



Residency Training Program in Pathology

JOHNS HOPKINS MEDICAL INSTITUTIONS

From the Director

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The first professor of pathology at Johns Hopkins, William H. Welch, set the standard for pathology training and practice in the United States, and indeed the world. His vision in correlating concepts of basic pathology with the anatomic and clinical manifestations of disease were critical in bringing the discipline of pathology into the 20th century. His successor as Baxley Professor and Director of Pathology, William MacCallum, further developed the concept of integrating anatomic, clinical and experimental pathology, as clearly demonstrated in his classic *Textbook of Pathology*.

Our current program attempts to build on the foundation established by these and subsequent Directors of Pathology at Hopkins; that is, to provide a truly integrated approach in the training and practice of pathology. We feel this is critical for bringing pathology into the 21st century where modern techniques at the molecular and cellular level will reduce distinctions between anatomic and clinical pathology and increase the importance of understanding basic pathologic mechanisms in reaching appropriate diagnoses from the study of tissues, cells, and fluids. The modern specialty of pathology, however does not just involve diagnostic medicine utilizing in vitro techniques, but also includes bedside patient care procedures such as apheresis procedures and fine needle biopsies. As such, it is important that the training of future pathologists includes a knowledge of technology and informatics, as well as an understanding of disease mechanisms and bedside skills, the identification of abnormalities in structure and function. Moreover, the importance of the pathologist as a consultant requires that training in pathology includes an emphasis on how to teach and interact



effectively with clinicians to improve the quality of patient care. Thus, the goal of our Residency and Fellowship Training Programs is to provide a comprehensive experience in understanding the pathobiology of disease, interpreting abnormalities in patient material, and learning how to teach effectively and consult.

The Johns Hopkins Medical Institutions and the Department of Pathology have the faculty, staff, and facilities, as well as the breadth and depth of clinical services and research activities, to provide the finest training in the country. This training also provides an experience that fully prepares the resident or fellow for a career in academic research, teaching, or clinical service. Just as the Department of Pathology at Johns Hopkins was at the forefront in changing pathology as medicine entered the 20th century, our current training program is designed to prepare our residents and fellows for the changes pathology faces in the 21st century. We view the mission of training our residents and fellows as one of our most important tasks and critical for our own future success. Therefore, we are committed to maintaining an environment that will attract the very best applicants and produce the very best pathologists. We are glad you are interested in training programs at Johns Hopkins and invite you to see firsthand what we have to offer.

The Residency Training Program

Clinical Training

The Department of Pathology at Johns Hopkins provides in-depth training in anatomic pathology (AP) and clinical pathology (CP), either combined or individually, to newly graduated M.D.s and those with previous postdoctoral experience. The program is designed to train a well-rounded pathologist through extensive clinical and research experience. House officers receive training in diagnostic anatomic and clinical pathology in a setting of clinical and academic excellence. The department also offers a combined anatomic pathology (AP) and neuropathology (NP) track.

Residents selecting combined AP and CP training have a fully integrated four-year program developed for their particular interest.

In the first two years, all residents are exposed to the major divisions of anatomic and clinical pathology. The first year generally focuses on AP training, including autopsy, surgical pathology and cytopathology, and CP. The second year emphasizes introductory rotations in CP. In the ensuing two years, the residents take advanced and elective rotations in both anatomic and clinical pathology. The final year of training provides substantial responsibility in anatomic and clinical pathology.

During the residency, there are multiple elective opportunities for training in the pathology of specific systems, including dermatopathology, molecular pathology, neuropathology, renal pathology/electron microscopy, immunohistochemistry and special electives including research.

The emphasis in CP is diagnostic interpretation of laboratory tests, interaction with clinical services, and understanding of technical methods, instrumentation, information systems, quality assurance and laboratory management. Additional training consists of rotations and electives that provide further experience in select areas and opportunities for research.



Core AP Rotations

- Autopsy
- Autopsy supervision
- Cytopathology
- Forensic pathology
- Gastrointestinal/liver pathology
- Gynecological/pediatric pathology
- Surgical pathology

Core CP Rotations

- Clinical chemistry
- Diagnostic immunology
- Hematology/coagulation
- Hematopathology
- Medical microbiology
- Molecular diagnostics & cytogenetics
- Transfusion medicine



The Residency Training Program continued...

Clinically relevant rotations, in both AP and CP are integrated throughout training, and residents attend and present at departmental and interdepartmental conferences. Several conferences play a major role in the Residency Training Program, including:

1. Weekly didactic sessions in both Anatomic and Clinical Pathology.
2. Daily autopsy gross conference.
3. Weekly surgical pathology case conference. (<http://pathology2.jhu.edu/sp>)
4. Daily and weekly multiheaded microscope and didactic conferences in autopsy and surgical pathology and in specialty areas.
5. Twice weekly work rounds and weekly seminars in clinical pathology.
6. Weekly grand rounds (<http://pathology2.jhu.edu/department/grandrounds.cfm>) with presentations by faculty, fellows and guest lecturers from within and outside the institution.
7. Research seminars.

