

Immunology at the University of Rochester

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Immunology at the University of Rochester Medical Center is concentrated in the Department of Microbiology & Immunology, but it has long been an interdepartmental program with faculty in both basic science and clinical departments and centers throughout the medical center. This program dates back many decades with several pivotal points at which strong scientists were recruited that strengthened the already existing research and training efforts. One of these points was the recruitment in the early 1970s of Drs John Kappler and Philippa Marrack, whose research acumen was already evident. In addition, new units of clinical immunology and infectious diseases were created in the Department of Medicine and basic and clinical researchers were hired. During this time, Dr David Smith and his colleagues in the Department of Pediatrics developed the vaccine against *Hemophilus influenzae* type B, which was remarkably successful and has virtually eliminated meningitis. In 1980, in a joint effort between the Department of Microbiology and the Cancer Center, Dr David Scott was appointed Dean's Professor of Immunology and ushered in a long-standing collaboration between these two administrative groups. Dr Scott recruited an additional four researchers with expertise in both T and B cell immunology. In recognition of the growing strength in immunology, the department name was changed to the Department of Microbiology & Immunology and an Immunology Track within the Department was formally approved. The 1990s brought additional changes as Dr Ignacio Sanz, a molecular immunologist interested in human immunoglobulin gene rearrangements was recruited to head the Clinical Immunology/Rheumatology Unit of the Department of Medicine. He established a strong group that continues to thrive and has led to the establishment and funding of an Autoimmunity Center of Excellence, which is an interdisciplinary group of investigators led by Dr Sanz. During this era, another major advance was made by Dr Robert Rose, then a Ph.D. student in the Department of Microbiology & Immunology and his mentors in the Department of Medicine as they developed the human papillomavirus (HPV)16 virus-like particle that led to a vaccine against cervical cancer. In 1999, another major change for immunology research and training occurred with the

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establishment of the David W. Smith Center in Vaccine Biology and Immunology and the recruitment of Dr Tim Mosmann to head this new center and continue the tradition of vaccine development at the University of Rochester Medical Center. He was able to quickly hire a diverse group of both young and established investigators that have added greatly to the intellectual environment of the immunology community. Dr Mosmann also established a Human Immunology Center, which brings together basic and clinical researchers and assists in developing expertise in new techniques to support research in human immunology and vaccine development.

Researchers at the University of Rochester study the role of the immune system in several different human diseases. Several investigators in the Autoimmunity Center of Excellence are studying this disease in both humans and a variety of animal models [1, 2]. Cancer has long been the focus of many different research programs, which are represented in this issue by studies on tumor metastases [3] and the role of heat shock proteins in eliciting anti-tumor immunity [4], but several other investigators are exploring many different aspects of this important disease with the goal of finding better therapies. Influenza is a major focal point for several researchers, who have active collaborations. These interactions resulted in the attainment of a New York Influenza Center of Excellence to the University of Rochester, bringing together a diverse group of investigators who are studying all aspects of influenza immunology, pathogenesis, epidemiology, and vaccine development. Other laboratories are focusing on the development of protection against organisms with potential as agents of bioterrorism [5]. One group is examining the immune response within bone and addressing diseases such as arthritis and osteoporosis [6].

Virtually all of the different kinds of cells of the immune system are being studied including B lymphocytes [1], T lymphocytes [2, 4, 7–12], antigen presenting cells [12], and platelets [13]. Many different receptors on these cells and how they affect cellular functions are being explored. Examples include the integrin molecules expressed by a wide range of leucocytes [8] and CD28 on T cells, and its mechanisms of stimulation [9]. Trafficking of immune cells is of particular interest to a number of investigators both in terms of mechanisms [7, 8] and how they function at tissue sites of inflammation [2] or tumor growth [3].

Training of Ph.D. students has long been an integral part of the immunology community at the University of Rochester. The Immunology Microbiology Virology (IMV) program is one of 10 graduate training programs in the biological sciences at the medical center. As one of the three tracks within this program, students in immunology have the opportunity to also interact with groups studying the pathogens to which the immune system must respond. This has led to many collaborative interactions among laboratory groups. An NIH training grant in immunology was first obtained in 1986 and has been successfully renewed for over 20 years. Other training grants within the department relevant to various aspects of immunity including one in pathogenesis of bacteria and viruses and another in HIV pathogenesis as well as a Medical Scientist Training Program for students pursuing a combined MD/Ph.D. degree all contribute to a rich training environment for students and postdoctoral fellows. In addition to lecture style courses in basic and advanced immunology, a seminar course, “Topics in Immunology” is led by a different faculty member each year covering a wide range of topics and using multiple formats. Recent topics have included “mucosal immunology”, “evolution of the immune system”, and “bioterrorism—the intersection of immunology and microbiology”. In addition, a weekly journal club and a “Research in Progress” seminar series brings faculty and students together on a regular basis. The students have ample opportunity to obtain experience in presenting their research during an additional weekly student seminar series. A rich program of outside

speakers further enhances the exposure to the leaders in immunology. With more than 80 students, the IMV program is one of the largest graduate programs at the medical center. Currently, 35 students are working toward the Ph.D. degree in immunology. The department is also a home to Postbaccalaureate Research Education Program (PREP), designed to encourage and prepare underrepresented minority students to pursue a research doctorate. Additional information on our programs is available on the departmental website (<http://www.urmc.rochester.edu/smd/mbi/index.htm>).

The immunology community at the University of Rochester Medical Center has a rich history of research at the basic science level that has led to the development of important vaccines and other clinical advances. Essential to the success of our programs has been the strong interdisciplinary approaches and collaborations among our faculty and the contributions of students and fellows. This tradition continues today as we conduct cutting-edge research and train the next generation of immunologists.

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