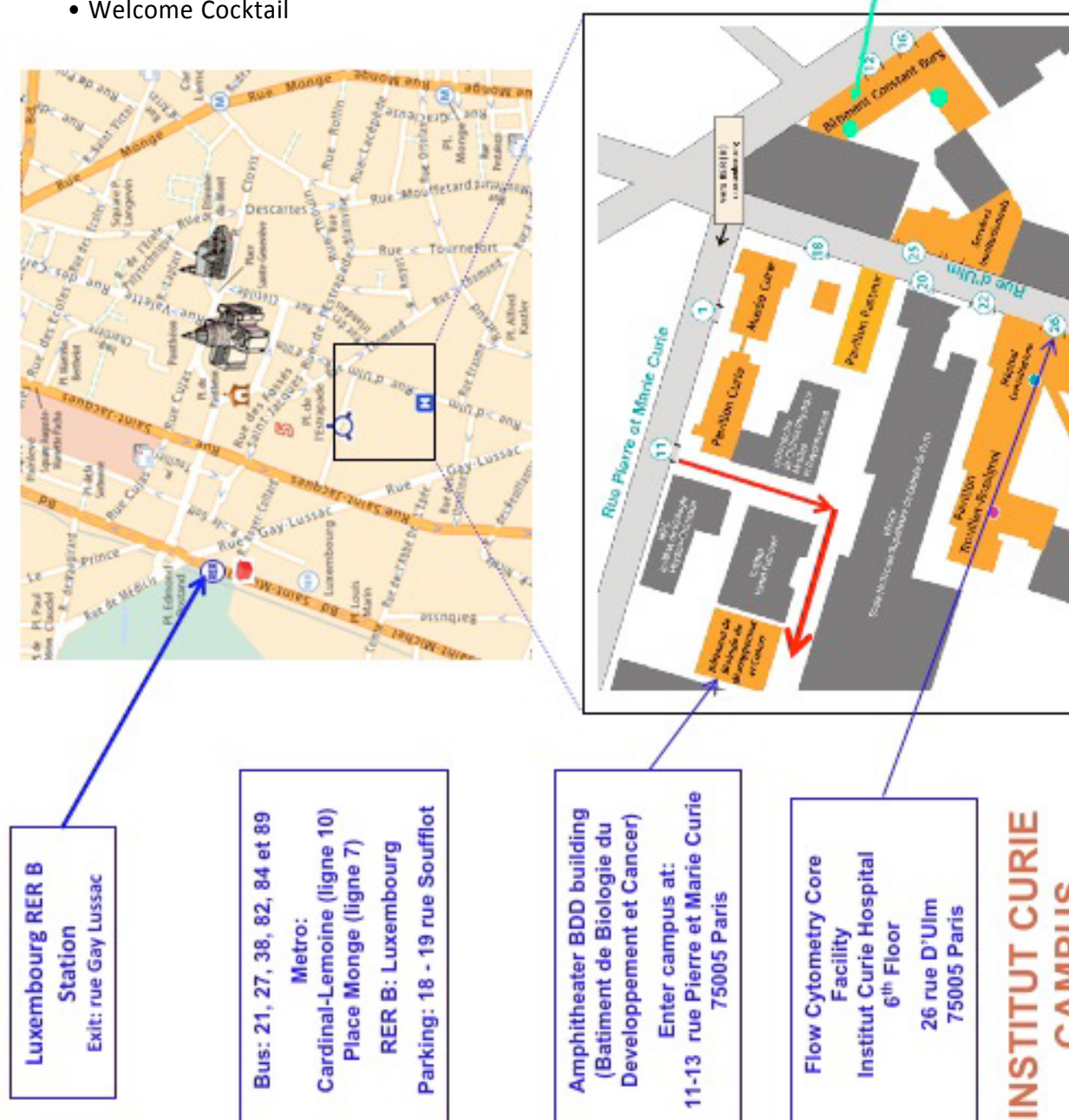
### Institut Curie Hospital: 26 rue d'Ulm

Take elevators in front of the entrance to the 6<sup>th</sup> Floor  
Plateforme de Cytometrie en Flux/Flow Cytometry Core Facility

- Main Flow Cytometry Core Facility: room 6A-11
- Annexe Flow Cytometry Core Facility: room 6A-31

### Institut Curie Green Café: 12 rue l'Homond

- Welcome Cocktail





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## PROGRAM - MONDAY 9<sup>th</sup> APRIL

**13:00-13:30** **Welcome** *Amphitheater BDD*  
**Organizing Committee:** Awtar Krishan, Zosia Maciorowski, Sophie Novault, Milena Hasan

Parallel sessions	Lectures		
	13:30-14:30	<b>Basics of Flow Cytometry: How a Cytometer Works</b> Dr Matthias Schiemann	<i>Salles Annexes 1 and 2</i>
	<hr/>		
	14:30-15:30	<b>Basics of Multicolor Flow Cytometry</b> Dr Sara De Biasi	
	<hr/>		
	Lecture		
	13:30-15:30	<b>High Dimensional Data Analysis Introduction</b> Dr Yvan Saeys	<i>Amphitheater BDD</i>
	<hr/>		
	15:30-15:45	<b>Coffee break</b>	<i>Hall BDD</i>

Lectures				
Parallel sessions	15:45-16:45	<b>Make Your Own Cytometer</b> Dr Bill Telford	<i>Amphitheater BDD</i>	
	<hr/>			
	16:45-17:30	<b>Basic Data Analysis</b> Dr Sara De Biasi		
	<hr/>			
	Practical modules HDA (High Dimensional Analysis)			
	Group A			<i>Cours Anglaise 1</i>
	15:45-16:35	<b>R basics</b> - Dr Quentin Barbier		
	<hr/>			
	Group B			<i>Cours Anglaise 2</i>
	15:45-16:35	<b>Discovery of Cytobank</b> - Dr Hervé Luche		
<hr/>				
Group B			<i>Cours Anglaise 2</i>	
16:40-17:30	<b>R basics</b> - Dr Quentin Barbier			
<hr/>				
Group A			<i>Cours Anglaise 1</i>	
16:40-17:30	<b>Discovery of Cytobank</b> - Dr Hervé Luche			
<hr/>				
18:00-19:00	<b>Welcome Cocktail</b>	<i>Green Café</i>		



2018



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**PROGRAM - TUESDAY 10<sup>th</sup> APRIL - Morning**

Parallel sessions	<b>Lectures</b>		
	09:00-10:00	<b>HDA Raw Data Analysis and Quality Control</b> Dr Yvan Saeys	<i>Salles Annexes 3 and 4</i>
	10:00-11:00	<b>HDA Supervised Analysis</b> - Dr Hervé Luche	
Parallel sessions	<b>Lectures</b>		
	09:00-10:00	<b>Basic Quality Control</b> - Dr Sara De Biasi	<i>Amphitheater BDD</i>
	10:00-11:00	<b>Basics Of Cell Sorting</b> - Dr Matthias Schiemann and Dr Geoffrey Osborne	
	11:00-11:15	<b>Coffee break</b>	<i>Hall BDD</i>
Parallel sessions	<b>Lectures</b>		
	11:15-12:00	<b>Apoptosis</b> - Dr Bill Telford	<i>Amphitheater BDD</i>
	12:00-13:00	<b>Cells Cycle and Proliferation</b> - Dr Paul Wallace	
	<b>Practical modules HDA (High Dimensional Analysis)</b>		
	<b>Group A</b>		
	11:15-12:05	<b>Raw data Analysis and QC</b> Dr Hervé Luche and Dr Quentin Barbier	<i>Cours Anglaise 1</i>
	<b>Group B</b>		
	11:15-12:05	<b>Supervised Analysis Tools</b> Dr Hervé Luche and Dr Quentin Barbier	<i>Cours Anglaise 2</i>
	<b>Group B</b>		
	12:05-13:00	<b>Raw data Analysis and QC</b> Dr Hervé Luche and Dr Quentin Barbier	<i>Cours Anglaise 2</i>
Parallel sessions	<b>Group A</b>		
	12:05-13:00	<b>Supervised Analysis Tools</b> Dr Hervé Luche and Dr Quentin Barbier	<i>Cours Anglaise 1</i>
	13:00-14:00	<b>Lunch</b>	<i>Hall BDD</i>
<b>Lunchtime Sponsor Presentations</b>			<i>Salles Annexes 2, 3 and 4</i>
	13:00-13:30	<b>BioRad</b>	
	13:30-13:45	<b>Propel</b>	
	13:45-14:00	<b>Miltenyi</b>	



