ESCCA
European Society
for Clinical Cell Analysis

ICCS
International Clinical Cytometry Society

Education
leads to
Standardization

Ahmad Al-Attar, MSc, PhD, ASCP(SCYM)

ESCCA 2023 Utrecht

Disclosure commercial conflict of interest

I have nothing to disclose




Labour's top three priorities

NEWS

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Page last updated at 15:37 GMT, Monday, 14 May 2007 16:37 UK

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'Education, education, education'

By Sean Coughlan
BBC News education reporter

"Education, education, education" was how Tony Blair set out his priorities for office - as Labour campaigned to put classrooms at the top of the political agenda.

THE BLAIR YEARS 1997-2007

The Blair story
From rebellious schoolboy to global statesman

KEY STORIES

- Blair resigns as prime minister
- Blair appointed Middle East envoy
- Blair will stand down on 27 June
- Key quotes: Blair farewell speech
- In quotes: Global reaction
- Prescott quits as deputy leader

http://news.bbc.co.uk/2/hi/uk_news/education/6564933.stm

The Department of Education is one

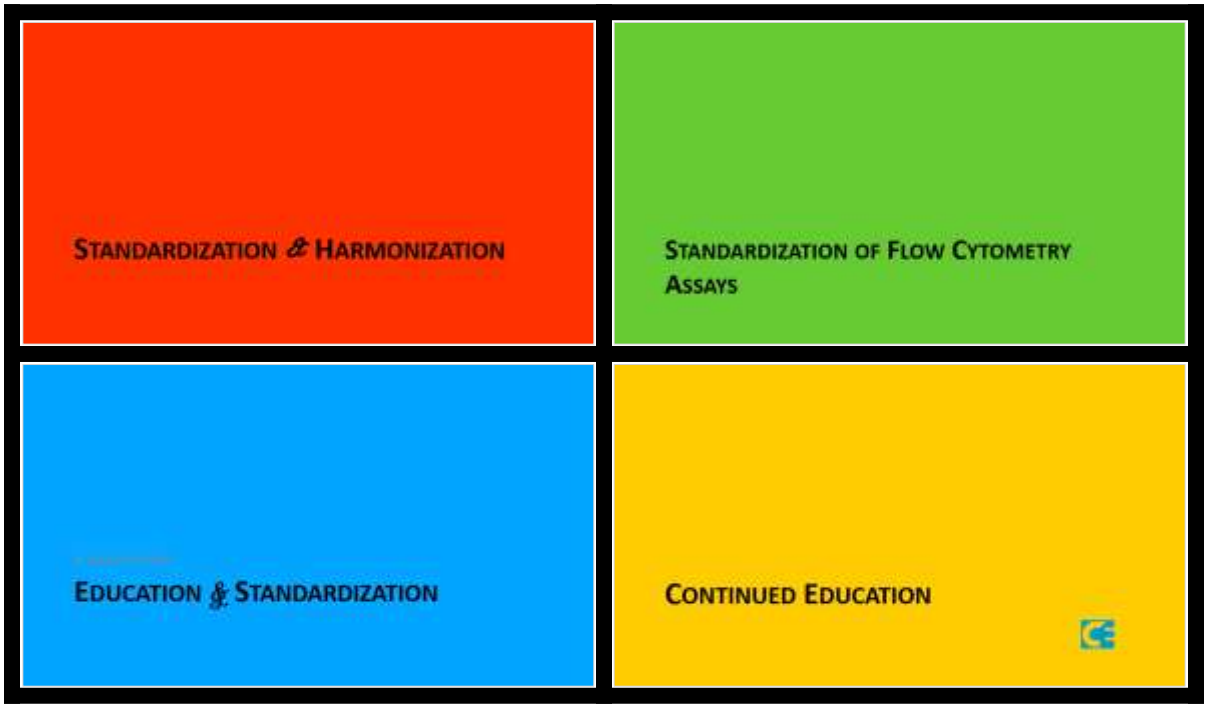
- Asked on “Fox News Sunday” how he would cut spending, Trump named the Department of Education and the Environmental Protection Agency as potential targets.

- “No, I'm not cutting services, but I'm cutting spending. But I may cut Department of Education.”

Standardisation

Standardization

Standarducation™®



STANDARDIZATION & HARMONIZATION

Standardization is a process

- Intended to accomplish reasonable comparability and/or interchangeability of results produced by different laboratory measurement procedures

- The process in practice establishes metrological traceability to internationally agreed measurement standards

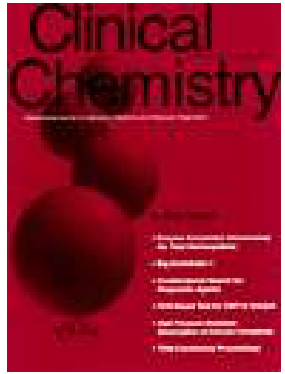
Vesper HW, Thienpont LM. Traceability in laboratory medicine. Clin Chem. 2009 Jun;55(6):1067-75. doi: 10.1373/clinchem.2008.107052. Epub 2009 Apr 9. PMID: 19359540.

A problem as old as clinical testing

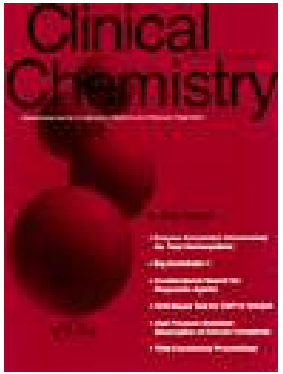
An Idea Whose Time Has Come

J Paul Cali

Clinical Chemistry, Volume 19, Issue 3, 1 March 1973, Pages 291–293,
https://doi.org/10.1093/clinchem/19.3.291
Published: 01 March 1973



Accuracy in clinical chemistry--does anybody care?



N W Tietz

Clinical Chemistry, Volume 40, Issue 6, 1 June 1994, Pages 859–861,
https://doi.org/10.1093/clinchem/40.6.859
Published: 01 June 1994

Accuracy in clinical chemistry – who will kiss Sleeping Beauty awake?

