

Evaluation of the “15th Practical Flow Cytometry Course”

[“XV. Uygulamalı Flow Sitometri Eğitimi”nin Değerlendirilmesi]

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ABSTRACT

Flow Cytometry (FCM) is a powerful technique for getting information and analysing multiple parameters of individual cells within heterogeneous populations. The annual course for FCM has been organized regularly every year by the Immunology Department of the Institute for Experimental Medicine (DETAE), Istanbul University and these courses including theoretical and practical sessions meet the need of FCM training in Turkey and help to build a firm network for sharing methods, protocols, problems and getting updated. This letter presents the evaluation of the questionnaire filled by the applicants of the “15th Practical Flow Cytometry Course” organised in June 2009.

Key Words: Flow cytometry, education, training

Conflict of Interest: There is no conflict of interest among the authors who contributed to the present study.

ÖZET

Flow sitometri (FSM, akan hücre ölçer) heterojen hücre toplulukları içinde yer alan hedef hücreler hakkında bilgi toplayan ve çok parametrelili analizini yapan güçlü bir tekniktir. Türkiye’de FSM eğitimi ihtiyacını karşılamak, yöntem ve ilgili problemleri paylaşılan sağlam bir bilgi ağı kurmak, bilgileri güncellemek amacıyla, İstanbul Üniversitesi, Deneysel Tıp Araştırma Enstitüsü (İ.Ü. DETAE), İmmünoloji Anabilim Dalı tarafından her sene teorik ve pratik bölümlerden oluşan yıllık FSM kursu düzenlenmektedir. Bu yazı, 8 - 12 Haziran 2009 tarihlerinde düzenlenen “Uygulamalı Flow Sitometri Eğitimi” nin katılımcı anketini değerlendirmektedir.

Anahtar Kelimeler: Flow sitometri, eğitim, uygulama

Çıkar Çatışması: Katkıda bulunan yazarların hiçbir çıkar çatışması yoktur.

Current FCM systems are unique tools supported by technologic developments intensely. FCM performs the analysis of thousands of cells in a second by up to nine fluorescences and by two parameters (size and granularity), providing scientists to gather statistical data on large number of cells. This ability makes it possible to study oncogenesis, apoptosis or cell cycle of cell populations and cellular events like DNA content [1]. FCM can be used for immunophenotyping and distinguishing between healthy and diseased cells, is used to assist diagnosis and monitor myelomas, lymphomas, leukemias, immunodeficiencies [1, 2, 3]. FCM is widely used in other fields like veterinary medicine, microbiology and fisheries. In both routine and research applications, data analysis, interpretation and reporting processes requires well educated users which is the core important issue for accurate results [2]. Immunology Department organized “*Flow Cytometry and its use in Medicine*” meeting as a one day organisation in 1995, to satisfy the need and to update the knowledge and awareness. The meeting was organised for three days in following years, and transformed to a five day meeting in 2003. The course includes theoretical and practical sessions. Practical sessions are usually held as wet labs, there are few tutorials included in practical sessions.

Course

“15th Practical Flow Cytometry Course” was held in DETAE on June 8 - 12, 2009, and 20 expert scientists gave theoretical lectures. Two FCMs, FACSCalibur and FACSaria cell sorter (Becton Dickinson, USA) in the department’s facility were used in wet labs. The practical sessions included seven main topics: immunophenotyping, CD34 measurement, DNA analysis, intracellular phosphokinase analysis, interpretation of the data in childhood/adult leukemias and sorting. Technical specifications of FCM and study methods on cells like natural killer (NK) cells, stem cells and circulating endothelial cells were discussed, quality control and standardization, DNA analysis and cell cycle, immunophenotyping, apoptosis, intracellular cytokines, proliferation and cell functions in transplantation and their protocols were addressed. One day was specifically designated for hematological diseases, and on the last day additional applications were discussed. Immunophenotyping, bcl-abl determination, DNA analysis, leukemia diagnosis and sorting studies were performed in wet lab sections.

