ESCCA
European Society
for Clinical Cell Analysis

EUROPEAN CERTIFICATE FOR CYTOMETRY OPERATORS

GUIDELINES AND SUGGESTED EDUCATIONAL RESOURCES

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This document:	**European Certificate For Cytometry Operators: Guidelines And Suggested Educational Resources**
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www.escca.eu	

1. BACKGROUND

The European Society for Clinical Cell Analysis (ESCCA) is committed to promote high quality education in Cytometry. Since its foundation more than 10 years ago, ESCCA has fostered its own ongoing Educational Program, coordinated by the Education and Accreditation Committee. In addition, ESCCA collaborates with other institutions in the diffusion of educational activities of relevance in Cytometry and related fields.

The ESCCA Education and Accreditation Committee is aware of the technical complexity and constant evolution of cytometry instrumentation and its applications, requiring continuous training and education. These issues have been covered traditionally by the Education Activities incorporated in the ESCCA Conferences and, more recently, by the ESCCA International and Local Schools on Cytometry.

The final goal of the educational efforts of ESCCA is to help ESCCA members, and especially the young ones, to attain excellence in their work in cytometry, be it in the clinical or in the basic fields. In order to attest the level of excellence of cytometrists, as evidenced by their knowledge and abilities, the ESCCA Education and Accreditation Committee has created the European Cytometry Certificate, which is now in course of implementation.

2. THE EUROPEAN CYTOMETRY CERTIFICATE

The European Cytometry Certificate will have two levels of certification:

a) The European Certificate for Cytometry Operators:

This first level of certification may be attained after evaluation of the basic knowledge of cytometry-related issues by means of a quiz-test, as further described in this document. Candidates should demonstrate a minimum of three years of experience in cytometry. This is the first level of ESCCA certification implemented and applications are now welcome.

b) The European Certificate for Cytometry Specialists:

This second level of certification may be attained after evaluation of skills and knowledge of the candidate in specialized fields of cytometry (e.g., Clinical, Biomedical or Biotechnological applications). Candidates should demonstrate a minimum of three years' experience in cytometry. The process of certification will consist of a written exam and the revision of the candidate's CV by the ESCCA Education and Accreditation Committee. This level of certification will be implemented in the near future.

3. THE EUROPEAN CERTIFICATE FOR CYTOMETRY OPERATORS: RULES

1. The European Certificate for Cytometry Operators is currently available only to ESCCA members.
2. The fee for the examination and certification is 100 €.
3. The examination for the Certificate will be available on site at least once a year during the annual ESCCA Conference.

4. When convenient, the examination may be available also in coincidence with other educational activities organized by ESCCA or by an ESCCA-affiliated Society. This possibility will be duly announced.
5. Candidates should demonstrate a minimum of three years of experience in cytometry. The work experience should be attested by the director of the employing facility or other entitled authority.
6. The examination will consist of 100 questions with four proposed answers of which only one correct and will last two hours.
7. The examination will be performed with the computers and software provided by ESCCA or by the ESCCA-affiliated society, and will be supervised by at least one member of the ESCCA Education and Accreditation Committee. The examination will be considered as passed if at least 60 questions are correctly answered.
8. The contents of the examination, their relative weight in the examination and examples of questions are described later in this document.
9. The candidates having successfully passed the examination will receive a signed document stating their status, and will be enlisted in a special page in the ESCCA website site and, when convenient, in the site of the ESCCA-affiliated society.
10. Certification will expire after three years, and can be renewed upon proof of continuous education and/or practice in cytometry, according to the forthcoming guidelines for ESCCA certification renewal.

4. THE EUROPEAN CERTIFICATE FOR CYTOMETRY OPERATORS: PRACTICAL ISSUES

1. The official examination for the European Certificate for Cytometry Operators will take place in the forthcoming ESSCA Conference in Thessaloniki, Greece, on Saturday 23 September 2017 (17.00 hrs.).
2. The number of candidates will be limited to 30.
3. The examination language will be English.
4. The registration procedure will be managed by ESCCA Office through the Members Section at the ESCCA Website.
5. For application and information, please see the ESCCA's Members Section at the ESCCA Website.