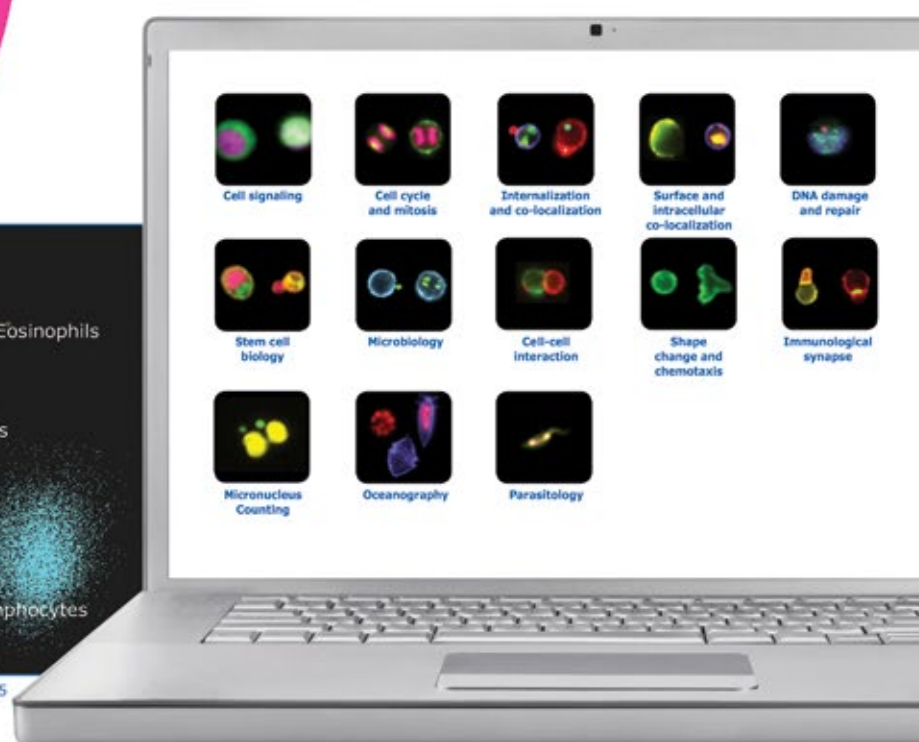
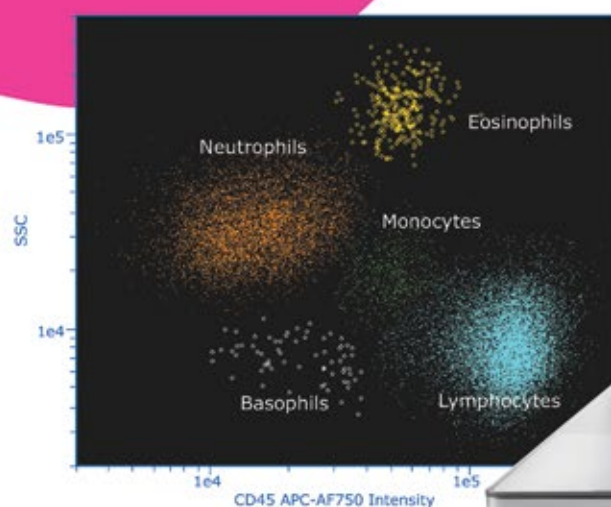
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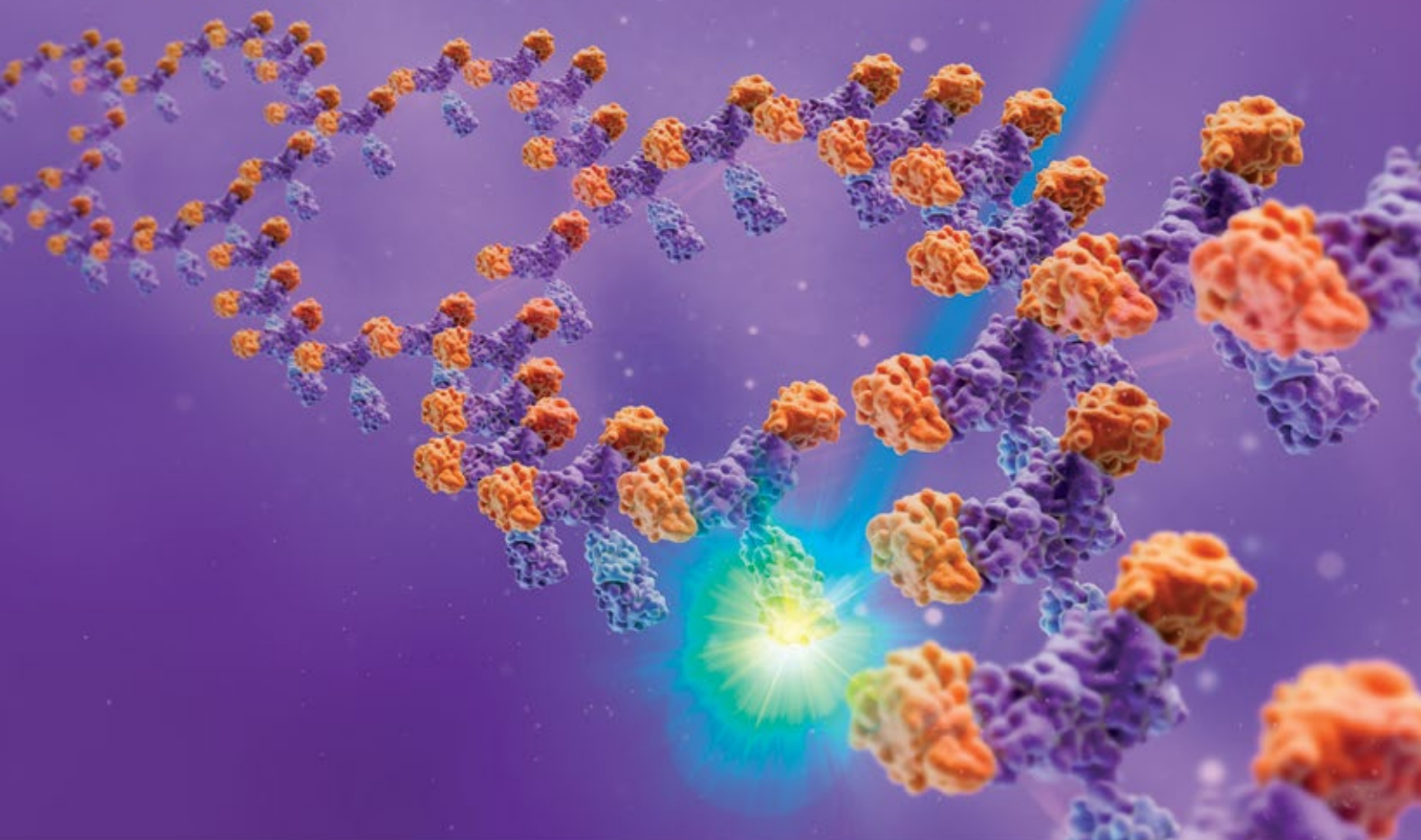
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2018 - 10326 03/2018