Questionnaire

On the evaluation session applicants were asked to fill in questionnaire forms and participant’s demographic information, background of flow cytometry, their expectations, critics and appreciations were evaluated.

Twenty six (90%, female/male: 17/9) of 29 participants participated in the survey. The attendants were mainly from Istanbul (9, 34.6%) followed by Antalya (3, 11%),

Isparta, Manisa, Kayseri (2, 7.7%, Figure 1A). Participants were mostly medical doctors (31%) and biologists (31%) followed by academicians (8%), laboratory technicians (7%) and other professions (Figure 1B). Most of the participants were working at universities (17, 65%), private hospitals or laboratories (4, 15%), and state hospitals (4, 15%, Figure 1C). Participants from universities were working mainly (80%) on basic sciences in medical faculties (Table 1, Figure 1D). The majority of the researchers were microbiologists and biochemists. Nine participants (35%) were active users performing routine immunophenotyping (8, 89%; Table 2), while thirteen (50%) had FCM in their department. Five attendants (19%) had previous trainings. The attendants’ expectations were divided in four categories: 27% expected to learn FCM basically, 42% theoretically but not practically, 38% basically and practically and 19% expected using FCM individually. Making more than one choices, 38% scored the course “*very beneficial*”, 50% “*beneficial*”, 12% “*not beneficial*” and 4% “*contextually insufficient*”. 15% claimed to have learned FCM basically, 58% basically, but not practically, 23% noted the course to be sufficient theoretically and practically, and 4% to be able to use FCM individually in their studies. The participants emphasized the complexity of FCM and the insufficiency of the practical applications and underlined the necessity of gaining experience in using FCM, having different brand and models of FCMs in their own lab, and they declared applications to be done intensively in smaller groups. Most of the participants suggested using different brand FCMs, organizing two different courses for beginners and FCM users, and allowing the students to perform individually on FCM.

Flow cytometry education in Turkey

FCM education may be organized in different forms: lectures & courses; in service, online or continuous workshops. Service training is the most used strategy for clinical applications, but although many major methods and protocols are mostly given in courses and lectures, it might be insufficient in some cases of lymphoma and leukemia immunophenotyping [2]. FCM training in Turkey is usually given by company tutorials or local technical services or in company education centers. In the latter, language is a common communication barrier. The main advantage of this course was that all lectures and applications were performed by local experts in Turkish. The trainers also published “*Flow Cytometry and Medical Applications*”, a book summarizing methods and protocols [4, 5].

The course trainers with at least ten years experience on FCM fulfilled the criteria by Greig et al. suggesting the education to be given by experts with at least two years experience [2]. According the questionnaire, thirteen applicants (50%) were coming from FCM laboratories and nine (89%) were active FCM users. Five of the attendants had already joined previous DETAE courses.

Table 2. Tests performed by the attendants active FCM users (n=9)

TEST	N	%
Immunophenotyping (lymphocyte subgroups)	8/9	89
CD4 and CD8	3/9	33
(rat or HIV patients)		
Platelet analysis	3/9	33
Cross match	3/9	33
Leukemia lymphoma panels	2/9	22
PNH (diagnosis)	2/9	22
CD3 (organ transplantation)	1/9	11
HLA B27	1/9	11
Viability	1/9	11
Project scope	1/9	11

Based on the feedback, it is clear that these courses are an update for FCM users and basic knowledge for beginners. Getting current information in their own language leads to an interactive training compared to advanced workshops organized biennially in Turkey by the Turkish Society of Immunology, with contribution of American colleagues and societies like International Society for Advancement of Cytometry and International Clinical Cytometry Society, to help Turkish users for getting first hand information from pioneers of cytometry.

In conclusion, our annual course organized regularly for the last fifteen years, meets the need of FCM training in Turkey and helps to build a firm network among FCM users. The third edition of the book published in 2009 [1], is an important reference book to keep up with new instrumentation technologies and diversify applications in laboratories. We aim to continue these courses on regular basis, to improve the level of knowledge for cytometry in Turkey.