5. THE EUROPEAN CERTIFICATE FOR CYTOMETRY OPERATORS: GUIDELINES

A) Content of the Exam and Their Relative Weight:

1. Technical aspects of cytometry, components and advances: 25%
2. Pre-analytical phase: Reagents and sample preparation: 25%
3. Analytical phase: Data acquisition and processing: 25%
4. Common applications of Cytometry: Immunophenotyping, DNA analysis, functional analysis: 25%

B) Examples of Questions:

Technical aspects of cytometry, components and advances

Question X. In flow cytometers with hydrodynamic focusing, what is the effect of increasing sample pressure?

A) Increases sample rate and reduces measurement quality.

B) Increases sample rate and reduces flow turbulence.

C) It widens the internal liquid vein and reduces the likelihood of coincidence of two or more cells in the measurement.

D) Increases sample rate without affecting hydrodynamic flow constants.

Comment: Increasing sample pressure increases sample rate but reduces measurement quality as it widens the internal liquid vein, and the cells are no longer focused in the same position relative to the point of impact of the laser beam. In addition, this increase in internal pressure increases the turbulence and the likelihood of coincidence of two or more cells or particles (particularly the small ones) at the measurement point. Acoustic pre-focusing cytometry allows the measurement quality to be increased by applying ultrasonic vibration to the flow chamber inlet, whereby the cells align independently of the differential pressure between the sample and the sheath.

Question X. Optical filters placed at a 45° angle to the incident light are known as:

A) Dichroic filters.

B) Diagonal filters.

C) Derivating driers.

D) Achromatic filters.

Comment: The dichroic name comes from the Greek and means "two colors". Dichroic filters (also called dichroic mirrors) are “long-pass” or short-pass filters placed at a 45° angle to the incident light. They reflect light blocked at a 90 ° angle. Therefore, in fluorescence systems (microscopes and flow cytometers), dichroic filters are used as beam dividers to direct the emitted light into the appropriate detection system.

Pre-analytical phase: Reagents and sample preparation:

Question X. Which of the following fluorochromes has the lowest Fluorochrome Brightness Index (FBI)?

A) Phycoerythrin (PE).

B) Allophycocyanin (APC).

C) PE / Cy5 tandem.

D) Fluorescein isothiocyanate (FITC).

Comment: FBI values show that the brightest fluorochromes (FBI = 5) are Phycoerythrin (PE), Alexa Fluor 647 and APC, followed by tandems PE / Cy5 and PE / Cy7, with a FBI = 4. Fluorescein (FITC) is one of the less bright fluorochromes, with an FBI of 2.

Question X. The fixative most widely used in the sample preparation for flow cytometry is:

A) Methanol.

B) Ethanol.

C) Acetone.

D) Paraformaldehyde (PFA).

Comment: The most commonly used fixative is paraformaldehyde (PFA), typically at a final concentration of 0.01-0.02%. PFA is the polymerized form of formaldehyde. It is stable when kept at 4 ° C-room temperature and releases formaldehyde when dissolved in water or buffer. Commercial preparations can be obtained, even as part of systems for fixing and permeabilization. For preparation in the laboratory, powdered paraformaldehyde is dissolved in water at 60 ° C and the pH is brought to 8 with KOH. When dissolved, the concentration of the stock solution (typically 0.2%) is adjusted with a buffer at pH 7.2.

Analytical phase: Data acquisition and processing

Question X. With regard to the collection and storage of data in flow cytometry analysis:

A) They are collected and stored as correlated data matrix files.

B) Most commercial flow cytometers store data in the Flow Cytometry Standard format.

C) The data files are binary files, not directly treatable.

D) All answers are correct.

Comment: During the acquisition at the flow cytometer, the set of parameters (previously selected by the operator), the order number of each cell and the time of the analysis period are collected for each of the cells (or particles) analyzed in the run. The final set of data is, therefore, an array of correlated data (cell / order number / time / parameter values). In the vast majority of current cytometers, data matrices are stored in the FCS format, in the form of binary files that are not directly manageable by the usual software (eg Excel) and must be processed by special software.

Question X. Which option for data presentation facilitates the manual adjustment of correct compensation?

A) Linear transformation.

B) Logarithmic transformation.

C) Bi-exponential transformation.

D) Antilogarithmic transformation.

Comment: The traditional way to confirm correct fluorescence compensation is based on fluorescence distributions appearing parallel to the axes. In fact, the logarithmic scales do not allow to correctly display the manual adjustment of the fluorescence compensation, due to the spread of the data, which complicates the visualization of the "negative" zone of the parameter distributions. The "logicle" or bi-exponential option facilitates the manual adjustment of the correct compensation, by showing all the data, well separated from channel 0 of values, as in the logarithmic transformations. It has to be taken into account that this strategy only helps visualization, whereas the mathematical calculation of the compensation does not require bi-exponential transformation, but is based on mean fluorescence intensities.

