Clinical Laboratory Immunology: the Future

JOHN L. FAHEY*

Department of Microbiology & Immunology, UCLA School of Medicine, Los Angeles, California 90095

Preparation for the future has two elements. One is to look at the dynamics operating at the present time to estimate where these are heading. The second is to have an open but prepared mind to discern important new elements that will arise to impact on the practice of clinical laboratory immunology.

The future is going to be a foreign land, as has been pointed out by Herbert Hooijkaas (1). The language will be different from that which we are used to. The terms of reference will be different. The areas of importance will be different and the assumptions of professional knowledge and responsibility may be different. Clearly, meeting the conditions required for successful performance and communication in a foreign land or era will require continual attention. Readiness to learn as well as preparation in the basics will be needed for effective participation in the future world.

SCOPE

In recent decades, there have been striking changes in the practice of clinical laboratory immunology. Diagnostic testing for infection is no longer the major activity. Advances have come from many areas of science and medicine and from new technologies. Autoimmune diseases, allergy and asthma, organ and bone marrow transplantation, lymphoid and plasma cell malignancies, and primary and secondary immune deficiencies, have all provided challenges and opportunities to advance clinical laboratory immunology. Each has unresolved issues that will continue into the future.

Technological advances have come on many fronts. Protein chemistry contributed electrophoresis. Immunologists contributed immunoelectrophoresis and monoclonal antibodies. Immunogeneticists and collaborating engineers brought forth flow cytometry. Many contributed to the huge advances in quantitative immunochemical methodologies. Now cytokines, receptors, and soluble immune activation markers can be measured in plasma and within stimulated lymphocyte subsets to assess the capacity of the immune system to respond to specific stimuli.

Immune-based therapies are being introduced at an accelerating rate and assessments of complex immune-based therapies are having an increasing impact on the responsibilities of the clinical immunology laboratory. The result has been a shift from diagnostic immunology to the increasing emphasis on functional status and responsiveness of the immune system. Are therapies having the intended effects of increasing or taming down selected immune functions? Accurate, quantitative measures of clinical effectiveness are required. Demands of the clinical immunology laboratory are increasing from new diseases and from new information about well-established disorders.

PROCEDURES

Future findings about immune mechanisms and disease pathogenesis as well as new technologies are likely to result in more precise assays on smaller samples obtained from restricted sites and requiring more precision in sample handling. These trends are likely to continue with more new tests and more sensitive assays which will require better control of reagent consistency and laboratory procedures. Close cooperation between clinical immunology laboratories and manufacturers of reagents and equipment is to be commended and fostered. Everyone will benefit as costs continue to escalate.

T-cell subsets, B and NK cells, Th1 and Th2 categories of lymphoid cells, lymphokines and cytokines, as well as immunoglobulins, autoantibodies, and therapeutics are the common parlance of clinical laboratory immunology. While diagnostic and clinical laboratory immunology long ago outgrew the confines of microbiology, AIDS may be a form of microbiological revenge where HIV infects and lethally damages the immune system. The overall point is that diagnostic and clinical laboratory immunology contributions and responsibilities have grown by input from many fields of science and medicine. Similarly, clinical laboratory immunology now provides intellectual and clinical services to medicine very broadly.

PROJECTIONS

One message from the recent past is that there will be new diseases. AIDS emphasizes that. Another message is that there will be new therapies. Other signals come from current work on the human genome. Many genetic factors that relate to occurrence or course of disease will be identified. New interventions will be devised for use in otherwise healthy individuals for the purpose of heading off disease or modulating its course. Some of these are likely to affect functions of the immune system and will require new measurements. There is every reason to believe that medicine and science in the future will benefit from broadly knowledgeable immunologists who incorporate advances from many different disciplines into the field of diagnostic and clinical immunology.

The assemblage of information into computers and the automation of testing have facilitated standardization and easy exchange of information. Clarity of communication between people is important before and after computers have done their thing. There will always be a need for well-trained and articulate persons to solve problems and provide corrective measures. Good training programs in fundamentals of immunology and clinical relevance and analytic interpretation will be important. Continuing educational programs will be needed for ensuring professional competence in a changing world. These will have to be modified to meet new developments.

In the past century, innovations and advancements were based on the development and adaptation of new principles and new technologies to meet identified needs. While it is hard
to be specific about the future, we are in a situation similar to that of 100 or 50 years ago. Only the challenges and opportunities are different now. Imaginative and innovative resolutions to current problems and new questions will be the substance of commentaries on accomplishments in the next century. The future is a land of opportunity. Adventure, rewards, and indeed, pleasure will be there for those who are prepared and are fortunate enough to have the resources to participate in the clinical laboratory immunology of the future.

REFERENCE

1. Hooijkaas, H. 1998. The role of the clinical immunology laboratory in disease evaluation beyond the year 2000. Presented at the Xth International Congress of Immunology, New Delhi, India, 1 to 6 November 1998.

*The views expressed in this Commentary do not necessarily reflect the views of the journal or of ASM.*