### PROGRAM - TUESDAY 10<sup>th</sup> APRIL - Afternoon

Parallel Modules		
Parallel sessions	14:00-15:45	<b>Basics of Multicolor Flow Cytometry</b> <i>Salles Annexes 1, 2 and 3</i> Dr Paresh Jain, Dr Sara De Biasi and Dr John Wotherspoon
	14:00-15:45	<b>Basics of Cell Sorting</b> <i>Flow Lab room 6A-11</i> Dr Matthias Schiemann and Dr Geoffrey Osborne
	14:00-15:45	<b>Cell Cycle</b> <i>Immunology Lab - Flow Lab room 6A-31</i> Dr Awtar Krishan <i>ZE5</i>
	<b>Group A</b> <i>Cours Anglaise 1</i>	
	14:00-15:45	<b>HDA Shiny Scaffold</b> - Dr Hervé Luche
	<b>Group B</b> <i>Cours Anglaise 2</i>	
	14:00-15:45	<b>HDA FlowSOM</b> - Dr Yvan Saeys
	<b>Tutorial</b>	
	14:00-15:45	<b>mRNA Flow Cytometry</b> <i>Amphitheater BDD</i> Dr Paul Wallace
	15:45-16:00	<b>Coffee break</b> <i>Hall BDD</i>
Parallel modules		
Parallel sessions	16:00-17:45	<b>Basics of Multicolor Flow Cytometry</b> <i>Salles Annexes 1, 2 and 3</i> Dr Paresh Jain, Dr Sara De Biasi and Dr John Wotherspoon
	16:00-17:45	<b>Basics of Cell Sorting</b> <i>Flow Lab room 6A-11</i> Dr Matthias Schiemann and Dr Geoffrey Osborne
	16:00-17:45	<b>Make Your Own Cytometer</b> <i>Salle Annexe 4</i> Dr Bill Telford
	16:00-17:45	<b>Proliferation</b> <i>Immunology Lab - Flow Lab room 6A-31</i> Dr Paul Wallace <i>ZE5</i>
	<b>Group B</b> <i>Cours Anglaise 2</i>	
	16:00-17:45	<b>HDA Shiny Scaffold</b> - Dr Hervé Luche
	<b>Group A</b> <i>Cours Anglaise 1</i>	
	16:00-17:45	<b>HDA FlowSOM</b> - Dr Yvan Saeys
	<b>Tutorial</b>	
	16:00-17:45	<b>Spectral Flow Cytometry</b> <i>Amphitheater BDD</i> Dr Maria Jaimes





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## PROGRAM - WEDNESDAY 11<sup>th</sup> APRIL - Morning

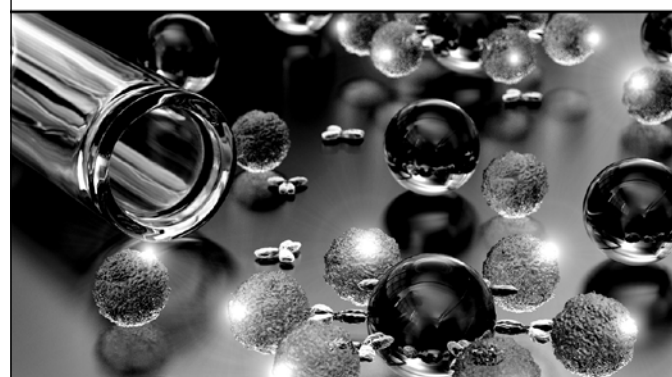
Parallel sessions	<b>Lecture</b>		
	09:00-11:00	<b>Panel Design Tools</b> Dr Paresh Jain	<i>Amphitheater BDD</i>
	<b>Practical modules</b>		
	09:00-11:00	<b>Group A</b> <b>HDA OneSense/Hypergate</b> Dr Quentin Barbier	<i>Salle Annexe 1</i>
Parallel sessions	09:00-11:00	<b>Group B</b> <b>HDA metaclustering</b> Dr Hervé Luche	<i>Salle Annexe 2</i>
	11:00-11:15	<b>Coffee break</b>	<i>Hall BDD</i>
	<b>Lecture</b>		
	11:15-13:00	<b>High Dimensional Panel Design</b> Dr John Wotherspoon	<i>Amphitheater BDD</i>
Parallel sessions	<b>Lectures</b>		
	11:15-12:00	<b>Imaging Flow Cytometry</b> - Dr Ziv Porat	<i>Salles Annexes 3 and 4</i>
	12:00-13:00	<b>Advanced Cell Sorting</b> - Dr Matthias Schiemann and Dr Geoffrey Osborne	
	<b>Practical modules</b>		
Parallel sessions	11:15-13:00	<b>Group B</b> <b>HDA OneSense/Hypergate</b> Dr Quentin Barbier	<i>Salle Annexe 2</i>
	11:15-13:00	<b>Group A</b> <b>HDA metaclustering</b> Dr Hervé Luche	<i>Salle Annexe 1</i>
	13:00-14:00	<b>Lunch</b>	<i>Hall BDD</i>
	<b>Lunchtime Sponsor Presentations</b>		
Parallel sessions	13:00-13:30	<b>Cytek</b>	
	13:30-13:45	<b>Merck</b>	
	13:45-14:00	<b>BioLegend</b>	



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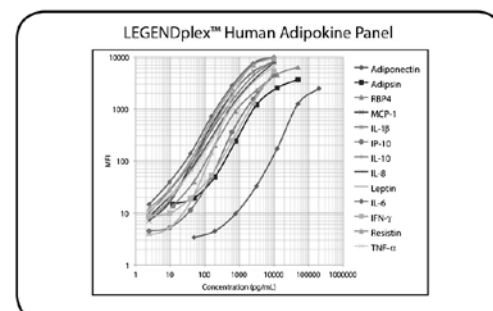
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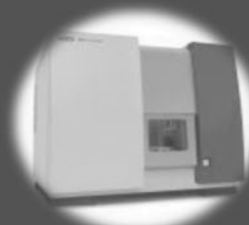
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## PROGRAM - WEDNESDAY 11<sup>th</sup> APRIL - Afternoon

### Lectures

14:00-15:00	<b>HDA</b> <b>Learning in vivo: How Data Science and Cytomics are connecting Cell Biology and medicine</b> - Dr Jonathan Irish	<i>Amphitheater BDD</i>
15:00-15:45	<b>Metaclustering</b> - Dr Hervé Luche	
<b>Practical modules</b>		
14:00-15:45	<b>Multicolor Panel Evaluation</b> Dr Cyril Wilmes	<i>Cours Anglaise 1 and 2</i>
14:00-15:45	<b>Advanced Cell Sorting</b> Dr Matthias Schiemann and Dr Geoffrey Osborne	<i>Flow Lab room 6A-11</i>
14:00-15:45	<b>Intracellular Staining</b> Sue Chow and Dr David Hedley	<i>Immunology Lab - Salle Annexe 1</i> <i>Cytoflex</i>
14:00-15:45	<b>Apoptosis</b> Dr Bill Telford	<i>Immunology Lab - Flow Lab room 6A-31</i> <i>ZE5</i>
14:00-15:45	<b>Imaging Flow Cytometry</b> Dr Ziv Porat	<i>Flow Lab room 6A-11</i>



15:45-16:00	<b>Coffee break</b>	<i>Hall BDD</i>
-------------	---------------------	-----------------

### Lectures

16:00-16:45	<b>HDA integrative data analysis</b> - Dr Antonio Cosma	<i>Amphitheater BDD</i>
16:45-17:30	<b>Putting It All Together: What to use when</b> - Dr Jonathan Irish	
<b>Practical modules</b>		
16:00-17:30	<b>Multicolor Panel Evaluation</b> Dr Cyril Wilmes	<i>Cours Anglaise 1 and 2</i>
16:00-17:30	<b>Advanced Cell Sorting</b> Dr Matthias Schiemann and Dr Geoffrey Osborne	<i>Flow Lab room 6A-11</i>
16:00-17:30	<b>Intracellular Staining</b> Sue Chow and Dr David Hedley	<i>Immunology Lab - Salle Annexe 1</i> <i>Cytoflex</i>
16:00-17:30	<b>Panel Design</b> Dr Parsh Jain, Dr Sara De Biasi and Dr John Wotherspoon	<i>Salles Annexes 3 and 4</i>
16:00-17:30	<b>Imaging Flow Cytometry</b> Dr Ziv Porat	<i>Flow Lab room 6A-11</i>
16:00-17:30	<b>Spectral Flow Cytometry</b> Dr Maria Jaimes	<i>Flow lab room 6A-31</i> <i>Aurora</i>