Common applications of Cytometry

Question X. With regard to the concept of a Cluster of Differentiation:

A) They are a set of monoclonal antibodies that have identical patterns of cell reactivity and recognize the same molecule.

B) They are a set of surface proteins that are recognized by the same clone of monoclonal antibodies.

C) Each represent a different leukocyte subpopulation that can be determined by polychromatic flow cytometry.

D) They are each of the hematopoietic lineages that can be determined by polychromatic flow cytometry.

Comment: According to the criteria of the HLDA Workshops, a Cluster of Differentiation is a set of monoclonal antibodies that present identical patterns of cellular reactivity and recognize the same molecule. The CD number, however, is only assigned when the antibodies have been screened and validated by a HLDA Workshop. Each set is identified by the CD code followed by a number, related to the cell line or the type of molecule recognized: for example CD1. Sometimes other characters may be added to indicate: Subunits of a complex molecule or molecular association: CD11a, CD11b, CD11c. Isoforms produced by different gene expression: CD45RA, CD45RB, CD45RO. Surface receptor ligand proteins: CD40, CD40L. Antibodies with provisional assignment: CDw145

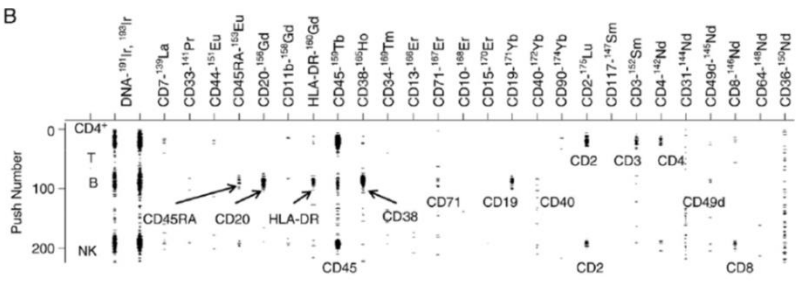
Question X. To which type of flow cytometry can the graph shown below be associated?

a) Multispectral flow Cytometry.

b) Acoustically-focused Cytometry.

c) M***ass spectrometry Cytometry.***

d) High throughput Cytometry.



Comment: The image is a typical graph of the data acquisition on a cytometry mass spectrometry system. Markers conjugated to rare earth elements are indicated on top. The vertical axis (Push number) indicates the cell analyzed at each instant. Columns therefore indicate positivity for each marker in each of the analyzed cells while each row defines the individual cell phenotype analyzed at each time instant.

SUGGESTED BIBLIOGRAPHY AND RESOURCES AVAILABLE IN THE INTERNET

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http://flowbook.denovosoftware.com/

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http://www.beckman.com/coulter-flow-cytometry/first-principles

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https://www.intechopen.com/books/quantum-dots-a-variety-of-new-applications

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http://www.intechopen.com/books/editor/flow-cytometry-recent-perspectives

Schmid, I, Ed. (2012) Clinical Flow Cytometry-Emerging Applications. InTech Open Science.
http://www.intechopen.com/books/clinical-flow-cytometry-emerging-applications

Schmid, I, Ed. (2016) Flow Cytometry - Select Topics. InTech Open Science.
http://www.intechopen.com/books/editor/flow-cytometry-select-topics

2. BASIC GUIDES

2.1 GENERAL ASPECTS

MDBioproducts, Flow Cytometry Guide.
www.mdbiosciences.com

Chromocyte, A Beginners Guide to Flow Cytometry.
www.chromocyte.com

Leslie G, Flow Cytometry: A Basic Guide.
http://www.flowcytometri.dk/literature/Leslie-FCBasic.pdf

Rahman M, Introduction to Flow Cytometry. AbD-Serotec.
https://www.abdserotec.com/introduction-to-flow-cytometry.html

Abcam, Flow cytometry guide.
www.abcam.com/technical

Dako Flow Cytometry Educational Guide.
http://www.dako.com/08065_15dec05_guide_to_flow_cytometry_single_pages.pdf

2.2 FLUORESCENCE

Molecular Probes, A Guide to Fluorescent Probes and Labeling Technologies.
www.lifetechnologies.com/handbook

