

THE ACADEMIC SECTIONS

Allergy and Clinical Immunology:

Faculty provide specialized diagnostic and clinical care for allergies, clinical immunology and immunodeficiencies. Examples include urticaria and angioedema, drug and food allergies, vasculitis and autoimmune diseases. The Section currently maintains a full load of patients in the active Yale Allergy and Sinus Center, which provides multidisciplinary care in conjunction with the Section of Otolaryngology. The research thread that runs through the Section is the regulation of the immune response, ranging from Lyme disease to allergy and from mast cells to T cell receptors in the regulation of autoimmune diseases and in immune responses. There is also molecular immunology research directed at important *in vivo* biologic questions such as the role of specific MHC molecules in specialized cell subsets, and identification of the autoantigen in diabetes.

Cardiovascular Medicine:

The Section represents the largest referral cardiology practice in the state and is responsible for more than 45 percent of inter-hospital referrals to YNHH. There are specialized programs in the Section in interventional cardiology, electrophysiology, echocardiography, nuclear cardiology, congestive heart failure/cardiac transplantation and preventive cardiology. Areas of research focus include nuclear cardiology, a field that was pioneered significantly at Yale, and the development of new molecular imaging techniques. Other topics include: cardiovascular genetics across large and diverse populations; psychological factors in acute coronary syndromes; the role of immune, inflammatory and hormonal factors in the rejection of vascularized allografts; the development of viral vectors for cardiovascular gene therapy; and the cellular and molecular mechanisms of metabolic adaptation to ischemia. The Section houses a world-class program in outcomes research in cardiovascular disease.

Digestive Diseases:

Faculty members specialize in disorders of the esophagus, stomach, liver, gallbladder, pancreas, small intestine, colon and rectum. Diagnostic and therapeutic endoscopy services, as well as evaluation and management for liver transplant patients, are also provided by this group. Outpatient diagnostic clinics and a Gastrointestinal Procedure Center complement an active inpatient service. The Center provides routine and therapeutic outpatient endoscopic procedures, including esophagogastro-duodenoscopy, enteroscopy, endoscopic retrograde cholangiopancreatography, colonoscopy, sigmoidoscopy and endoscopic ultrasound with and without fine-needle aspiration of lesions. The center has an active colon cancer screening program. Non-endoscopic studies include liver biopsy, esophageal and anorectal manometry, 24-hour ambulatory pH studies, secretin studies, gastric acid analysis and breath tests for lactose intolerance, bacterial overgrowth or *H. pylori*. Research in the Section is multifaceted and includes the work of the Yale Liver Center, one of 16 NIH-funded Digestive Disease Research Core Centers, and one of only four that focus on the liver.

Endocrinology and Metabolism:

The major areas of expertise in the Section are carbohydrate metabolism, mineral metabolism and developmental biology. The faculty numbers 18 and includes two Yale-endowed professorships and one Howard Hughes Medical Institute investigator. Research awards include

a Diabetes Endocrine Research Center and portions of several program grants in addition to individual research grants. There are a total of six clinical and 20 research postdoctoral fellows as well as a number of undergraduate and graduate students. Faculty expertise covers all aspects of endocrine and metabolic disease, and there are a number of focused multidisciplinary clinics, including a Clinical Diabetes Center, a Bone Center, and multidisciplinary thyroid, renal stone and pituitary clinics. A close working and training relationship exists between the adult and pediatric endocrine sections, and the NIH training grant is shared by the two sections. These funds are used to support both physician-scientists and bench scientists-in-training.

General Internal Medicine:

The Section includes over 65 full-time faculty including graduates of five Robert Wood Johnson Clinical Scholars Programs (Yale, Hopkins, Michigan, UCLA and the University of Pennsylvania). Research in the Section utilizes the principles and methods of clinical epidemiology and health services research. These are applied to specific content areas, from cancer screening to the prevention of cerebral vascular disease, the treatment of chronic pain and outcomes research. Clinical programs of the Section are based at each major Yale teaching site, including YNHH, the VA Connecticut Healthcare System in West Haven, and Waterbury Hospital and Saint Mary's Hospital in Waterbury. The Primary Care Center at Yale-New Haven Hospital is a major focus of clinical and educational activity. In addition, Yale Internal Medicine Associates provides state-of-the-art general medical care within the Yale Medical Group.