Information and acknowledgment

The research is based on a poster presentation at “20th National Immunology Congress” and “CYTO2010”.

Conflict of Interest: There is no conflict of interest among the authors who contributed to the present study.

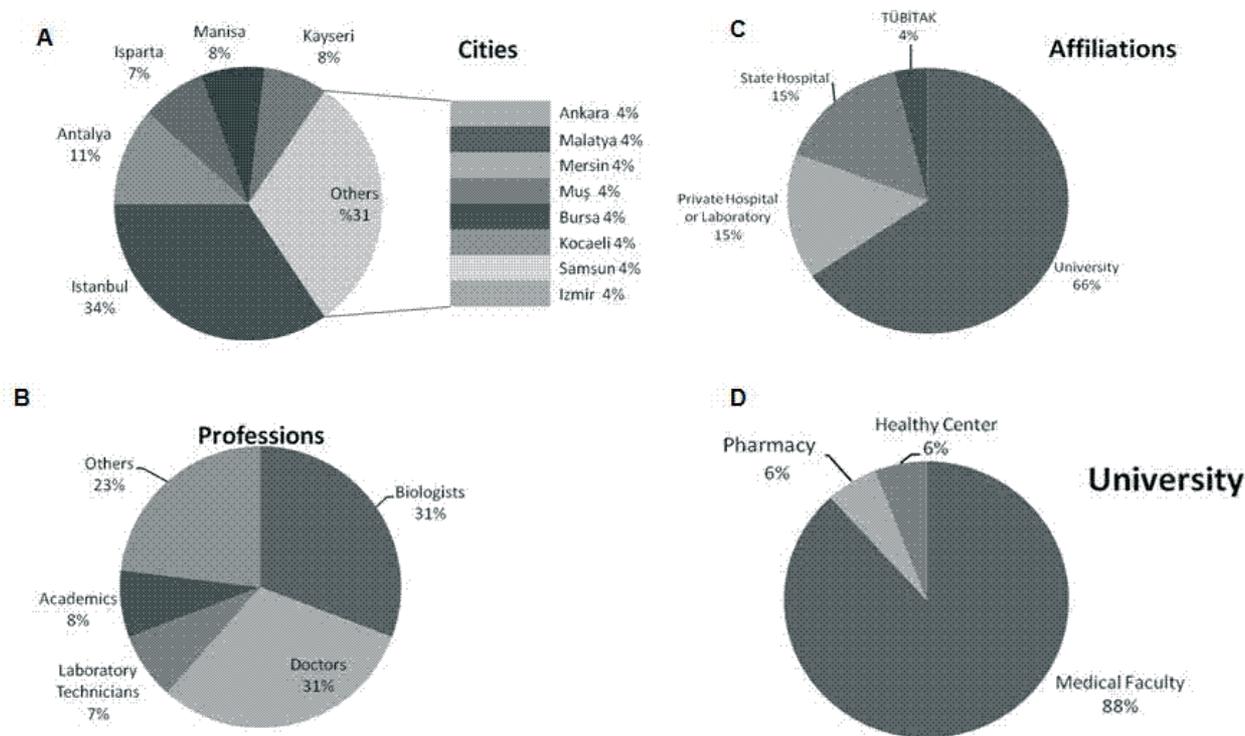


Figure 1. Distribution of the participants regarding to: A cities, B professions, C affiliations (TÜBİTAK; The Scientific and Technological Research Council of Turkey), D Faculty distribution of the attendants from universities

Table 1. Affiliations of the attendants from medical faculty

DEPARTMENT	N	%
Basic Sciences		
80%		
Biochemistry	3	25%
Microbiology	3	25%
Immunology	2	17%
Hematology	2	17%
Tissue Typing	1	8%
Genetics	1	8%
Total	12	
Internal Medicine		
20%		
Pediatric allergy	1	33%
Cardiology	1	33%
Infectious Diseases	1	33%
Total	3	

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