Published by De Gruyter July 2, 2008

Linda M. Thienpont

From the journal Clinical Chemistry and Laboratory Medicine
https://doi.org/10.1515/CCLM.2008.245

Linda Thienpont - Keynote - Evolution of Standardization in Laboratory Medicine https://www.youtube.com/watch?v=RnEZJ8H9IjY

It makes sense, but…

- Establishing standardization is a fast-flowing river overcoming all obstacles
- Obstacles cause the river to meander and slow down
- A theory will find its way into practice because it has value

Linda Thienpont - Keynote - Evolution of Standardization in Laboratory Medicine https://www.youtube.com/watch?v=RnEZJ8H9IjY

Insulin measurement

- 1959 – insulin assay in plasma
- Still not standardized
- Obstacles
  - Insufficient definition
  - What is measured?

R. S. Yalow and **S. A. Berson**

Assay of Plasma Insulin in Human Subjects by Immunological Methods. Nature 1959

The Nobel Prize in Physiology or Medicine 1977 Rosalyn Yalow "for the development of radioimmunoassays of peptide hormones"

Linda Thienpont - Keynote - Evolution of Standardization in Laboratory Medicine
https://www.youtube.com/watch?v=RnEZJ8H9IjY

What do we “intend” to measure?

- Insofar as the antigenic substances present in standards or test samples are dissimilar and/or molecularly heterogeneous, an immunoassay is invalid, and the results it yields have no universal significance
- Attempts to standardize “analytically-invalid” immunoassays inevitably fail

Roger Ekins
Department of Molecular Endocrinology, University College and Middlesex School of Medicine, London, UK

Ekins R. Immunoassay standardization. Scand J Clin Lab Invest Suppl. 1991;205:33-46. doi: 10.3109/00365519109104600. PMID: 1947747.

Two approaches

Standardization

- A metrological approach
- Reference measurement procedure
- Trueness is established

Harmonization

- A pragmatic approach
- Alignment of assays
- Surrogate reference measurement procedure

Both harmonization and standardization aim for the same outcome: laboratory test results that are comparable across technologies, time, and location.


WHAT?
WHERE?
WHO?
WHEN?
WHY?
HOW?

CDC's Clinical Standardization Programs (CSPs) make certain that the accuracy, precision, and other relevant analytical performance parameters of a laboratory test are improved and maintained to meet clinical needs

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

International Consortium
for Harmonization of Clinical Laboratory Results

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The International Consortium for Harmoni
Clinical Laboratory Results

OUR VISION

✓ Clinical laboratory test results will be equivalent independent of the clinical laboratory that prod

OUR MISSION

✓ To provide a centralized process to organize global efforts to achieve harmonization of clinical l

RESULTS ENTRY | HELP ME | LOGIN

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International Quality Expertise

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IMPROVING GLOBAL DIAGNOSTIC TESTING
FOR THE BENEFIT OF PATIENTS THROUGH
QUALITY ASSESSMENT AND EDUCATION

UK NEQAS services and EQA shipments outside of the United Kingdom

Pilot modules and ISO/IEC 17043:2010 accreditation

UK NEQAS IVDR Response

Access e-LAB Solutions Suite

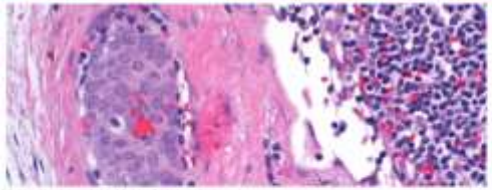
COLLEGE of AMERICAN PATHOLOGISTS

All Sites

Member Resources Advocacy Laboratory Improvement Education Protocols and G

Home > Protocols and Guidelines

Protocols and Guidelines



Cancer Reporting Protocols

The CAP Cancer Reporting and Biomarker Reporting Protocols provide consistent and meaningful information that enable health care professionals to manage and study clinical data necessary in improving patient care. Our Cancer Reporting Protocols are used by thousands of pathologists and other medical professionals to provide complete and uniform reporting of malignant tumors. Printable versions of the standards (in Word or PDF formats) are available for free.

CAP Guidelines

The CAP Pathology and Laboratory Quality along with our professional partners, advanc laboratory medicine by bringing evidence-b recommendations to the forefront of clinical guidelines helps pathologists and laboratory testing with consistent, high-quality results,

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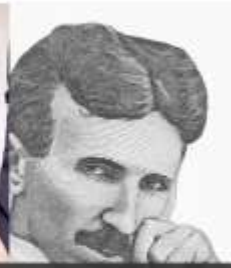
Why Does Matter Exist? Roundness of Electrons May Hold Clues

AI Can Accurately Predict Potentially Fatal Cardiac Events in Firefighters



What's in a Name? The Tesla

Harmonization of flow cytometry data across three different platforms through panel design, antibody titration, instrument calibration, reference cell controls, high dimensional data analysis

Standardization of Flow Cytometry Assays

ISAC CYTOMETRY Journal of Quantitative Cell Science PART A

Reproducibility of Flow Cytometry Through Standardization: Opportunities and Challenges

Tomas Kalina*

CLIP-Childhood Leukemia Investigation Prague, Department of Pediatric Hematology and Oncology, 2nd Medical School, Charles University and University Hospital Motol, Prague, Czech Republic

Received 21 March 2019; Revised 4 September 2019; Accepted 11 September 2019

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*Correspondence to: Tomas Kalina, CLIP-Childhood Leukemia Investigation Prague, Department of Paediatric Hematology/Oncology, 2nd Medical School, Charles University Prague, V Uvalu 84, 150 06 Praha 5, Czech Republic. Email: tomas.kalina@lfmotol.cuni.cz

Published online 8 October 2019 in Wiley Online Library (wileyonlinelibrary.com)