Geriatrics:

Yale researchers have conducted the first studies of the causes and prevention of common health problems affecting older persons such as falls, injuries, delirium, functional decline and difficulty with driving. These investigators have helped replace the prevailing opinion that these are inevitable problems of growing older with the knowledge that these conditions, while common and associated with morbidity, are predictable and preventable. Clinical programs include direction of a special inpatient geriatric rehabilitation unit at YNHH, consultative services for the frail elderly at the Dorothy Adler Geriatric Assessment Center, and the Elder Horizons Program, a unique effort to maintain the independence of elderly hospitalized patients. The faculty directs a rehabilitation unit, a respite unit, a home care program and an outpatient geriatric assessment clinic at the VA Connecticut Healthcare System, as well as a unique nursing home practice that provides care for a large number of patients with both short-term sub-acute rehabilitative needs and long-term care needs.

Hematology:

The Section provides state-of-the-art diagnostic and therapeutic care with an emphasis on molecular explanations and solutions to disease. Clinical disorders of particular interest include: disorders of red blood cell production, including hemoglobinopathies; bleeding and clotting disorders; hematologic malignancies such as leukemia, lymphoma and multiple myeloma; myeloproliferative/myelodysplastic syndromes; dysproteinemias; and hematologic disorders associated with various systemic diseases. Comprehensive services available from Laboratory Medicine and Hematopathology complement the clinical service and ensure a multidisciplinary approach to diagnosis. Faculty members are board certified in Hematology and actively participate in the clinical programs of the Yale Cancer Center. The research activities of the Section are focused on the study of the cellular and molecular biology of blood cell production.

Particular areas of emphasis include the study of the regulation of gene expression during blood cell maturation and stem cell biology.

Infectious Diseases:

Patient care and consultation is provided for hospitalized and ambulatory adult patients with every variety of infectious disease. Specialized services are offered in a variety of areas such as HIV and related disorders. Research programs within the Section include studies of inpatient management and consultation for infectious diseases; fungal and bacterial infections; central nervous system infections; antimicrobial therapy; traveler's medicine; international health; clinical microbiology, endocarditis; nosocomial infections; host defenses; hospital epidemiology; HIV disease and AIDS. The Section is comprised of 16 full-time faculty, and 11 clinical and research fellows.

Medical Oncology:

Clinical services offered by this Section cover all aspects of cancer treatment, including breast, lung, head and neck, lymphoma, leukemia, melanoma, colorectal, pancreatic, prostate, renal and bladder oncology. Faculty members care for patients in the inpatient oncology service of YNHH (including the bone marrow transplant unit) and the VA Connecticut Healthcare System, as well as in the outpatient oncology clinics of the Yale Medical Group, YNHH and the VA. The extensive use of clinical trials and close collaboration between the faculty and the Yale Cancer Center's clinical trials office makes the most current treatment options available to patients. In addition, the Section maintains a large research program encompassing a broad spectrum of scientific investigation supported by grants. The Section is administered by the Yale Cancer Center; appointments and promotions are approved jointly with the Department of Medicine.

Nephrology:

Clinical services offered in the Section cover all aspects of the discipline including acute renal failure, glomerulonephritis, vasculitis, electrolyte and acid-base disorders, hypertension, genetic kidney diseases, renal complications of pregnancy, chronic kidney disease and renal osteodystrophy. Yale has a large renal failure program, providing primary care to more than 250 patients with end-stage renal disease, and an active renal transplantation program. Current research areas include studies of renal tubular electrolyte transport, renal epithelial cell biology and morphogenesis, molecular genetics of hypertension, polycystic kidney disease, transplant immunology and complications of chronic kidney disease, end-stage renal disease and dialysis. In addition to a large spectrum of research projects supported by individual NIH research grants, Yale is home to a Hypertension Research Center and a Polycystic Kidney Disease Research Center. Five faculty members have received the Homer W. Smith Award from the American Society of Nephrology, and four have received ASN's Young Investigator Award.