PROGRAM - THURSDAY 12<sup>th</sup> APRIL - Morning

Parallel sessions	Practical modules		
	09:00-11:00	<b>Panel Design</b> Dr Parsh Jain, Dr Sara De Biasi and Dr John Wotherspoon	<u>Salles Annexes 3 and 4</u>
	09:00-11:00	<b>Imaging Flow Cytometry</b> - Dr Ziv Porat	<u>Flow Lab room 6A-11</u>
	09:00-11:00	<b>Apoptosis</b> Dr Bill Telford	<u>Salle Annexe 2</u> <u>Novocyte</u>
	09:00-11:00	<b>Intracellular Staining</b> Sue Chow and Dr David Hedley	<u>Immunology Lab - Salle Annexe 1</u> <u>Cytoflex</u>
	09:00-11:00	<b>Advanced Cell Sorting</b> Dr Matthias Schiemann and Dr Geoffrey Osborne	<u>Flow Lab room 6A-11</u>
		<b>Group A</b>	<u>Cours Anglaise 1</u>
	09:00-11:00	<b>HDA Cytobank Unsupervised</b> - Dr Jonathan Irish	
		<b>Group B</b>	<u>Cours Anglaise 2</u>
	09:00-11:00	<b>HDA Intergrative</b> - Dr Hervé Luche	
<b>11:00-11:15 Coffee break</b>			<u>Hall BDD</u>
Parallel sessions	Lecture		
	11:15-13:00	<b>Data Evaluation, Panel Troubleshooting</b> Dr Maria Jaimes, Dr Paresh Jain, Dr Sara De Biasi, Dr John Wotherspoon and Dr Christoph Freier	<u>Amphitheater BDD</u>
	Practical modules		
	11:15-13:00	<b>Imaging Flow Cytometry</b> - Dr Ziv Porat	<u>Flow Lab room 6A-11</u>
	11:15-13:00	<b>Intracellular Staining</b> Sue Chow and Dr David Hedley	<u>Immunology Lab - Salle Annexe 1</u> <u>Cytoflex</u>
		<b>Group B</b>	<u>Cours Anglaise 2</u>
	11:15-13:00	<b>HDA Cytobank Unsupervised</b> - Dr Jonathan Irish	
		<b>Group A</b>	<u>Cours Anglaise 1</u>
	11:15-13:00	<b>HDA Intergrative</b> - Dr Hervé Luche	
	<b>13:00-14:00 Lunch</b>	<u>Hall BDD</u>	
<b>Lunchtime Sponsor Presentations</b>			<u>Salles Annexes 2, 3 and 4</u>
13:00-13:30	<b>Acea / Ozyme</b>		
13:30-14:00	<b>ThermoFisher</b>		

PROGRAM - THURSDAY 12<sup>th</sup> APRIL - Afternoon

Parallel sessions	Practical modules		
	14:00-15:30	<b>Basic data analysis Flowjo</b> Dr Christoph Freier	<u>Salle Annexe 4</u>
	14:00-15:30	<b>Imaging Flow Cytometry</b> Dr Ziv Porat	<u>Flow Lab room 6A-11</u>
	14:00-15:30	<b>Spectral Flow Cytometry</b> Dr Maria Jaimes	<u>Flow Lab room 6A-31</u> <u>Aurora</u>
	14:00-15:30	<b>Intracellular Staining</b> Sue Chow and Dr David Hedley	<u>Immunology Lab - Salle Annexe 1</u> <u>Cytoflex</u>
		<b>Group A</b>	<u>Cours Anglaise 1</u>
	14:00-15:30	<b>HDA Cell Identification</b> Dr Jonathan Irish	
		<b>Group B</b>	<u>Cours Anglaise 2</u>
	14:00-15:30	<b>HDA Cytosplore</b> Dr Vincent van Unen	
	<b>15:45-16:00    Coffee break</b> <u>Hall BDD</u>		
Parallel sessions	Practical modules		
	16:00-17:30	<b>Imaging Flow Cytometry</b> Dr Ziv Porat	<u>Flow Lab room 6A-11</u>
	16:00-17:30	<b>Spectral Flow Cytometry</b> Dr Maria Jaimes	<u>Flow Lab room 6A-31</u> <u>Aurora</u>
	16:00-17:30	<b>Intracellular Staining</b> Sue Chow and Dr David Hedley	<u>Immunology Lab - Salle Annexe 1</u> <u>Cytoflex</u>
	16:00-17:30	<b>Advanced Cell Sorting</b> Dr Matthias Schiemann and Dr Geoffrey Osborne	<u>Flow Lab room 6A-11</u>
		<b>Group B</b>	<u>Cours Anglaise 2</u>
	16:00-17:30	<b>HDA Cell Identification</b> Dr Jonathan Irish	
		<b>Group A</b>	<u>Cours Anglaise 1</u>
	16:00-17:30	<b>HDA Cytosplore</b> Dr Vincent van Unen	



**PROGRAM - FRIDAY 13<sup>th</sup> APRIL****Lectures**

09:00-11:00 **High dimensional data analysis using standard commercial software** - Dr Christoph Freier (Flowjo), Dr Benoit Dupont (Kaluza) and Dr Manuel Martinez (FCS Express) *Amphitheater BDD*

09:00-11:00 **Review Multicolor Panel Troubleshooting**  
Dr Paresh Jain, Dr Sara De Biasi and Dr John Wotherspoon

**Practical modules**

09:00-11:00 **Cell Cycle** *Immunology Lab - Salle Annexe 2*  
Dr Awtar Krishan *Novocyte*

09:00-11:00 **Advanced Cell Sorting** *Flow Lab room 6A-11*  
Dr Matthias Schiemann and Dr Geoffrey Osborne

09:00-11:00 **Make Your Own Cytometer** - Dr Bill Telford *Salle Annexe 1*

11:00-11:15 **Coffee break** *Hall BDD*

**Practical modules**

11:15-13:00 **Advanced Cell Sorting** *Flow Lab room 6A-11*  
Dr Matthias Schiemann and Dr Geoffrey Osborne

11:15-13:00 **High dimensional data analysis using standard commercial software** - Dr Christoph Freier (Flowjo), Dr Benoit Dupont (Kaluza) and Dr Manuel Martinez (FCS Express) *Salles Annexes 1, 2 and 4*

11:15-13:00 **Proliferation** *Immunology Lab - Salle Annexe 3*  
Dr Paul Wallace *Attune*

13:00-14:00 **Lunch** *Hall BDD*

**Lunchtime Sponsor Presentations***Salles Annexes 2, 3 and 4*

13:00-13:30 **Becton Dickinson** 

13:30-14:00 **Beckman Coulter** 

**Lecture and round table**

14:00-14:45 **Standardization** - Zosia Maciorowski and all faculty *Amphitheater BDD*

**Lectures**

14:45-15:45 **Building A High Content, Precision Immunology Program To Support Cancer Trials** - Dr Pratip Chattopadhyay (remote) *Amphitheater BDD*

15:45-16:00 **Coffee break** *Hall BDD*

16:00-16:45 **Imaging mass Cytometry** - Dr David Hedley

16:45-17:15 **Closing and Certificates**

**SPEAKERS BIOGRAPHY**



**Dr. Pratip K. Chattopadhyay**

Pratip K. Chattopadhyay, Ph.D. performed graduate work at Johns Hopkins School of Public Health, where he obtained a Ph.D. in Molecular Microbiology and Immunology in 2003. His work studied T-cell turnover in HIV+ patients at various stages of disease to understand the relative contribution of T-cell production and destruction to disease pathogenesis. He then began post-doctoral research at Vaccine Research Center at the National Institutes of Health (NIH), where he was ultimately promoted to Staff Scientist. Under Mario Roederer's guidance in the ImmunoTechnology Section, he performed the first 20-parameter flow cytometry experiment in 2003. Since that work, he has had a central role in developing a number of tools important to multiparameter flow cytometry, including Quantum Dot reagents (Nature Medicine, 2006), Brilliant Violet dyes (Cytometry, 2008), and various data analysis tools (e.g. Bioinformatics, 2010). At the NIH, he performed some of the largest multicolor flow cytometry studies to date (both in terms of number of colors and samples), investigating T-cell immunity in early HIV infection (Journal of Virology, 2010) and other settings. Additionally, he helped develop and apply molecular single cell technologies, like the Fluidigm BioMark, for studying vaccine responses (JIM, 2012). In 2014, he co-led a team that introduced the first 30-parameter flow cytometer.

Dr. Chattopadhyay was recently appointed to the faculty of New York University's Medical Center, where he leads an independent research program (as Associate Professor of Pathology) and a core (as Director, Precision Immunology) in the Perlmutter Cancer Center. At NYU, he is applying high-dimensional single cell technologies to immuno-oncology trials and studies. His program aims to identify and better understand the cell types associated with efficacy of immunotherapy treatments for cancer, and optimize new platforms for comprehensive single cell profiling. To fulfill this mission, the lab currently employs 30+ parameter flow cytometric analysis (and soon, sorting) technology alongside a new platform known as CITE-seq (which measures protein and mRNA simultaneously at the single cell level; Nature Methods, 2017).