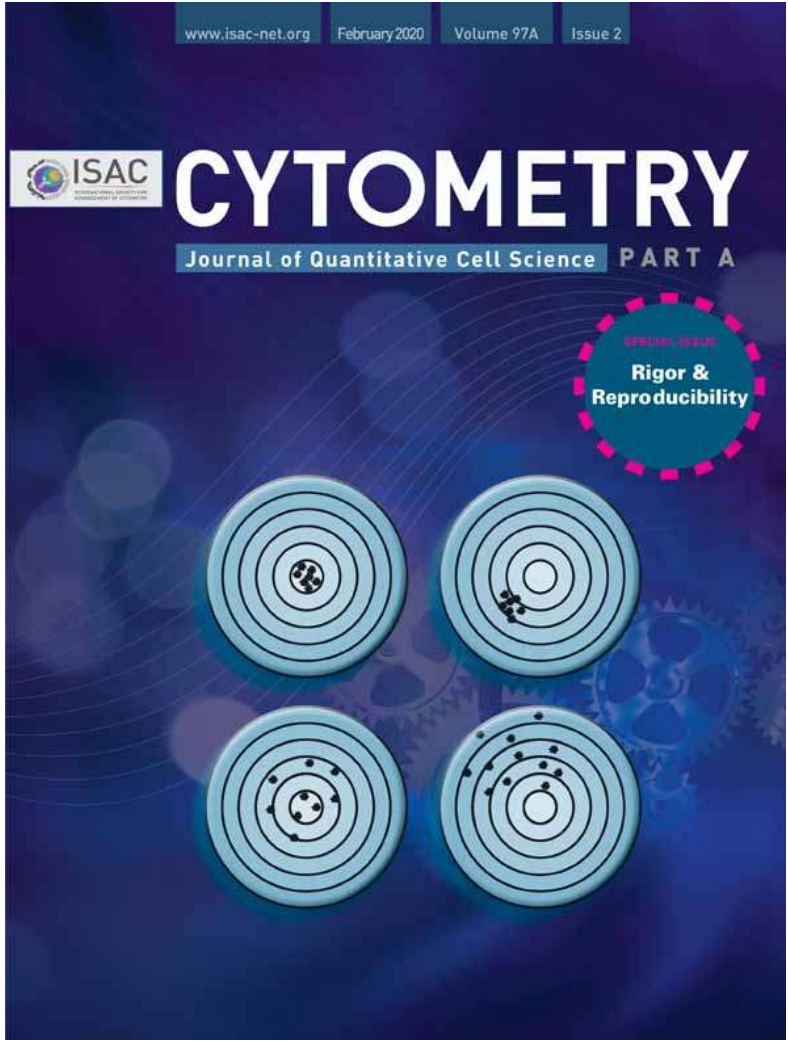
DOI: 10.1002/cyto.a.23901

Abstract

There is an agreement in the field that interlaboratory reproducibility of flow cytometry measurements as well as the whole studies might be improved by a consensual use of methodological approach. Typically, a consensus is made on a crucial markers needed in the immunostaining panel, sometimes on the particular fluorochrome conjugates and rarely on a complete set of methods for sample preparation. The term "standardization" is used to describe the complete set of methodical steps, while "harmonization" is used for partial agreement on the method. Standardization can provide a platform for improved reproducibility of cytometry results over prolonged periods of time, across different sites and across different instruments. For the purpose of structured discussion, several desired aims are described: common interpretation of the immunophenotype definition of a target subset, accurate quantification, reproducible pattern of a multicolor immunophenotype, and reproducible intensity of all measured parameters. An overview of how standardization was approached by several large consortia is provided: EuroFlow, The ONE Study, Human Immunology Project Consortium (HIPC), and several other groups. Their particular aims and the tools adopted to reach those aims are noted. How those standardization efforts were adopted in the field and how the resulting outcome was evaluated is reviewed. Multiple challenges in the instrument hardware design, instrument setup tools, reagent design, and quality features need to be addressed to achieve optimal standardization. Furthermore, the aims of different studies vary, and thus, the reasonable requirements for standardization differ. A framework of reference for the reasonable outcomes of different approaches is offered. Finally, it is argued that complete standardization is important not only for the reproducibility of measurements but also for education, for quality assessment and for algorithmic data analysis. The different standardized approaches can and in fact should serve as benchmarking reference tools for the development of future flow cytometry studies.

Key terms

standardization; flow cytometry; EuroFlow; data analysis



ISAC CYTOMETRY
Journal of Quantitative Cell Science PART A

Reproducibility of Flow Cytometry Through Standardization: Opportunities and Challenges

Tomas Kalina*

Acknowledgments

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Grant sponsor: Ministry of Education, Youth and Sports, Czech Republic, Grant number LO1604; Grant sponsor: EU-Prague, Grant numbers CZ.2.16/3.1.00/24505, CZ.2.16/3.1.00/21540

*Correspondence to: Tomas Kalina, CLIP-Childhood Leukemia Investigation Prague, Department of Paediatric Hematology/Oncology, 2nd Medical School, Charles University Prague, V Uvalu 84, 150 06 Praha 5, Czech Republic. Email: tomas.kalina@lfmotol.cuni.cz

Published online 8 October 2019 in Wiley Online Library (wileyonlinelibrary.com)