Pulmonary and Critical Care Medicine:

Faculty members in the Section work closely with physicians in cardiothoracic surgery, diagnostic radiology and pathology to provide comprehensive care to patients with a variety of complicated lung problems such as pulmonary vasculitides, lung cancer, refractory asthma and advanced interstitial lung diseases. Patients are seen in the Winchester Chest Clinic, adjacent to a state-of-the-art Pulmonary Function Laboratory, and in the inpatient facilities of YNHH and the Sleep Study Center's three Connecticut locations. The Section has a wide and varied research

portfolio that extends from bench-focused studies of disease pathogenesis and target-gene validation to human-based studies of clinical issues such as cognitive impairment in the MICU. A unifying theme among the bench-focused investigators is the desire to elucidate the cellular and molecular events involved in lung injury and repair. The result has been an intense focus on immunology and molecular biology and the development of new scientific approaches.

Rheumatology:

The Section is dedicated to the diagnosis and management of rheumatic diseases and the advancement of knowledge through a robust program of research. Faculty members are board certified in rheumatology and work closely with physicians from other specialties to ensure comprehensive management of these illnesses. Lyme disease testing using ELISA and western blot techniques and a full diagnostic panel for antinuclear and anti-cardiolipin antibodies are available through the Section's laboratory. Faculty members are involved in clinical projects focused on issues relevant to rheumatic diseases, with particular interests in Lyme disease and systemic lupus erythematosus (SLE). In addition to our general rheumatology clinics, the Section has a lupus clinic devoted to the care of patients with SLE and the related diseases of scleroderma, polymyositis, and Sjogren's syndrome. Research topics include: better understanding of the host-spirochete interactions in Lyme disease; the mechanisms of loss of self-tolerance and activation of autoreactive T cells in SLE; the pathogenesis of West Nile virus and other vector-borne illnesses; and the epidemiology and provision of health services in rheumatic disease among many others.

Specialized centers and programs

In addition to the clinical activities carried out in the academic sections, a substantial portion of the Department's work is conducted in the following centers and programs:

Yale Cancer Center:

The Yale Cancer Center (YCC) is one of 38 comprehensive cancer centers in the country designated by the National Cancer Institute and the only comprehensive center in Southern New England. The Center harnesses the scientific resources of Yale University School of Medicine, YNHH and Yale University. Led by Richard L. Edelson, the Center supports 11 multi-disciplinary research programs and 14 shared resource facilities. There are 346 members of YCC, including full, associate, and affiliate members.

General Clinical Research Center:

Established in 1960 with a grant from the National Institutes of Health, the General Clinical Research Center (GCRC) has functioned as a "center without walls," providing resources to investigators pursuing excellence in clinical research. The center has been credited with developing the insulin pump, a device that changed both clinical practice and quality of life for patients with diabetes. Today the center is led by Robert Sherwin and is part of a nationwide network funded by the National Center for Research Resources. The GCRC is funded for several inpatient and outpatient beds, core laboratories, metabolic kitchen, biostatistical and data processing units and a Bone Density Center. Approximately 90 approved protocols include studies of diabetes, genetics, NMR spectroscopy, calcium disorders, multiple sclerosis, HIV, schizophrenia, depression, substance abuse, chemotherapy, dietary protein, obesity, insulin resistance, Gaucher's and cardiovascular disease.

The Yale AIDS Program:

The program is active in clinical care, teaching, clinical research and community service at local, national and international levels. Components include a counseling and testing service, a dedicated inpatient service at YNHH, a community health care van that provides care in New Haven neighborhoods, an HIV in Prisons program, and the state's oldest and largest AIDS clinic for adults, the Nathan Smith Clinic. The AIDS Program offers an elective to first-year medical students, pairing them with patients with HIV, and an outpatient elective for house staff that is based at the Nathan Smith Clinic. Faculty members are engaged in teaching locally and internationally through projects in South Africa, China, Vietnam and Russia. Research in the program is patient-oriented and focused on underserved and vulnerable populations.

Yale Diabetes Center:

The center is a clinical consultative service of the department's Section of Endocrinology. Founded in 1994, the center cares for over 1,500 patients with Type 1 and Type 2 diabetes. The program stresses tight glucose control and aggressive management of other cardiovascular risk factors, in order to prevent or forestall the long-term complications of diabetes. The staff includes eight faculty members, all board-certified or board-eligible diabetologists/endocrinologists. Other staff members include a diabetes nurse practitioner, a nurse educator, and clinical fellows from the Section of Endocrinology and Metabolism.