Dr. Chattopadhyay is an active member of the flow cytometry community, who has taught extensively on multicolor panel design, quality control, troubleshooting, and data analysis. He serves as Councilor for the International Society for the Advancement of Cytometry (ISAC), and as a member of ISAC's Education Committee (participating in the early development of the online learning platform CYTO U). He is an Associate Editor for the journal Cytometry Part A, for which he helped develop a new manuscript type (OMIPs) describing multicolor immunophenotyping panels. Finally, he has been appointed Scientific Program Chair for ISAC's CYTO2019 international meeting.





Sue Chow

Sue Chow graduated in molecular biology from the University of Toronto, and developed a specialist interest in flow cytometry, joining David Hedley’s lab as senior technician in 1990. David and Sue have published extensively in the area of flow cytometry applications, including the measurement of lipid peroxidation, antioxidant regulation, signal transduction analysis, and epigenetic targeting. For the past 14 years they have been teaching the intensive annual flow cytometry research methods course that alternates between the University of New Mexico and Bowdoin College ME. For the past 14 years they have been teaching the intensive annual flow cytometry research methods course that alternates between the University of New Mexico and Bowdoin College ME.

Dr. David Hedley

David Hedley completed his higher specialist training in medical oncology, combined with a graduate program in tumour immunology, at the Royal Marsden Hospital, University of London. He was junior faculty at the University of Sydney, Australia, 1981-89 where he was responsible for the development of flow cytometry applications to cancer biology, including the technique for DNA content analysis using paraffin-embedded tissue that played a major role in the early development of clinical flow cytometry. Since 1990 he has been Senior Scientist/Senior Staff Physician at the Princess Margaret Hospital, and Professor of Medicine at the University of Toronto, Canada, with a major focus on pancreatic cancer. His laboratory makes extensive use of patient-derived xenografts that recapitulate the clinical spectrum of the disease, and develops flow cytometry techniques to study complex biological processes linked to experimental treatment development.



Dr. Antonio Cosma

Antonio Cosma worked in different institutions in Italy, Germany and France and is now the head of the FlowCyTech core facility at the CEA, Fontenay-aux-Roses, France. He is an expert in the development of flow-cytometry-based assays and new technologies related to immune-assay, data management and analysis. His scientific activity focuses on the study of the immune system during HIV infection. He is now working on multidimensional data analysis approaches to facilitate the analysis of complex dataset by the general life science scientist. He recently proposed a new method for the annotation of cell type based on prime numbers and the fundamental theorem of arithmetic.



**Dr. Sara De Biasi**

Sara De Biasi obtained PhD in Clinical and Experimental Medicine (Immunology) from the University of Modena and Reggio Emilia, Italy in 2013. From mid 2013, she is carrying out post-doc research as senior scientist in the lab of Immunology directed by prof. Andrea Cossarizza. Most of her work focuses on the variability of adaptive immune response in HIV, autoimmune, and cancer patients. In particular, she studied the role of rare cells such as iNKT cell and circulating endothelial cells (CEC). During the last two years, she is studying T cell metabolism with particular interest in mitochondria.

Dr. Sara De Biasi is an International Society for Advancement of Cytometry (ISAC) Marylou Ingram Scholar and she is part of the Cyto U task force of the same society. Moreover, she was involved in the organization of Multiple Sclerosis workshops and flow cytometry workshop as teacher and as organizer.

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**Dr. Jonathan Irish**

Dr. Jonathan Irish trained in cancer biology, immunology, and computational biology at Stanford with Garry Nolan during his Ph.D. research and Ron Levy during his post-doctoral studies. His lab at Vanderbilt University in Nashville studies how signaling governs healthy cell functions and human disease outcomes. His group also operates Vanderbilt's mass cytometry shared resources, the Cancer & Immunology Core (CIC) and the Mass Cytometry Center of Excellence (MCCE). The Irish lab's approach focuses on single cell tools capable of targeting signaling networks in cell subsets and dissecting immune interactions of cells within human tissue biopsies obtained before and during therapy. Dr. Irish co-created Cytobank cloud software for single cell data

analysis and the marker enrichment modeling (MEM) algorithm. MEM is designed to bridge human and machine learning of cell identity. Current projects in the Irish lab aim to personalize therapies by measuring millions of cells in human tissues and using computational tools to identify and target pathogenic cells.

Lab website: <http://my.vanderbilt.edu/irishlab/>

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**Dr. Maria C Jaimes**

Dr. Maria Jaimes earned her MD degree at the Universidad Javeriana in Colombia (South America). She completed her postdoctoral training at Stanford University in the department of Microbiology and Immunology. During her postdoc, she worked at characterizing the immune responses in humans and mice to both rotavirus and influenza after natural infection and immunization.

In 2005, Maria joined BD Biosciences. While at BD, Maria worked in different aspects of Quality Assurance and standardization of flow cytometry assays. As part of the R&D reagent team she participated in the development and testing of new dyes, and was also involved in the development and characterization of new instrumentation and software including FACSuite, FACSLytic and 10 Color Canto.

Since 2015, Maria has been working at Cytex, with the R&D team developing the Aurora spectral cytometer.



**Dr. Paresh Jain**

Dr. Paresh Jain is a hemat-oncopathologist currently working as Associate Director, Clinical Solutions Platform, BD Biosciences Greater Asia. Dr. Jain qualified as M.D. (Pathology) from Grant Medical College, University of Bombay, India and trained in hemato-oncopathology at the All India Institute for Medical Sciences (AIIMS), New Delhi and at The Royal Marsden NHS Trust Hospital, London. He worked as Assistant Professor at AIIMS, New Delhi (2001-2005).

In 2005, he joined BD Biosciences, India as Scientific Advisor where he has played an active role in institutionalizing CD4 GLP training programs for NACO sites, giving shape and direction to structured training courses in flow cytometry (where more than 1000 scholars have received hands-on training on flow cytometry) and establishing several BD Centers of Excellence for education and training in flow cytometry at Bangalore (BD-NCBS CoE), Kolkata (BD-CU CoE), Lucknow (BD-CSIR CDRI CoE), Pune (BD-NCCS CoE), Mumbai (BD-Hinduja Hospital CoE) and New Delhi (BD-JH FACS Academy). Dr Paresh has more than 35 national/international publications and has organized and/or joined as faculty in more than 100 CMEs/workshops/ training programs on clinical and research applications of flow cytometry.

He is an active member of the ISAC's Live Education Task Force and a founder member of The Cytometry Society, India.

**Dr. Awtar Krishan**

Awtar Krishan obtained PhD in Zoology (cytogenetics) from the Panjab University, Chandigarh, India (1962) and a PhD in Micro-Anatomy from the Univ. of Western Ontario, Canada (1963). From 1965 to 1977, he was at the Sidney Farber Cancer Institute, Harvard Medical School, Boston, USA as Head of the Tissue Ultrastructure and Experimental Pathology Labs. He transferred to the University of Miami-School of Medicine and from 1980 to 1993 was Scientific Director of the Comprehensive Cancer Center. Most of his work has focused on avian cytogenetics, experimental therapeutics and analytical cytology. He developed flow cytometric techniques for rapid analysis of DNA content by the propidium iodide staining method, monitoring

of fluorescent drug retention and resistance and for hormone receptor and marker expression in tumor cells. Dr. Krishan has organized cytometry workshops in India, Thailand, China, Egypt, Turkey, Malaysia, and Singapore.

These activities are described in the website: <http://www.cytometryworkshops.com>. He is Chair of the Live Education Task Force of The International Society for Advancement of Cytometry (ISAC).



**Dr. Hervé Luche**

Hervé Luche studied developmental immunology in the lab of Hans-Joerg FEHLING during his PhD and in the lab of Bernard and Marie MALISSEN for his post-doctoral studies using engineered knock-in mouse strains to address lineage commitment issues by multi-parametric flow cytometry panels to trace the lineage of reporter positive cells. He applied high resolution flow cytometry using mouse mutants of the TCR signaling pathway and transcriptomics to understand the pattern of genes involved in lineage decisions at the molecular level. In 2012, he joined CIPHE, the Centre for ImmunoPHEnomics - (Inserm/US012, AMU, CNRS/UMS3367) in Marseille-Luminy to lead the Immuno-phenotyping module. With its cutting-edge expertise in mouse genetics and immunology, CIPHE aims to develop and analyze, in a massively parallel and standardized mode, mouse KO/KI models to understand the function of the mouse immune system under normal and infectious conditions. He contributes to national and international phenotyping efforts (International Mouse Phenotyping Consortium (IMPC) and leads the mass cytometry effort at CIPHE towards functional phenotyping.