DOI: 10.1002/cyto.a.23901

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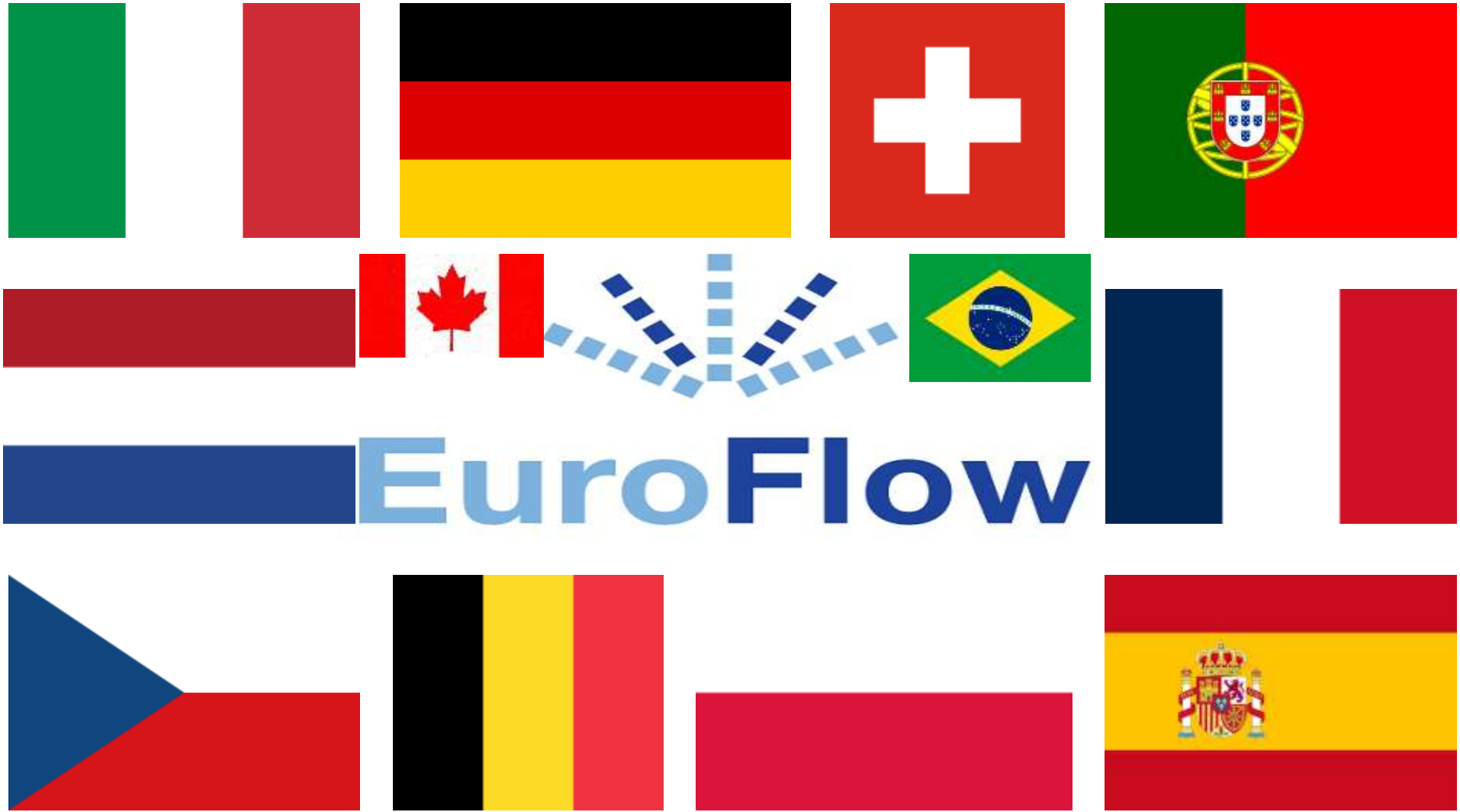
• **Key terms**
standardization; flow cytometry; EuroFlow; data analysis

Prof. Tomáš Kalina

"all [flow cytometric assays] need to define the cells of interest, interpret (simplify) their identity from the immunophenotype and enumerate their proportion in the sample"

Kalina T. Reproducibility of Flow Cytometry Through Standardization: Opportunities and Challenges. Cytometry A. 2020 Feb;97(2):137-147. doi: 10.1002/cyto.a.23901. Epub 2019 Oct 8. PMID: 31593368.

EUROVISION


EuroFlow

the Human ImmunoPhenotyping Consortium 2016

The Children's Oncology Group (COG) study **2008**

PRECISESADS Flow Cytometry Study Group & PRECISESADS Clinical Consortium 2016

The Swiss Cytometry Society (SCS) study 2019

the Human Immunology Project Consortium (HIPC) 2012

the ONE Study consortium 2013

The Canadian National Transplant Research Program (CNTRP) 2018

Standardized and flexible eight colour flow cytometry panels - Glycostem Therapeutics 2017

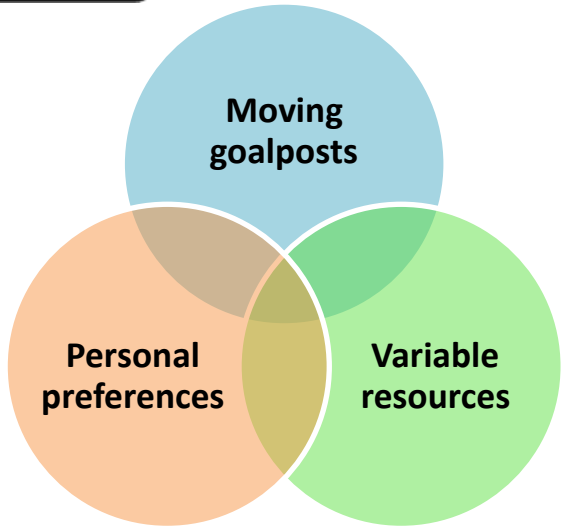
The GEIL study 2013

Is standardization impossible?

- It depends…

How Good Is Good Enough?

  - Enumeration vs. Leukemia/Lymphoma



A success story

EDUCATION & STANDARDIZATION

CD34+ HSC enumeration

- Flow cytometric enumeration of CD34+ cells provides a rapid means of measuring a clinically useful surrogate marker of graft adequacy
  - based on the number of CD34+ cells/Kg of patient body weight
  - predictor of the success of apheresis
  - “on-line” monitor the yield of CD34+ cells

Stem Cell Enumeration

- CD34+ enumeration dates back to the late 1980's

Milan Protocol

Bender Protocol

SIHON Protocol

Nordic Protocol

ProCOUNT™ (BD Biosciences)

Stem-Kit™ (Beckman-Coulter)