Occupational and Environmental Medicine:

The program has more than 20 years of experience in the conduct of environmental and occupational health research, ranging from the bench to the field, and in the training of occupational health specialists. Beyond these academic missions, the program provides an extensive array of clinical and consulting services on behalf of individual patients, companies, government organizations, and unions. It is the oldest such program in the United States associated with a private academic institution, and has helped over 10,000 patients and provided consulting services for hundreds of companies.

Hospitalist Program:

Ten physicians and 14 physician associates serve in the program, which provided care to more than 3,500 patients at YNHH during the past year. Team members combine months of direct patient care with months of academic focus in which they work on projects in patient safety, quality of care, education or efficiency of care.

FACULTY

Faculty distribution by track, rank and gender

Faculty appointments at the School of Medicine are made in four tracks: traditional, investigator, clinician-educator, and clinician-scholar. Assistant professors are not differentiated in a track. Faculty are required to specify a track upon promotion to associate professor. An exception may be granted to assistant professors, who, after one year as an assistant professor, may be reappointed for additional three-year terms as an assistant professor in the clinician-educator track. In the traditional track, tenure may be achieved at the associate professor level. In the investigator, clinician-scholar, and clinician-educator tracks, a continuing appointment is granted at the professor level.

Full-time faculty		
Faculty Track	Ladder Rank	Faculty Count
Traditional	Professor	37
Traditional	Associate Professor—tenure	6
Traditional	Associate Professor—term	3
Total Traditional		46
Clinician-Scholar	Professor	24
Clinician-Scholar	Associate Professor	15
Total Clinician-Scholar		39
Clinician-Educator	Professor	6
Clinician-Educator	Associate Professor	29
Clinician-Educator	Assistant Professor	3
Clinician-Educator Total		38
Investigator	Professor	0
Investigator	Associate Professor	6
Investigator Total		6
Undifferentiated	Assistant Professor	85
Total Ladder Faculty		214
Non-Ladder Rank		
	Instructor	18
	Lecturer	3
	Research Faculty	80
Total Non-Ladder Faculty		101
Total Full-Time Faculty		315

Total Male: 204
Total Female: 111

Source: Office of Faculty Affairs

EDUCATION

There are 194 residents and 112 clinical fellows in the department. There are an additional 124 postdoctoral fellows and associates conducting research. The third-year class (100 students) spends three months on the medical service (two inpatient and one outpatient), and approximately 55 fourth-year students take subinternships in the department. Another 50 students take electives in medicine.

The Department offers training in all of the major subspecialties. Yale-New Haven Hospital (the medical school's primary affiliate), along with the VA Connecticut Healthcare System, the Hospital of Saint Raphael, Waterbury Hospital and Bridgeport Hospital, provide excellent venues for subspecialty training. Large inpatient and outpatient populations provide a rich clinical experience and a large faculty with varied academic interests provides numerous opportunities in basic and clinical research. Fellows may also participate in the Investigative Medicine Program, which awards the Ph.D. degree.

There are three residency programs:

Traditional Internal Medicine Residency (three years):

Residency training in the traditional residency program is based at two hospitals: YNHH and the VA Connecticut Healthcare System hospital in West Haven. Residents who complete the traditional program most often continue onto specialized training and careers in one of the subspecialties. The traditional program traces its roots to the 1910s.

Primary Care Residency (three years):

The Primary Care Residency began in 1989 as part of the national movement encouraging internists to move beyond the hospital, see patients in ambulatory settings and deliver primary care. Residents completing the program receive nine months of training in outpatient blocks (compared to three months in the traditional program). They receive their inpatient internal medicine training at Waterbury Hospital and YNHH. The residents conduct their outpatient experience in the Waterbury community.

Medicine-Pediatrics Residency (four years):

Residents in this program receive two years of training in Internal Medicine and two years in Pediatrics. The inpatient rotations are conducted at YNHH. The Med/Peds clinic at St. Mary's Hospital in Waterbury is unique in that the entire family is seen. The program provides a different genre of training compared to mainstream family practice residency programs; the training is more in depth and more hospital based. Graduates of the Med/Peds Program see adult and pediatric patients in outpatient settings in addition to their hospital work.