An Introduction to Fluorescence Spectroscopy.
http://www.google.es/url?sa=t&rct=j&q=fluorescence%20pdf&source=web&cd=1&ved=0ahUKEwjivqqcg8HLAhXG7xQKHeJgAnQQFggcMAA&url=https%3A%2F%2Fwww.researchgate.net%2Ffile.PostFileLoader.html%3Fid%3D56b5a38c7eddd349b38b4593%26assetKey%3DAS%253A326036052037632%25401454744460024&usg=AFQjCNH_WzK6C1H7FbOizU3gzJI-wkvK6Q&bvm=bv.116636494,d.ZWU

Understanding Fluorescence.
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Principles of fluorescence, Imperial College London.
http://www.imperial.ac.uk/media/imperial-college/medicine/facilities/film/Fluorophores-website.pdf

Chapter 2 - Principles of Fluorescence- AbD Serotec.
https://www.abdserotec.com/introduction-to-flow-cytometry.html#chapter2

AbCam Fluorochrome chart – a complete guide.
http://docs.abcam.com/pdf/secondary-antibodies/abcam-fluorochrome-chart.pdf

The Fluorescent Protein Color Palette.
http://www.microscopyu.com/pdfs/FPColorPalette.pdf

Tandem Dyes-Biolegend.
http://www.biolegend.com/tandem_dyes

Introduction to Click Chemistry.
http://www.lumiprobe.com/click-chemistry

2. 3 PANEL DESIGN, SETUP AND COMPENSATION

The Stain Index: What Is It and What Does It Tell You?
http://www.biolegend.com/newsdetail/1245/

Biolegend Panel Selector
https://www.biolegend.com/panelselector

Biolegend Panel Construction
https://www.biolegend.com/custom_panel_construction

Examples of Human Immunophenotype Multicolor Panels
http://static.bdbiosciences.com/eu/documents/human_panel_big_EUR.pdf?_ga=1.250809286.1969991131.1488965150

3. REVIEWS

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3.6 DATA ANALYSIS

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http://www.nature.com/nmeth/journal/v10/n3/pdf/nmeth.2365.pdf

3.7 BIOSAFETY

Flow cytometry: Biosafety recommendations and protective measures:
http://www.biosafety.be/CU/FlowCytometry/FCMMenu.html

Biosafety Guidelines and Links to Information on the Internet (ISAC):
http://isac-net.org/Resources-for-Cytometrists/Biosafety.aspx

Biosafety in Flow Cytometry – To Be or Not to Be…
http://bitesizebio.com/21608/biosafety-in-flow-cytometry-to-be-or-not-to-be/

4. WEBINARS, VIDEOS AND ANIMATIONS:

4.1 GENERAL ASPECTS

History of Flow Cytometry-BioLegend
https://www.biolegend.com/historyofflow

Becton-Dickinson Training and e-Learning
https://m.bdbiosciences.com/us/support/s/itf_launch

Flow Cytometry Animation:
https://m.bdbiosciences.com/us/support/s/itf_launch

Molecular Probes—Introduction to Flow Cytometry:
https://youtu.be/sfWWxFBltpQ

Introduction to Flow Cytometry Webinar:
https://youtu.be/o2joszUiVhM

Webinar: Flow Cytometry - Save Time and Steps:
https://youtu.be/FTfhs5T5y8g

MCBC Flow Cytometry Training Course - Session 1:
https://youtu.be/fMNNXlh4OkQ

Flow Cytometry-Genesync:
https://youtu.be/6j-AzBocWKw

Flow Cytometry lecture part 1:
https://youtu.be/YPb9Pfpm66c?list=PL1DA0F59A86AFCE59

Flow Cytometry lecture part 2:
https://youtu.be/YEl96A7L1rU?list=PL1DA0F59A86AFCE59

Flow Cytometry lecture part 3:
https://youtu.be/JXovmJJOjs8?list=PL1DA0F59A86AFCE59

4.2 FLUORESCENCE

Fluorescence Tutorials-Thermofisher:
http://www.thermofisher.com/es/en/home/support/tutorials.html

Chemwiki:
http://chemwiki.ucdavis.edu/Core/Physical_Chemistry/Spectroscopy/Electronic_Spectroscopy/Fluorescence

Molecular Probes Tutorial Series—Introduction to Fluorescence.
https://youtu.be/SGFlr1jFNBM