Stem Cell Enumeration


Rob Sutherland

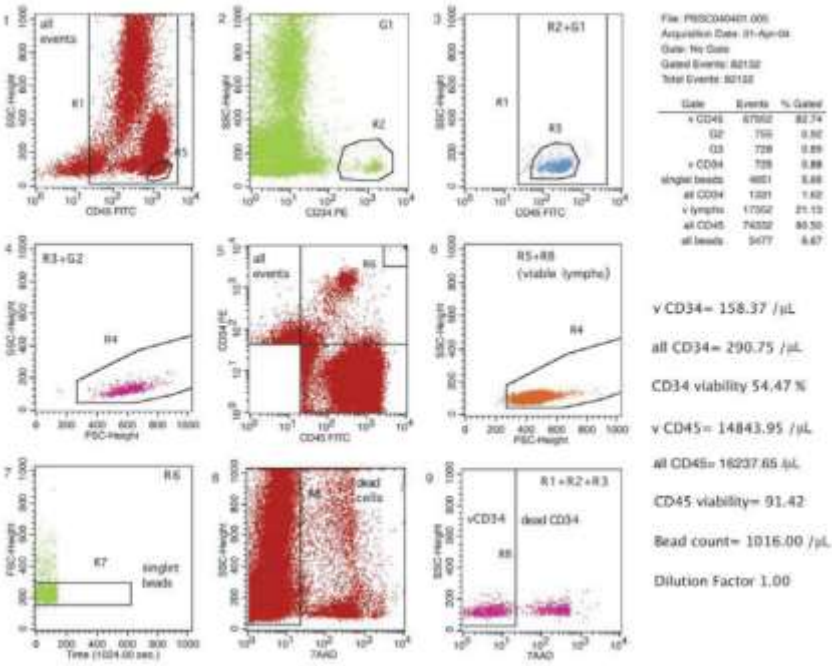
JOURNAL OF HEMATOTHERAPY 5:213–226 (1996)
Mary Ann Liebert, Inc.

The ISHAGE Guidelines for CD34+ Cell Determination by Flow Cytometry

D. ROBERT SUTHERLAND,[1] LORI ANDERSON,[2] MICHAEL KEENEY,[2]
RAKASH NAYAR,[1] and IAN CHIN-YEE[2]

ABSTRACT

The increased use of Peripheral Blood Stem Cells (PBSC) to reconstitute hematopoiesis in autotransplant and, more recently, allotransplant settings has not been associated with a consensus means to quality control the PBSC product. Since the small population of cells that bear the CD34 antigen are thought to be responsible for multilineage engraftment, graft assessment by flow cytometric quantitation of CD34+ cells should provide a rapid, reliable, and reproducible assay. Unfortunately, although a number of flow cytometric assays for CD34 enumeration have been described, the lack of a standardized method has led to the generation of widely divergent data. Furthermore, none of these assays has been validated as to interlaboratory reproducibility and suitability for widespread clinical application. In early 1995, the International Society of Hematotherapy and Graft Engineering (ISHAGE) established a Stem Cell Enumeration Committee, the mandate of which was to validate a simple, rapid, and sensitive flow cytometric method to quantitate CD34+ cells in peripheral blood and apheresis products. We also sought to establish its utility on a variety of flow cytometers in clinical laboratories and its reproducibility between transplant centers. Here, we describe the four-parameter flow methodology adopted by ISHAGE for validation in a multicenter study in North America.



courtesy of D. Robert Sutherland

The ISHAGE protocol – a journey

The **ISHAGE** guidelines for CD34+ cell determination by flow cytometry. International Society of Hematotherapy and Graft Engineering.

Sutherland DR, Anderson L, Keeney M, Nayar R, Chin-Yee I.

J Hematother. 1996 Jun;5(3):213-26. doi: 10.1089/scd.1.1996.5.213.

The influence of flow cytometric gating strategy on the standardization of CD34+ cell quantitation: an Australian multicenter study. Australasian BMT Scientists Study Group.

Chang A, Ma DD.

J Hematother. 1996 Dec;5(6):605-16. doi: 10.1089/scd.1.1996.5.605.

Single platform flow cytometric absolute CD34+ cell counts based on the **ISHAGE** guidelines. International Society of Hematotherapy and Graft Engineering.

Keeney M, Chin-Yee I, Weir K, Popma J, Nayar R, Sutherland DR.

Cytometry. 1998 Apr 15;34(2):61-70.

The 2nd Biannual **ISHAGE** Conference on applications of flow cytometry in blood and marrow stem cell transplantation.

Lamb LS Jr.

Cytotherapy. 1999;1(4):331-2. doi: 10.1080/0032472031000141268.

Comparison of single and dual-platform assay formats for CD34+ haematopoietic progenitor cell enumeration.

Gratama JW, Braakman E, Kraan J, Lankheet P, Levering WH, Van Den Beemd MW, Van Der Schoot CE, Wijermans P, Preijers F.

Clin Lab Haematol. 1999 Oct;21(5):337-46. doi: 10.1046/j.1365-2257.1999.00236.x.

Validation of the single-platform **ISHAGE** method for CD34(+) hematopoietic stem and progenitor cell enumeration in an international multicenter study.

Gratama JW, Kraan J, Keeney M, Sutherland DR, Granger V, Barnett D.

Cytotherapy. 2003;5(1):55-65. doi: 10.1080/14653240310000083.

A convergence of methods for a worldwide standard for CD34+ cell enumeration.

Marti G, Johnsen H, **Sutherland R**, Serke S.

J Hematother. 1998 Apr;7(2):105-9. doi: 10.1089/scd.1.1998.7.105.

Comparison of two single-platform **ISHAGE**-based CD34 enumeration protocols on BD FACSCalibur and FACSCanto flow cytometers.

Sutherland DR, Nayyar R, Acton E, Giftakis A, Dean S, Mosiman VL.