As of 2018, he heads the Immuno-phenotyping module and contributes to the development and expansion of analytical pipelines towards humanized mouse model characterization.

Hervé an ISAC Marylou Ingram Scholar and has co-organized 2 INSERM Workshops 225, with practical sessions in Marseille on mass cytometry and data analysis. He has contributed to the creation of the 3C (Computational Cytometry Club) in France with the 'Association Française de Cytométrie' to evaluate in a collaborative manner data analysis methodologies.

**Scientific interests:** Understand how cells integrate signals and communicate with their environment to actually change their transcriptional programs, fate or acquire a new function. Knock-in mouse strains generation to address lineage commitment issues. Blend phenomic datasets, functional assays and transcriptomic datasets to help deciphering the function of a gene on the immune system.

**Dr. Geoffrey Osborne**

Geoffrey Osborne is Director of Special Order Research Products for BD Biosciences, based in San Jose, CA, USA. He leads a team focused on meeting customer needs by engineering technology advances to modify flow cytometers to fit unique roles. He has been specialized in flow cytometry for 29 years.

Prior to taking his current role he was an Academic Group Leader and Director of Flow Cytometry for both Queensland Brain Institute and the Australian Institute for Bioengineering and Nanotechnology, at the University of Queensland, Brisbane, Australia for 13 years. In this position Geoff lead a team that provided crucial cell sorting and analysis services to researchers both within QBI and across the broader university. The laboratory specialized in the analysis and separation of cells derived from a variety of sources such as solid tissue, blood and cultured cell lines.

In addition he held a Faculty research position where his interests were in the application of flow cytometry in stem cell research, brain tumours, novel assay development encompassing not only biological assays but also hardware / software development projects.

He has more than 20 peer reviewed research papers, has authored 4 book chapters on flow cytometric sorting and is a life time member of the Australasian Cytometry Society.

Geoff holds a B.Sc. from The Australian National University (1993) and an Associate Diploma in Applied Biology from the Queensland University of Technology (1983).



**Dr. Ziv Porat**

Ziv Porat obtained his PhD in Cell Biology from the Weizmann Institute of Science, Israel in the lab of Prof. Chaim Kahana (2007). From 2007 to 2011, he was at the lab of Prof. Benjamin Geiger as a post-doc fellow, specializing in microscopy and imaging techniques. Since 2011 he is part of the Weizmann Institute Flow Cytometry unit as an Assistant Staff Scientist, and now as an Associate Staff Scientist. He specializes in Imaging Flow Cytometry, and participated in more than 200 different projects utilizing this technology. He took part in more than 60 publications in this field, including development of novel Imaging Flow Cytometry applications.

These include quantification of senescence, Golgi fragmentation, protein-protein interaction, Malaria parasite infection and many others. He participated and lectured in numerous international conferences, including the CYTO meetings since 2015. Dr. Porat is the organizer of the Israeli annual Imaging Flow Cytometry meetings since 2012, and lectures in international user meetings and courses.

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**Dr. Yvan Saeys**

Yvan Saeys obtained his PhD in computer science from Ghent University, and after spending time abroad at the University of the Basque Country and the Université Claude Bernard (Lyon 1, France) he obtained an FWO postdoctoral fellowship at Ghent University. Since 2015 he is an Associate Professor at Ghent University and a Principal Investigator at the VIB Inflammation Research Center. He is heading the Data Mining and Modeling group, an interdisciplinary research team of 15 people, consisting of mathematicians, computer scientists, engineers and bioinformaticians. The main research theme of his group is the design and application of data mining and machine learning techniques for high-throughput single-cell technologies.

These include flow and mass cytometry based techniques but also single-cell transcriptomics platforms. His group developed the FlowSOM and FloReMi R packages for flow cytometry visualization and biomarker discovery, and obtained the best results at the FlowCAP IV challenge on predicting HIV to AIDS progression.

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**Dr. Matthias Schiemann**

Matthias Schiemann is Core Manager of the Flow Cytometry FACS unit CyTUM-MIH and group leader at the Institute for Medical Microbiology, Immunology and Hygiene - Technische Universität München. He started as Chemist and received his graduation in Biology/Immunology. He has been on the faculty at Klinikum rechts der Isar since 2000. His area of interest includes quality control and hardware modifications of commercial available flow cytometric analyzers and cell sorters for special immunological applications. He has been involved in training courses in flow cytometry of cell sorting and setup of multicolor experiments for a long time.

The major focus of the Schiemann laboratory is to visualize and find out effects as well as influxes due to purification and in general manipulation during handling and purification of cells. These studies are designed to increase our understanding of how the purification of cells manipulates their functionality. This knowledge is of special interest for adoptive immunotherapy, diagnostic monitoring of, for example T cell mediated immunity, and the development of new vaccination strategies.

**Dr. Bill Telford**

Bill Telford received his Ph.D. in microbiology from Michigan State University in 1994, where his laboratory developed some of the earliest techniques for flow cytometric detection of apoptosis. He received his postdoctoral training in immunology at The University of Michigan Medical School, was appointed assistant scientist at the Hospital for Special Surgery in New York City from 1997 to 1999. Dr. Telford became a Staff Scientist at the National Cancer Institute, National Institutes of Health in 1999, and is currently a Senior Associate Scientist and director of the flow cytometry core laboratory in the NCI Experimental Transplantation and Immunology Branch.

Dr. Telford's main research interests include: instrument development, particularly in the area of novel solid-state laser integration into flow cytometers; flow cytometric stem cell detection and characterization; and functional characterization of early apoptosis by flow and image cytometry.

**Dr. Vincent van Unen**

Vincent van Unen studied Biomedical Sciences at the Leiden University Medical Center (LUMC), and went on an exchange to the Karolinska Institutet in Stockholm, Sweden and to the Garvan Institute of Medical Research in Sydney, Australia, obtaining his Master degree *Cum Laude*. He is currently finishing his PhD degree in the department of Immunohematology of the LUMC under the supervision of Prof. Frits Koning. He has implemented mass cytometry in the LUMC and at present he has experience working with the CyTOF2, the Helios and the Hyperion (imaging-mass cytometry). He has been instrumental in connecting the biomedical research field with computer scientists which has resulted in the development of Cytosplore<sup>+HSNE</sup>,

a computational tool that breaks the scalability limits of tSNE-type approaches, thus enabling the single-cell analysis of tens of millions of cells using whole data information in a fraction of the time required by currently available tools, published in *Nature Communications*.

He was the first to apply mass cytometry to the analysis of the composition of the immune system in biopsy material from patients with inflammatory bowel diseases. This led to the identification of tissue- and disease-associated immune subsets, results that have been published in *Immunity*, a leading journal in the field of immunology. In addition, his research revealed extensive heterogeneity as well as multi-lineage differentiation trajectories of innate lymphoid cells in the human fetal intestine, published in the *Journal of Experimental Medicine*. He is expected to obtain his PhD degree in 2018, after which he will perform a Postdoc at Stanford University in the USA with Prof. Mark M. Davis. He obtained three awards in recognition of his work during his PhD period: the Junior Researcher Prize 2016 from the Dutch Society of Gastroenterology, the Third Takeda Prize 2017 from the initiative on Crohn's disease and Colitis and the Best Article Prize 2016 from the LUMC.



**Dr. Paul Wallace**

Paul Wallace, Professor Oncology and Director Department of Flow & Image Cytometry at Roswell Park Comprehensive Cancer Center, is recognized for his expertise in clinical flow cytometry with a strong background in immunology and research interests in antigen processing and presentation. He is President of the International Society for the Advancement of Cytometry (ISAC) and a past Councilor of the International Clinical Cytometry Society (ICCS). Flow and Image Cytometry at Roswell Park offers a strong combination of clinical and research missions and under Dr. Wallace's direction actively works to build translational synergies between them. The clinical laboratory is focused on the diagnosis and monitoring of patients with leukemia and lymphoma with a recent emphasis on minimal residual disease. Before joining Roswell Park, Dr. Wallace was an Assistant Professor of Immunology at Dartmouth Medical School, Lebanon, NH (1993-2003); a cofounder of Zynaxis Cell Science, Inc., Malvern PA (1988-1991) the company that developed the PKH tracking dyes, and supervisor of Microbiology, Immunology, Serology, and Flow Cytometry at Smith-Kline Clinical Laboratories. He obtained his PhD from the Medical College of Pennsylvania in 1993 and his Masters from Idaho State University in 1979.