Lecture 4 part 1 (fluorescence, Jablonski diagram).
https://youtu.be/5KLBrnauilg

Lecture 4 part 2 (fluorescence spectral distribution, parameters).
https://youtu.be/PYmjrL_8OY0

Lecture 4 part 3 (fluorescence microscope, applications of fluorescence, photobleaching).
https://youtu.be/ywE6VaVm5kg

Lecture 4 part 4 (FRET).
https://youtu.be/JH2LIffu_7I

Microscopy: Introduction to Fluorescence Microscopy (Nico Stuurman).
https://youtu.be/AhzhOzgYoqw
Microscopy: Fluorescent Proteins (Roger Tsien).
https://youtu.be/qK9aYnkIr3w

The expanding palette of fluorescent proteins.
https://youtu.be/n7f1-PttVcs

Nobel Laureate Martin Chalfie - "Green Fluorescent Protein: Lighting up Life".
https://youtu.be/YCY0Inhb4oI

What are Quantum Dots?
https://youtu.be/LlPDyl53rZA

4.3 SAMPLE PREPARATION

Techniques of Breast Biopsy - Manipal Hospital
https://youtu.be/ZcWOPmyPj68

Dividing the FNA aspirate sample for ancillary testing
https://youtu.be/J3gBCqAu3GM

DNA content cell cycle analysis using flow cytometry
https://youtu.be/MlE0Xnr9oz

4.4 DATA ANALYSIS

Molecular Probes Tutorial Series—Analyzing Flow Cytometry Data
https://youtu.be/ccR5snuCE80

Basics of flow cytometry, Part I: Gating and data analysis
https://youtu.be/y9-mojIXU_I

4.4 INSTRUMENTATION

Beckman Coulter Flow Cytometry:

https://www.youtube.com/playlist?list=PL1DA0F59A86AFCE59

Gallios Flow Cytometer:

https://youtu.be/5TtOpfYwqoQ

Gallios Cytometer Tour Guides

http://beckman.eu/assets/training/flowcytometry/flowcytometer/index.html

FC500 Fow Cytometer:

https://youtu.be/kLcf7QsSfrQ

Modifying the FC500 Flow Cytometer with Multiple Lasers:

https://youtu.be/XygjLak2BUM

Flow Cytometry -Beckman Coulter Life Sciences

https://www.youtube.com/playlist?list=PLzfAZrs5hqGdSCbWAv5Sjzm_J7761PoyA

"The BD Accuri C6 Flow Cytometer"-David Lee, BD Biosciences:

https://youtu.be/k0QhLWk3RO4

Accuri C6 Flow Cytometer.mp4:

https://youtu.be/gz09Oi3ci8A

Accuri Cytometers:

https://youtu.be/6Iqvpykoqjl

Displaying Accuri CFlow Data and Using the CFlow Importer in FCS Express:

https://youtu.be/9HTSgzBJ4v4

Becton Dickinson Flow cytometry:

https://www.youtube.com/playlist?list=PLrTm-FBR3jxT9sJ0H8BTakbhokek1X2fc

Attune-Thermo Fisher Scientific Flow Cytometry:

https://www.youtube.com/playlist?list=PLGlvFEwL2wDHYu3pyBrrkCIt_0jRuRcao

Milteny Biotec Flow Cytometry:

https://www.youtube.com/playlist?list=PL5EpKG-_c5XfrPax8A-Oh3sHy4CLuJRkQ

4.5 ADVANCES IN CYTOMETRY

POLYCHROMATIC CYTOMETRY:

Webinar: Multicolor Flow Cytometry
https://youtu.be/S5U3BI4Eqx4

MULTISPECTRAL CYTOMETRY

Spectral Flow Cytometry
https://youtu.be/DfoU7HB_36k

ACOUSTIC PRE-FOCUSING CYTOMETRY

The Discovery of Acoustic Focusing & the Attune® Flow Cytometer
https://youtu.be/b2ilHEnugE0

