Preface

Clinical Flow Cytometry: State-of-the-Art and New Approaches

David M. Dorfman, MD, PhD
Editor

Flow cytometric immunophenotypic analysis is critical for diagnosing and subtyping a number of hematopoietic neoplasms. In recent years, significant advances in clinical flow cytometry have included the development of robust commercial flow cytometers suitable for the multiparametric assessment of clinical samples, a wide range of fluorochrome-conjugated antibodies directed at antigens that are useful for the identification of hematopoietic cells at various stages of development and differentiation, as well as sophisticated data analysis software.

This 2017 issue of *Clinics in Laboratory Medicine* summarizes the current state of the field. It reviews the flow cytometric analysis of B-cell and T-cell neoplasms and acute leukemias and discusses the rationale for flow cytometric testing, gating strategies, antibody panels for diagnosis and disease subtyping, and specific immunophenotypic patterns important for differential diagnosis. It discusses flow cytometric testing of systemic mastocytosis and paroxysmal nocturnal hemoglobinuria, two rare diseases well suited to assessment by flow cytometric analysis, particularly with new immunophenotypic markers and approaches. It reviews flow cytometric analysis of minimal residual disease in patients with acute lymphoblastic leukemia, which has become a standard clinical practice. In addition, Dr Sa A. Wang and colleagues at MD Anderson Cancer Center describe here their approach for the flow cytometric assessment of minimal residual disease in patients with acute myeloid leukemia, an application of clinical flow cytometry that is not yet widely employed.

This issue also discusses the flow cytometric analysis of hematopoietic neoplasms in pediatric patients and in patients with primary immunodeficiencies. Several articles discuss timely and emerging topics, such as algorithms and strategies for cost-effective flow cytometric testing of clinical samples and sophisticated approaches and scoring systems to assess chronic myeloid neoplasms, another area of clinical flow cytometry that is still in development. Dr Richard H. Scheuermann, one of the pioneers of

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the field, discusses automated analysis of clinical flow cytometry data using computer algorithms. This approach has been employed for the assessment of a number of hematopoietic neoplasms and holds great promise for identifying important patterns in complex multiparametric data generated by contemporary flow cytometers. In the future, clinical flow cytometry and related technology will likely permit increasingly multiparametric immunophenotyping approaches to be employed in routine clinical practice. Dr Gregory K. Behbehani discusses the potential clinical application of mast cytometry, a novel technology that has the potential to significantly expand the ability to perform immunophenotyping with up to 50 simultaneous parameters, as well as a number of highly sophisticated data analysis approaches developed to analyze mass cytometry data.

I wish to express my gratitude to the authors of these articles for their contributions, which I hope will enlighten students and practitioners of clinical flow cytometry and hematopathology.

David M. Dorfman, MD, PhD
Department of Pathology
Brigham and Women's Hospital
and Harvard Medical School
75 Francis Street
Boston, MA 02115, USA

E-mail address:
ddorfman@bwh.harvard.edu