**Dr. John S Wotherspoon**

John S Wotherspoon [PhD] – I was excited by immunology during my undergraduate science degree in the late 1970's at Australian National University with discussion regarding lymphoid tissues, and graft responses mediated by B- and non-B-cells. Subsequently, I continued studies at University of Sydney completing both an MSc (1984) and PhD (1988) in the Pathology Department, Faculty of Medicine, in experimental models of the cellular basis of transplantation tolerance and graft rejection. It was during these post-graduate studies, where monoclonal antibody and flow cytometry technologies, together, became the new tools to accelerate immunological research studies. Monoclonal antibodies were not commercially available, but needed to be purified after being grown as ascites in mice. Practical experiences in immunochemistry, fluorochrome conjugation, and subsequent titration studies provided the foundation experiences in optimising cellular staining protocols.

My interest in flow cytometry encouraged my career transition, joining BD Immunocytometry Systems, Australia, in 1988. Across 25 years, primarily in the Asia Pacific region, I have had roles of increasing responsibility supporting Applications, Instrument Training, Marketing and Business Development. Especially, in these markets, capability training and education in flow technologies has been a passion and focus of my attention.

Key programmes supported include:

- Good Laboratory Practice Resource - supporting accurate and reliable CD4 testing in local laboratories in 3rd-world countries; and
- BD Horizon Multicolour Programme - providing guidance in optimising multicolour flow cytometry assay.



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THE 16 PARTICIPANTS WHO ARE ACCEPTED FOR THE HIGH DIMENSIONAL ANALYSIS HANDS ON TRACK WILL BE IN 2 GROUPS

Group A	Group B
Commere Pierre-Henri	Chauvin Camille
Guerin Coralie	Coillard Alice
Hubert Julie	Iscache Anne-Laure
Lalanne Ana	Korniotis Sarantis
Loos Pauline	Leloup Claire
Mouton Aurore	Rabie Chelbi
Sirven Philémon	Riant Elodie
Zver Tristan	Trichot Coline

STUDENT PLANNING MODULE ASSIGNMENT


Last Name	Tuesday 14:00	Tuesday 16:00	Wednesday 14:00	Wednesday 16:00	Thursday 9:00	Thursday 11:15	Thursday 14:00	Thursday 16:00	Friday 09:00	Friday 11:15
Abreu	Basics of Multicolor HANDS ON	Cell Sorting BASIC	Imaging Flow (Imagestream)	Imaging Flow Apoptosis (Imagestream)	Intracellular extracellular staining lab	Intracellular extracellular staining lab	Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED		Cell Sorting Track ADVANCED
Andrieu	mRNA by Flow cytometry	Make Your Own cytometer	Multicolor Panel Design Track	Multicolor Panel Design Track					Cell Sorting Track ADVANCED	
Azar	mRNA by Flow cytometry	Basics of Multicolor HANDS ON		Multicolor Panel Design Track	Multicolor Panel Design Track		Intracellular extracellular staining lab	Intracellular extracellular staining lab	Make Your Own cytometer	
Bedin	mRNA by Flow cytometry	Basics of Multicolor HANDS ON		Multicolor Panel Design Track	Multicolor Panel Design Track		Intracellular extracellular staining lab	Spectral Flow Cytometry /	Make Your Own cytometer	Proliferation
Blanc	mRNA by Flow cytometry		Apoptosis	Multicolor Panel Design Track	Multicolor Panel Design Track			Intracellular extracellular staining lab	Make Your Own cytometer	
Borzova	Basics of Multicolor HANDS ON	Spectral Flow Cytometry	Imaging Flow (Imagestream)	Imaging Flow Apoptosis (Imagestream)			Basic data analysis FlowJo			
Brewinska Olchowik	Cell Cycle	Proliferation	Apoptosis	Multicolor Panel Design Track	Multicolor Panel Design Track		Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED		
Catelain	mRNA by Flow cytometry	Basics of Multicolor HANDS ON	Imaging Flow (Imagestream)	Imaging Flow Apoptosis (Imagestream)	Intracellular extracellular staining lab	Intracellular extracellular staining lab	Cell Sorting Track ADVANCED	Spectral Flow Cytometry	Make Your Own cytometer	
Cyranowski		Make Your Own cytometer	Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED	Intracellular extracellular staining lab	Intracellular extracellular staining lab				
De Poulpiquet du Halgouet	Basics of Multicolor HANDS ON	Cell Sorting BASIC			Apoptosis	Imaging Flow Apoptosis (Imagestream)	Intracellular extracellular staining lab	Intracellular extracellular staining lab	Make Your Own cytometer	Proliferation
Dura	Cell Cycle	Proliferation	Apoptosis						Make Your Own cytometer	Esmerian

Last Name	Tuesday 14:00	Tuesday 16:00	Wednesday 14:00	Wednesday 16:00	Thursday 9:00	Thursday 11:15	Thursday 14:00	Thursday 16:00	Friday 09:00	Friday 11:15
Esmerian		Proliferation	Multicolor Panel Design Track	Multicolor Panel Design Track	Apoptosis	Imaging Flow Apoptosis (Imagestream)	Imaging Flow (Imagestream)		Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED
Ferrand	Basics of Multicolor HANDS ON	Cell Sorting BASIC				Basic data analysis FlowJo				
Fradet	Cell Cycle	Basics of Multicolor HANDS ON	Multicolor Panel Design Track	Multicolor Panel Design Track	Apoptosis	Imaging Flow Apoptosis (Imagestream)	Imaging Flow (Imagestream)		Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED
Gomez Pacheco		Make Your Own cytometer		Multicolor Panel Design Track	Multicolor Panel Design Track		Intracellular extracellular staining lab	Intracellular extracellular staining lab		
Grondin	mRNA by Flow cytometry	Make Your Own cytometer	Multicolor Panel Design Track	Multicolor Panel Design Track	Apoptosis	Imaging Flow Apoptosis (Imagestream)	Imaging Flow (Imagestream)	Spectral Flow Cytometry	Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED
Gubbay	Cell Sorting BASIC	Basics of Multicolor HANDS ON	Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED						
Hedin	Cell Sorting BASIC	Basics of Multicolor HANDS ON		Multicolor Panel Design Track	Multicolor Panel Design Track		Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED	Make Your Own cytometer	
Jouhault	mRNA by Flow cytometry		Multicolor Panel Design Track	Multicolor Panel Design Track			Spectral Flow Cytometry		Cell Cycle	
Karpf	mRNA by Flow cytometry				Intracellular extracellular staining lab	Intracellular extracellular staining lab	Spectral Flow Cytometry			
Kortisova	Basics of Multicolor HANDS ON	Spectral Flow Cytometry	Apoptosis	Multicolor Panel Design Track	Multicolor Panel Design Track		Intracellular extracellular staining lab	Intracellular extracellular staining lab		
Kozlak	Basics of Multicolor HANDS ON	Spectral Flow Cytometry	Multicolor Panel Design Track	Multicolor Panel Design Track		Imaging Flow Apoptosis (Imagestream)	Imaging Flow (Imagestream)			
Lasgi	mRNA by Flow cytometry	Basics of Multicolor HANDS ON	Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED			Spectral Flow Cytometry		Cell Cycle	Proliferation
Lawand	mRNA by Flow cytometry	Basics of Multicolor HANDS ON		Multicolor Panel Design Track	Multicolor Panel Design Track		Spectral Flow Cytometry			