Attune® Acoustic Focusing Cytometer Tutorial
https://youtu.be/kpkL2EEJDsU

The Next Generation in Acoustic Cytometry
https://youtu.be/Q1PlICS5VnM

HIGH-THROUGHPUT CYTOMETRY

High Throughput Flow Webinar Preview
https://youtu.be/uPv6UgW1bB4

HyperCyt revisited
https://youtu.be/jf-1Q3QZ6Oc

iQue Screener
https://youtu.be/JB-FR2aArS0

IMAGING FLOW CYTOMETRY

Amnis brand FlowSight Imaging Flow Cytometer - Flow Cytometry with Vision
https://youtu.be/P14E_ne8f0M
Amnis® Flow Cytometry: Multispectral Imaging in Flow Applied to Research
https://youtu.be/5SD7Q-RtPb4

MASS-SPECTROMETRY CYTOMETRY

Dr. Gaudillière Discovers Immune System Markers Using CyTOF 2.
https://youtu.be/XGc0tbtqnG0

National CyTOF Meeting 2014: Scott Tanner, PhD, Fluidigm Corp
https://youtu.be/HnUVWIhKA3k

Using Mass Cytometry to Study Single-Cell Signaling in Biology and Disease
https://youtu.be/4TWHYOMiuec

5. SPECTRAVIEWERS

eBioscience:
http://www.ebioscience.com/resources/fluorplan-spectra-viewer.htm

Thermofisher:
https://www.thermofisher.com/es/en/home/life-science/cell-analysis/labeling-chemistry/fluorescence-spectraviewer.html

BioLegend:
http://www.biolegend.com/spectraanalyzer

Becton Dickinson:
http://m.bdbiosciences.com/us/s/spectrumviewer

6. OTHER RECOMMENDED SITES FOR EDUCATIONAL RESOURCES

Chromocyte:

https://www.chromocyte.com/

Purdue University Cytometry Labs (PUCL):

http://www.cyto.purdue.edu/

European Cytometry Network:
http://euroflownet.ning.com/

OMICTOOLS Community:
http://omictools.com/

Cytobank:
www.cytobank.org

FlowRepository:
www.flowrepository.org

Bitesize Bio:
http://bitesizebio.com/category/technical-channels/flow-cytometry/

Sanford-Burnham Flow Cytometry Blog:
https://sbmriflowcytometry.wordpress.com/

Websites of Cytometer-Manufacturing Companies

ACEA Biosciences, Inc.:
http://www.aceabio.com/

Apogee Flow Systems:
http://www.apogeeflow.com/

Bay Bioscience:
http://baybio.co.jp/english/top.html

Beckman Coulter:
http://beckman.es/coulter-flow-cytometry

Becton Dickinson Biosciences:
http://www.bdbiosciences.com/eu/applications/s/flowcytometry?WT.srch=1&gclid=CP6gi-ql8swCFU4o0wodSOsLxg

Bio-Rad:

http://www.bio-rad.com/es-es/category/flow-cytometry

Fluidigm:
https://www.fluidigm.com/products/helios

Handyem:
http://www.handyem.com/

Merck-Millipore:
http://www.merckmillipore.com/ES/es/products/life-science-research/cell-analysis/yjSb.qB.uBwAAAE_3S53.M6W,nav

Miltenyi Biotec:
http://www.miltenyibiotec.com/en/products-and-services/macs-flow-cytometry.aspx
Propel Labs: http://www.propel-labs.com/

Sony Biotechnology:
http://www.apogeeflow.com/

Stratedigm:
https://stratedigm.com/

Sysmex:
http://www.sysmex-europe.com/products/flow-cytometry.html

Thermo-Fisher:
https://www.thermofisher.com/es/es/home/life-science/cell-analysis/flow-cytometry.html

Websites of Companies Manufacturing Antibodies and Fluorescent Probes

Abcam:
http://www.abcam.com/

Antibody BCN:
http://www.antibodybcn.com/

Beckman Coulter:
http://beckman.es/coulter-flow-cytometry/reagents

Becton Dickinson:
http://www.bdbiosciences.com/eu/reagents/research/antibodies-buffers/immunology-reagents/c/744843

BioLegend:
http://www.biolegend.com/

Bio-Rad:
https://www.bio-rad-antibodies.com/

Cell Signaling Technology:
http://www.cellsignal.com/

Cytognos:
http://www.cytognos.com/index.php/es

Dako:
http://www.dako.com/es/index/products.htm

eBioscience:
http://www.ebioscience.com/

Enzo Life Sciences:
http://www.enzolifesciences.com/

ExBio:
http://www.exbio.cz/

Fluidigm:
http://maxpar.fluidigm.com/product-catalog-metal.php

Hycult Biotech:
http://www.hycultbiotech.com/

Immunostep:
http://immunostep.com/

Innova Biosciences:
https://www.innovabiosciences.com/

Jackson Immunoresearch:
https://jireurope.com/?gclid=COCc8fmy8swCFUKZGwodsEYCWQ

Labclinics:
http://www.labclinics.com/

Miltenyi Biotec:
http://www.miltenyibiotec.com/en/products-and-services/macs-flow-cytometry/reagents.aspx