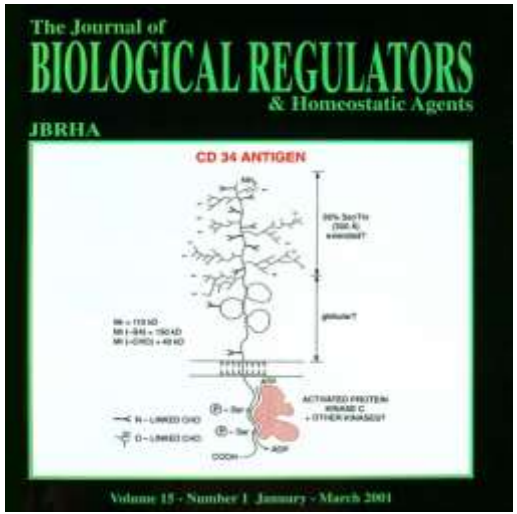
Cytotherapy. 2009;11(5):595-605. doi: 10.1080/14653240902923161.

ISHAGE protocol: are we doing it correctly?

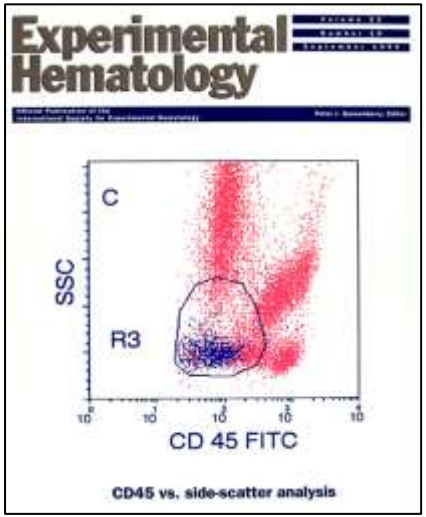
Whitby A, Whitby L, Fletcher M, Reilly JT, Sutherland DR, Keeney M, Barnett D.

Cytometry B Clin Cytom. 2012 Jan;82(1):9-17. doi: 10.1002/cyto.b.20612. Epub 2011 Sep 13.

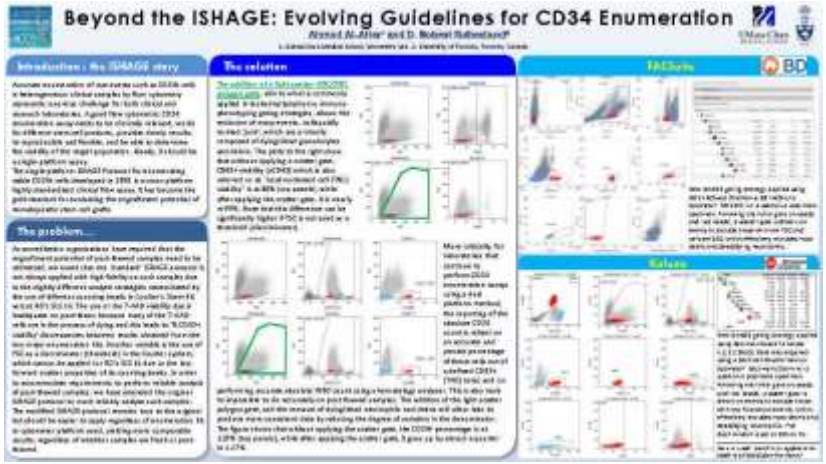
Education. Education. Education.



- CD34 Epitopes:
- CLASS I, II, and III
- CD45 isoforms
- Fluorochrome suitability



- Boolean gating strategy
- Useless isotype controls
- Adding a viability dye
- Single platform
- Reverse pipetting



- CD3 drop-in for allogeneic products
- Guidelines for post-thawed samples
- Limitations of hematology analyzers
- Use of a Forward Scatter/Side Scatter gate
- Challenges faced on new cytometers

Slide from Sutherland

Gain Consensus – the Hard Part!

Take the show on the road
- identify key groups
- take the message to them
- answer the hard questions
- accept criticism, gracefully if possible (@#$%!!!)
    - this is what good science is all about!
- teach workshops
- do talks
- Visit Hospital/University Flow labs

Develop and publish Consensus Guidelines

Europe comes together!

- 1998

Cytometry PART A
Journal of Quantitative Cell Science
ISAC

Original Article | Free Access

Volume34, Issue3 - 15 June 1998
Pages 128-142

Flow cytometric enumeration of CD34+ hematopoietic stem and progenitor cells†

Jan W. Gratama, Alberto Orfao, David Barnett, Bruno Brando, Andreas Huber, George Janossy, Hans E. Johnsen, Michael Keeney, Gerald E. Marti, Frank Preijers, Gregor Rothe, Stefan Serke, D. Robert Sutherland, C. Ellen Van der Schoot, Gerd Schmitz, Stefano Papa ... See fewer authors

https://doi.org/10.1002/(SICI)1097-0320(19980615)34:3<128::AID-CYTO3>3.0.CO;2-D | Citations: 157

† The European Working Group on Clinical Cell Analysis (EWGCCA) is a collaborative initiative of scientists

"...successful implementation of a standard protocol can significantly reduce interlaboratory variation and that centralized hands-on training of the involved laboratory personnel is an effective tool to achieve this goal."

The ISHAGE protocol – results

- The use of SP flow cytometric technology has improved standardization globally of this procedure
  - using the SP ISHAGE approach, CVs of <10% have been achieved
  - consistently produces the lowest inter-laboratory CVs of all the gating strategies used
  - laboratories performing the ISHAGE protocol incorrectly are up to twice as likely to fail an external quality assurance / proficiency testing exercise
- Education and technical support has improved the correct usage of the ISHAGE protocol gating strategy

Whitby A, Whitby L, Fletcher M, Reilly JT, Sutherland DR, Keeney M, Barnett D. ISHAGE protocol: are we doing it correctly? Cytometry B Clin Cytom. 2012 Jan;82(1):9-17. doi: 10.1002/cyto.b.20612. Epub 2011 Sep 13. PMID: 21915992.