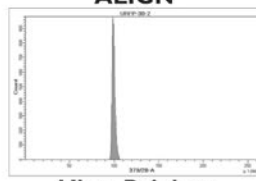
Last Name	Tuesday 14:00	Tuesday 16:00	Wednesday 14:00	Wednesday 16:00	Thursday 9:00	Thursday 11:15	Thursday 14:00	Thursday 16:00	Friday 09:00	Friday 11:15
Le	Basics of Multicolor HANDS ON		Multicolor Panel Design Track	Multicolor Panel Design Track						
Leifer	Basics of Multicolor HANDS ON	Cell Sorting BASIC			Apoptosis	Imaging Flow Apoptosis (Imagestream)	Imaging Flow (Imagestream)	Spectral Flow Cytometry	Cell Cycle	Proliferation
Maquet	mRNA by Flow cytometry			Multicolor Panel Design Track	Multicolor Panel Design Track		Intracellular extracellular staining lab	Intracellular extracellular staining lab		
Monier	mRNA by Flow cytometry	Basics of Multicolor HANDS ON	Multicolor Panel Design Track	Multicolor Panel Design Track					Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED
Mrad	mRNA by Flow cytometry	Basics of Multicolor HANDS ON	Imaging Flow (Imagestream)	Imaging Flow Apoptosis (Imagestream)	Intracellular extracellular staining lab	Intracellular extracellular staining lab			Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED
Munier	mRNA by Flow cytometry	Spectral Flow Cytometry	Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED						
Novault	Basics of Multicolor HANDS ON	Make Your Own cytometer	Multicolor Panel Design Track	Multicolor Panel Design Track	Intracellular extracellular staining lab	Intracellular extracellular staining lab	Spectral Flow Cytometry		Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED
Olcott	Basics of Multicolor HANDS ON	Cell Sorting BASIC	Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED	Intracellular extracellular staining lab	Intracellular extracellular staining lab	Spectral Flow Cytometry			
Oppezzo		Proliferation			Apoptosis	Imaging Flow Apoptosis (Imagestream)	Intracellular extracellular staining lab	Intracellular extracellular staining lab	Cell Cycle	
Pasquier	mRNA by Flow cytometry	Proliferation	Apoptosis						Cell Cycle	
Patras	Basics of Multicolor HANDS ON	Cell Sorting BASIC	Multicolor Panel Design Track	Multicolor Panel Design Track	Apoptosis	Imaging Flow Apoptosis (Imagestream)	Imaging Flow (Imagestream)	Spectral Flow Cytometry	Cell Cycle	Proliferation
Pehrson	Basics of Multicolor HANDS ON	Cell Sorting BASIC	Multicolor Panel Design Track	Multicolor Panel Design Track						



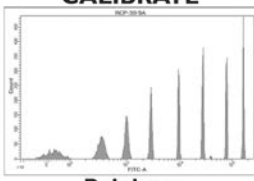
Last Name	Tuesday 14:00	Tuesday 16:00	Wednesday 14:00	Wednesday 16:00	Thursday 9:00	Thursday 11:15	Thursday 14:00	Thursday 16:00	Friday 09:00	Friday 11:15
<b>Pernet</b>	Basics of Multicolor HANDS ON	Cell Sorting BASIC	Apoptosis		Intracellular extracellular staining lab	Intracellular extracellular staining lab	Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED		
<b>Pilanc-Kudlek</b>	Cell Sorting BASIC	Basics of Multicolor HANDS ON		Multicolor Panel Design Track	Multicolor Panel Design Track		Basic data analysis FlowJo			
<b>Pontisso-Mahout</b>	Cell Sorting BASIC	Basics of Multicolor HANDS ON		Multicolor Panel Design Track	Multicolor Panel Design Track		Basic data analysis FlowJo			
<b>Puvion</b>	Basics of Multicolor HANDS ON	Spectral Flow Cytometry	Multicolor Panel Design Track	Multicolor Panel Design Track						
<b>Radosavljevic</b>	Cell Sorting BASIC	Basics of Multicolor HANDS ON	Imaging Flow (Imagestream)	Imaging Flow Apoptosis (Imagestream)	Intracellular extracellular staining lab	Intracellular extracellular staining lab	Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED	Make Your Own cytometer	
<b>Riolt</b>	Cell Cycle	Make Your Own cytometer	Apoptosis							Proliferation
<b>Schmutz</b>	mRNA by Flow cytometry	Make Your Own cytometer						Spectral Flow Cytometry	Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED
<b>Schumacher</b>	Cell Cycle	Basics of Multicolor HANDS ON	Multicolor Panel Design Track	Multicolor Panel Design Track	Apoptosis	Imaging Flow Apoptosis (Imagestream)	Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED	Make Your Own cytometer	Proliferation
<b>Serres</b>	Basics of Multicolor HANDS ON	Make Your Own cytometer		Multicolor Panel Design Track	Multicolor Panel Design Track		Intracellular extracellular staining lab	Intracellular extracellular staining lab		
<b>Shakhmaeva</b>	Cell Sorting BASIC	Basics of Multicolor HANDS ON	Multicolor Panel Design Track	Multicolor Panel Design Track			Spectral Flow Cytometry		Make Your Own cytometer	
<b>Sobrinho</b>	mRNA by Flow cytometry	Spectral Flow Cytometry		Multicolor Panel Design Track	Multicolor Panel Design Track			Spectral Flow Cytometry		
<b>Viguier</b>	Cell Cycle	Make Your Own cytometer	Imaging Flow (Imagestream)	Imaging Flow Apoptosis (Imagestream)			Cell Sorting Track ADVANCED	Cell Sorting Track ADVANCED		



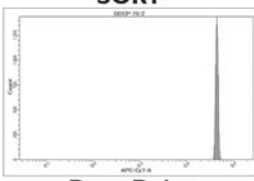
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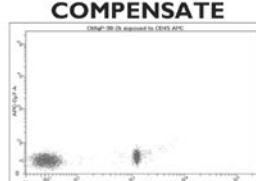
**ALIGN**  
Ultra Rainbow  
Fluorescent Particles  
Cat. No. URFP-30-2



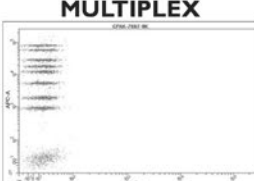
**CALIBRATE**  
Rainbow  
Calibration Particles  
Cat. No. RCP-30-5A



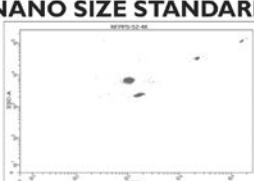
**SORT**  
Drop Delay  
Calibration Particles  
Cat. No. DDCP-70-2



**COMPENSATE**  
COMPTrol Antibody  
Capture Beads  
Cat. No. CMlgP-30-2K




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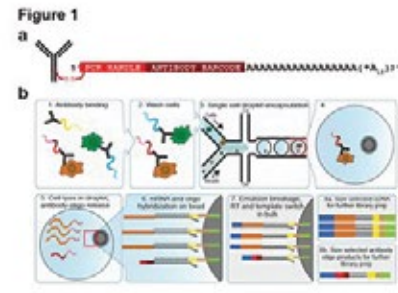


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### Simultaneous epitope and transcriptome measurement in single cells

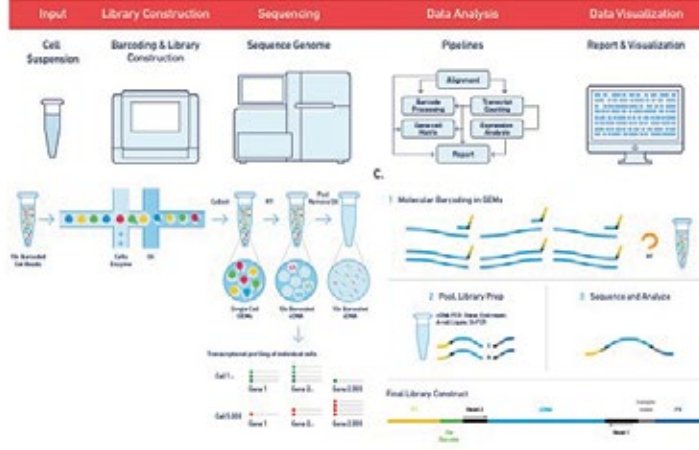
Marlon Stoeckius<sup>1</sup>, Christoph Hafemeister<sup>1</sup>, William Stephenson<sup>1</sup>, Brian Houck-Loomis<sup>1</sup>, Pratip K Chattopadhyay<sup>2</sup>, Harold Swerdlow<sup>1</sup>, Rahul Satija<sup>1,2</sup> & Peter Smibert<sup>1</sup>



**Figure 1**  
a. Schematic of the 10x Genomics single-cell transcriptomics workflow. b. Microfluidic droplet generation and bead encapsulation. c. Droplet-based reverse transcription and amplification. d. Droplet-based sequencing and data analysis. e. Data visualization and interpretation.



**10x GENOMICS**



**Input** Library Construction Sequencing Data Analysis Data Visualization

Cell Suspension Barcoding & Library Construction Sequence Genome Pipelines Report & Visualization

1. Molecular Barcoding in 10x  
2. Pool, Library Prep  
3. Sequencing and Analysis

Final Library Construct



## ACKNOWLEDGMENT

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