Other training opportunities include:

RWJ Clinical Scholars Program:

The Yale Clinical Scholars Program has been training academic physicians for 30 years. In the next funding cycle, Yale will be one of only four universities nationally to host the Robert Wood Johnson Clinical Scholars Program. The program, which currently has nine scholars in residence, prepares physicians to become leaders in improving the nation's health and health care. Through coursework and practical experiences, the program provides opportunities to work across

disciplines and think creatively and rigorously about health care issues. The unique learning environment of the program prepares scholars to generate ideas and test hypotheses, work within communities, participate in policy development, and lead organizational change.

International Health Program:

The International Health Program (IHP) was founded in 1981 in an attempt to inspire a more global vision of health care in a traditional internal medicine residency program. During the past 23 years, more than 300 residents have participated in the program by working and teaching in underserved areas around the world. Rotations offer unusual opportunities for residents to enrich their knowledge and practice of medicine in settings with few resources. A study of Yale graduates of this program confirmed that IHP physicians were more likely than their counterparts to demonstrate social concern within their clinical practices as measured by their commitment to serve poor and immigrant populations. The program was expanded in 2001 with support from Johnson & Johnson.

RESEARCH

The Department of Internal Medicine has a robust program of research, with 349 active awards in total and 162 grants and contracts awarded by the National Institutes of Health. In 2003, much of the Department's research program moved into the new Anlyan Center for Biomedical Research and Education, a 457,000-square-foot building that is Yale University's second largest structure. The Department oversees a total of 174,449 net square feet throughout the medical campus, with 100,943 net square feet dedicated to research activities. In fiscal 2004, it received more than \$82 million in sponsored awards and contracts.

FY 2004 research awards by section and program			
Sections and programs	Total Awards	Total \$	% Total \$
Endocrinology & Metabolism	42	\$10,098,767	12.2%
Cardiovascular Medicine	43	\$9,616,698	11.7%
Rheumatology	50	\$9,147,409	11.1%
Pulmonary & Critical Care Medicine	32	\$8,123,703	9.8%
Infectious Diseases	33	\$6,928,203	8.4%
Nephrology	36	\$6,912,950	8.4%
Digestive Diseases	29	\$5,671,258	6.9%
Geriatrics	23	\$4,783,102	5.8%
GCRC	1	\$4,637,815	5.6%
General Internal Medicine	15	\$4,245,780	5.1%
Education	13	\$3,842,567	4.7%
Hematology	6	\$3,355,625	4.1%
Occupational Medicine	11	\$2,602,261	3.2%
Allergy & Clinical Immunology	7	\$1,380,164	1.7%
Clinical Scholar Program	8	\$1,194,292	1.4%
Total	349	\$82,540,594	100.0%

	NIH Awards	Total \$	% Total \$
Rheumatology	32	\$7,995,604	13.2%
Endocrinology & Metabolism	20	\$7,957,161	13.1%
Cardiovascular Medicine	23	\$7,040,258	11.6%
Pulmonary & Critical Care Medicine	14	\$6,159,497	10.2%
Nephrology	19	\$5,399,550	8.9%
Infectious Diseases	14	\$4,642,378	7.7%
GCRC	1	\$4,637,815	7.7%
Digestive Diseases	12	\$4,558,922	7.5%
General Internal Medicine	6	\$3,808,555	6.3%
Hematology	6	\$3,355,625	5.5%
Geriatrics	7	\$2,935,556	4.8%
Allergy and Clinical Immunology	3	\$1,099,833	1.8%
Occupational Medicine	4	\$843,965	1.4%
Education	1	\$115,841	0.2%
Total	162	\$60,550,560	100.0%

Source: Office of Grants and Contracts

CLINICAL CARE

Clinical care in the Department is provided by physicians in the Yale Medical Group, the multispecialty group practice of faculty physicians at the school, and ranges from primary care provided through Yale Internal Medicine Associates and the YNHH Primary Care Center to advanced subspecialty care delivered through the department's 12 academic sections (referenced above). The following exhibits profile overall patient care activity in the department and direct patient care billings and collections by clinical program and section:

FY 2004 patient care activities data	
Yale Medical Group	
Patients	32,776
Patient Encounters	119,955
Office Visits	50,823
Work Relative Value Units	224,135
Yale-New Haven Hospital	
Discharges	13,625
Days	76,854
Average Length of Stay (Days)	5.64
Number of Staffed Beds	194

Source: Yale Medical Group