UK NEQAS
International Quality Expertise

Utilization

FL-4 (CD34+ Enumeration Survey)

- DP users (n=77):
  - ISHAGE: 77% of respondents
- SP users (n=232):
  - ISHAGE: 86% of respondents

Continued Education

Systematic Education

- Education of users
- Education of manufacturers
- Education of regulatory bodies – new CLSI guidelines (in process)
- Education at conferences
- Education in the lab
- Education within specialized societies

Original Article

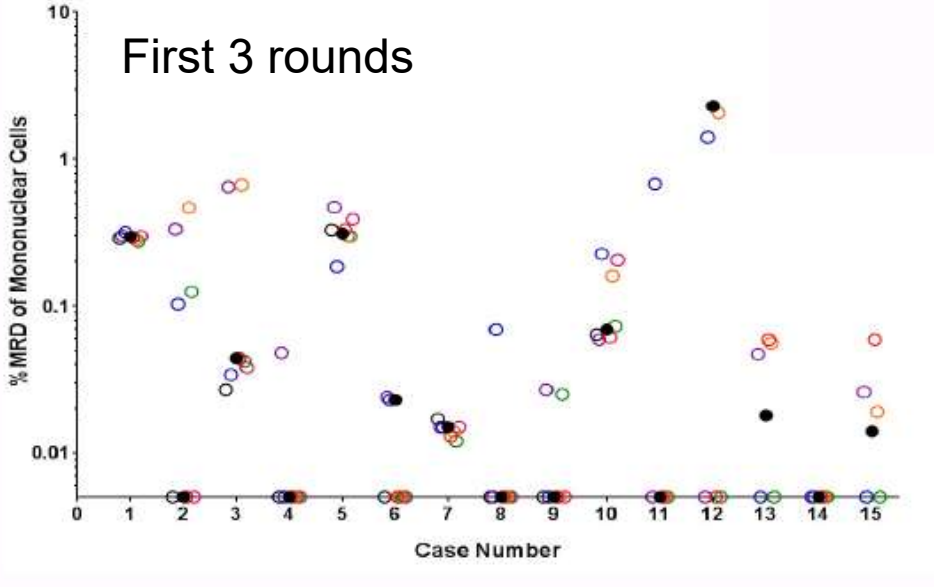
A QA Program for MRD Testing Demonstrates That Systematic Education Can Reduce Discordance Among Experienced Interpreters

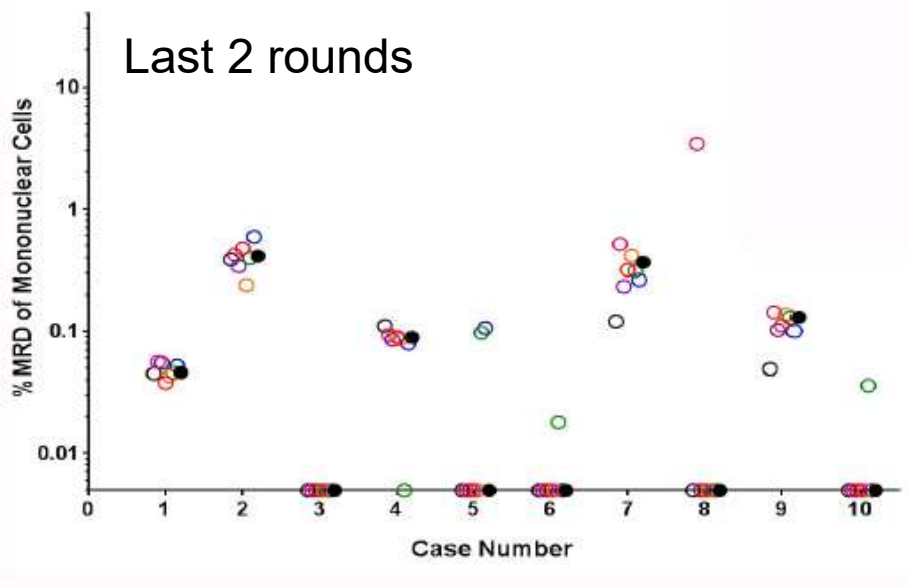
Cytometry Part B (Clinical Cytometry) 94B:239–249 (2018)

Michael Keeney, Brent L. Wood, Benjamin D. Hedley, Joseph A. DiGiuseppe, Maryalice Stetler-Stevenson, Elisabeth Paietta, Gerard Lozanski, Adam C. Seegmiller, Bruce W. Greig, Aaron C. Shaver, Lata Mukundan, Howard R. Higley, Caroline C. Sigman, Gary Kelloff, J. Milburn Jessup, Michael J. Borowitz

Systematic Education

<u>Conclusion</u>: Despite the provision of the COG standardized analysis protocol, even experienced labs require an educational component for B-ALL MRD analysis by FCM





https://onlinelibrary.wiley.com/doi/10.1002/cyto.b.21528

Small Cell Therapy Labs

- Established 12/3/2009
- 1229 members
- 148,320 discussion threads
- 297 posts are ISHAGE protocol-related
  - *"The currently used flow gating platform came from an article by D. Robert Sutherland, chair of the ISHAGE Stem Cell Enumeration Committee at the time, in an attempt to standardize methods between labs*
  - *The committee was established in 1995 by ISHAGE to "validate a simple, rapid and sensitive flow cytometric method to quantitate CD34+ cells in peripheral blood and apheresis products." See Journal of Hematotherapy 5:213-226(1996)*".

small-cell-therapy-lab@googlegroups.com

Purdue Cytometry Discussion List

- Established in 1989
- Archive goes back to July 1992
- Continuously available for free access to all scientists
- Current membership is approximately 4500 scientists
- ISHAGE: 13 posts
- CD34: 87 posts

PURDUE UNIVERSITY

http://www.cyto.purdue.edu/hmarchiv/index.htm

PUCL cytometry laboratories

Final thoughts


WE'RE NOT
ALONE

A Consortium for Analytic Standardization in Immunohistochemistry

Steven A. Bogen, MD, PhD; David J. Dabbs, MD; Keith D. Miller, FIBMS; Søren Nielsen, BLS; Suzanne C. Parry, BSc(Hons), MSc, FIBMS; Matthias J. Szabolcs, MD, PhD; Nils t'Hart, MD, PhD; Clive R. Taylor, MD, PhD; Emina E. Torlakovic, MD, PhD

• *Context.*—The authors announce the launch of the Consortium for Analytic Standardization in Immunohistochemistry, funded with a grant from the National Cancer Institute. As with other laboratory testing, analytic standards are important for many different stakeholders: commercial vendors of instruments and reagents, biopharmaceutical firms, pathologists, scientists, clinical laboratories, external quality assurance organizations, and regulatory bodies. Analytic standards are customarily central to assay development, validation, and method transfer into routine assays and are critical quality assurance tools.