Santa Cruz Biotechnology:
http://www.scbt.com/

Thermo-Fisher:
https://www.thermofisher.com/es/es/home/life-science/antibodies.html

Tonbo Biosciences:
http://www.tonbobio.com/

Websites of Companies Producing Cytometry Software:

De Novo Software:
https://www.denovosoftware.com/

FlowLogic Software:
http://www.inivai.com/flowlogic

FlowJo Software:
http://www.flowjo.com/

Infinicyt Software:
http://www.infinicyt.com/

Kaluza Software:
http://beckman.es/coulter-flow-cytometry/software/kaluza-analysis-software

Phoenix Flow Systems:
http://www.phnxflow.com/

Verity Software House:
http://www.vsh.com/

OTHER BOOKS

Fienberg, Harris G., Nolan, Garry P. (Eds.) Mass Cytometry, Multi-parametric Flow Cytometry and Bioinformatic Techniques.
http://www.springer.com/gp/book/9783642548260

Flow Cytometry: Current Aspects. B Roth. Callisto Reference, 2015

Advanced Flow Cytometry: Applications in Biological Research. RC Sobti y A Krishan. Springer, 2013

In Living Color: Protocols in Flow Cytometry and Cell Sorting. RA Diamond y S DeMaggio. Springer, 2013

Flow Cytometry: Principles, Methodology and Applications. S Papandreou, Ed. Nova Science Publishers, 2013

Recent Advances in Cytometry, Part B: Advances in Applications: 103 (Methods in Cell Biology), Z Darzynkiewicz, E Holden, W Telford y D Wlodkowic, Eds. Academic Press, 2011

Cellular Diagnostics: Basic Principles, Methods and Clinical Applications of Flow Cytometry. U Sack, A Tárnok, Eds. Karger Publishers, 2008

Flow Cytometry: Principles and Applications. MGMacey, Humana Press, 2007

B) CLINICAL FLOW CYTOMETRY:

Practical Flow Cytometry in Haematology: 100 Worked Examples. M Leach, M Drummond, A Doig, P McKay, B Jackson, BJ Bain, Wiley-Blackwell, 2015

Practical Flow Cytometry in Haematology Diagnosis. M Leach, M Drummond, A Doig. Wiley-Blackwell, 2013.

Flow Cytometry of Hematological Malignancies. C Ortolani. Wiley-Blackwell, 2011

Flow Cytometry in Neoplastic Hematology: Morphologic-Immunophenotypic Correlation. W Gorczyca, CRC Press, 2010.

Flow Cytometry and Immunohistochemistry for Hematologic Neoplasms. T Sun. Lippincott Williams & Wilkins, 2008

Flow Cytometry in Hematopathology: A Visual Approach to Data Analysis and Interpretation. DT Nguyen, LT Diamond, RC Braylan. Springer, 2007.

Flow Cytometric Analysis of Hematologic Neoplasms: A Color Atlas & Text 2nd Edition. T Sun. Lippincot, Williams & Wilkins, 2002.

Introduction to Diagnostic Flow Cytometry : An Integrated Case-Based Approach (Pathology and Laboratory Medicine). S. David, M. Hudnall, editors. Humana Press, 2000

Immunophenotyping. C.C. Stewart, J.K.A. Nicholson, editors. John Wiley & Sons, 2000

Flow Cytometry: Principles for Clinical Laboratory Practice. M. A. Owens, M. R. Loken. Wiley-Liss, 1995

Diagnostic Applications of Cytofluorimetric Methods Using Monoclonal Antibodies. B. Brando, J.E. O'Connor, editors. European School of Transfusion Medicine, 1994

Flow Cytometry and Clinical Diagnosis. D. F. Keren, C. A. Hanson, P. E. Hurtubise, eds. American Society of Clinical Pathologists Press, Chicago, 1994

Clinical Flow Cytometry: Principles & Application. K.D. Bauer, R.E. Duque,T. V. Shankey, editors. Williams & Wilkins, Baltimore, 1993