Objective.—To improve immunohistochemistry (IHC) test accuracy and reproducibility by integrating analytic standards into routine practice. To accomplish this mission, the consortium has 2 mandates: (1) to experimentally determine analytic sensitivity thresholds (lower and upper limits of detection) for selected IHC assays, and (2) to inform IHC stakeholders of what analytic standards are, why they are important, and how and for what purpose they are used. The consortium will then publish the data and offer analytic sensitivity recommendations where appropriate. These mandates will be conducted in collaboration and coordination with clinical laboratories, external quality assurance programs, and pathology organizations.

Data Sources.—Literature review and published external quality assurance data.

Conclusions.—Integration of analytic standards is expected to (1) harmonize and standardize IHC assays; (2) improve IHC test accuracy and reproducibility, both within and between laboratories; and (3) dramatically simplify and improve methodology transfer for new IHC protocols from published literature or clinical trials to clinical IHC laboratories.

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https://meridian.allenpress.com/aplm/article/147/5/584/485897/A-Consortium-for-Analytic-Standardization-in

ICCS Education Committee

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The goal of the ICCS Education Committee is to provide educational materials to the membership.

Committee members work to identify topics of interest and create educational materials using a variety of modalities, including the eNewsletter, videos, web presentations, Case Study Interpretation (CSI) cases, the ICCS website Question & Answer section and e-learning activities. The committee members are divided into subcommittees, as needed. The Education Committee collaborates with other ICCS committees, such as the Quality and Standards and Advocacy committees, and distributes related materials and updates. The Education Committee also works in partnership with the Clinical Cytometry Education Network (CCEN), formed by ESCCA and ICCS for the global distribution of educational materials.

Appointments are made by the committee Chair, after consideration of an application and letter of recommendation from an ICCS member. Elected terms are for 3 years, with the option of reappointment for a second term. The ICCS Course Director and President are ex officio members of the Education committee.

EDUCATION

› Committee Application

39 members

ICCS Quality and Standards Committee

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Quality & Standards Committee

25 open-access modules

Introduction

The ICCS Quality and Standards committee is dedicated to the optimization of fundamental flow cytometric testing components. Its purpose is to identify major areas of variability, determine critical components needing standardization, develop and define acceptability standards and criteria, and provide guidance and measures for practical implementation in the laboratory. This group will work closely with the ICCS education committee and other entities as necessary.

The Q&S committee is comprised of 4 groups (instrument optimization, reagents and panels, specimen preparation and reporting) which will address the most common areas of variability in flow cytometry. The information will be presented in peer-reviewed "modules" with the goal to provide the laboratory staff with a practical reference guide in optimizing their procedures. These modules can be viewed below.

Chair:
Prof. Dr. med. Wolfgang Kern

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David Ng
Dietrich Werner
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Weijie Li
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WHAT IS CLINICAL CYTOMETRY?
CONFERENCES
SCHOOLS & AFFILIATED EVENTS
CERTIFICATION EXAM
CERTIFIED CYTOMETRISTS
ESCCA PUBLICATIONS

CLINICAL CYTOMETRY - BASICS

- Frank Preijers - Identification of pre-analytical errors
- Frank Preijers - From stem cell to blood cell: flow cytometry of the differentiation pathway
- Pedro Horna - International Guidelines for the Diagnosis and Follow up of Sezary Syndrome/Mycosis Fungoides in Peripheral Blood
- Iuri Marinov - Detection of GPI-A deficient cells in Paroxysmal Nocturnal Hemoglobinuria (PNH) and Bone Marrow Failure Syndromes (BMFS) by Flow Cytometry

ADVANCED HEMATOLOGY-ONCOLOGY

- Pedro Horna - Sézary Syndrome (and mycosis fungoides)
- Bruno Brando - Rules in Rare Event Acquisition. An Overview
- Francesco Buccisano - Measurable residual disease in acute myeloid leukemia, consensus document of European Leukemianet
- Francesco Buccisano - Gating strategies for MRD detection in AML

IMMUNOLOGY

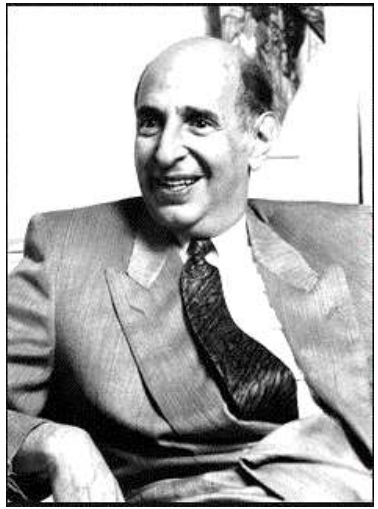
- Alexandra Fleva - Pre-analytical issues in a Flow Cytometry lab
- Alexandra Fleva - T lymphocytes in sickness and in health
- Bruno Brando - B Cell Monitoring During Anti-B Treatment in Autoimmune Diseases
- Katherina Psarra - Immune monitoring of patients with multiple sclerosis

References

- Personal communication with Rob Sutherland
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5004491/
- https://onlinelibrary.wiley.com/doi/full/10.1002/cyto.a.23901
- https://pubmed.ncbi.nlm.nih.gov/31593368/
- https://www.biocompare.com/Editorial-Articles/580801-Standardizing-Flow-Cytometry-Assays/
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5004491/
- https://meridian.allenpress.com/aplm/article/147/5/584/485897/A-Consortium-for-Analytic-Standardization-in
- https://www.biocompare.com/Editorial-Articles/580801-Standardizing-Flow-Cytometry-Assays/

Education is the movement from darkness to light.

(Allan Bloom)



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