In addition, all house staff participate in the teaching of medical students. The residents have assigned days to teach small groups of students in collaboration with faculty members.

Throughout the training program, residents assume progressively increasing responsibility for the management of cases under the close supervision of senior residents and attending faculty members. Two residents are selected to serve as the Chief Residents in Pathology.

Research Opportunities

The Department of Pathology maintains active basic, translational, and clinical research programs in a broad spectrum of anatomic and clinical pathology areas. Current basic research in the department involves molecular, genetic and cellular studies of neurologic, gastrointestinal, gynecologic, kidney-urologic, pediatric and hematologic diseases, as well as in transplantation, microbiology, immunopathology, toxicology, transfusion medicine, oncology and comparative pathology. Residents are encouraged to participate in research projects with faculty members in the department and with other mentors within the institution. A wide range of clinical and research fellowships also is available in the department, and more senior residents are encouraged to consider specialty training in one of these areas.



Facilities & Resources

The Johns Hopkins Hospital is a 990-bed general hospital that is a part of the Johns Hopkins Medical Institutions (JHMI). The Hospital provides care to the population of metropolitan Baltimore as well as to patients referred from regional and distant locations. Training in anatomic and clinical pathology is integrated in the Department of Pathology, which each year performs approximately 338 autopsies, 91,452 surgical and 39,780 cytopathology evaluations, and over 7.6 million laboratory tests. Laboratories are well-equipped for electron microscopy, fluorescence microscopy, flow cytometry, immunohistochemistry, biochemical and molecular biology, and modern automated diagnostic services. The department has 18 divisions including autopsy pathology, cardiovascular-pulmonary, clinical chemistry, comparative pathology, cytopathology, immunology, gastrointestinal-liver pathology, gynecologic pathology, hematology, informatics, kidney-urologic pathology, microbiology, molecular pathology, neuropathology, ophthalmic pathology, pediatric pathology, surgical pathology and transfusion medicine.

The Department of Pathology has more than 100,000 square feet of space for its service and research activities. Anatomic pathology services and support labs are located on floors of the Pathology Building and are contiguous with the clinical pathology laboratories located in the Meyer and Carnegie Buildings. A surgical pathology suite was opened in the Fall of 2000 as part of the Weinberg Comprehensive Cancer Center. In 2013, the new Core Lab and Blood Bank opened in the Sheikh Zayed Tower Building. The Pathology Residents and Fellows Resource Center is centrally located adjacent to the Pathology Administration Offices on the fourth floor of the Pathology/Carnegie Building. The resource center includes a 3,000-square-foot office area with cubicles for all house staff; an adjacent house staff workroom with computers and microscopes, the Training Program Office, for the Coordinator, chief residents and housestaff secretary; a lounge, mail room and conference room with modern video technology. The Pathology Library and reading room also is on the fourth



floor of the Pathology Building. More than 25 faculty members of the department have their basic research laboratories in 67,050 square feet in the Richard Ross Research Building, the Koch Cancer Research Building, the Bunting Blaustein Cancer Research Building and the Sheikh Zayed Tower. Conference rooms are available in all buildings.

The Johns Hopkins Bayview Medical Center, a JHMI institution located two miles from The Johns Hopkins Hospital, provides opportunities for selected AP and CP rotations. Pathology services at Bayview are provided by full-time Hopkins faculty members.

More than 104 full-time primary faculty and numerous secondary and part-time faculty provide internationally recognized expertise in diagnostic pathology as well as clinical, translational and basic research. They provide the basis for training residents interested in careers in academic pathology, research, and/or community practice.

Johns Hopkins

Medical Institutions

The Johns Hopkins Medical Institutions were the vision - and the gift - of Quaker merchant Johns Hopkins, who wished to unite in a single enterprise a threefold mission: to produce superior physicians, to seek new knowledge for the advancement of medicine, and to administer the finest patient care.

The Johns Hopkins Hospital opened in 1889, followed years later by the Johns Hopkins University School of Medicine. Together, they ushered in a new era in medicine. Moving from laboratory to lecture hall to the patient's bedside, students and residents brought the scientific approach to medicine and received firsthand training in the diagnosis and treatment of patients. The "Hopkins experiment" changed the pattern of medical education in the United States and had a positive impact on patient care. Within two decades, the Hospital and School of Medicine were models of medical and surgical care and physician education for the nation. That distinction remains intact more than 100 years later.

A new era in disease prevention began when the School of Hygiene and Public Health, the third of the Hopkins Medical Institutions, was established in 1916. It was the nation's first graduate training and research institutions devoted solely to health promotion among groups of people, not just individuals.

Two of the most far-reaching advances in medicine were made at Hopkins. The Nobel Prize-winning discovery of restriction enzymes gave birth to the genetic engineering industry and can be compared, some say, to the first splitting of an atom. In addition, the discovery of the brain natural opiates has triggered an explosion of interest in neurotransmitter pathways and functions. Other significant accomplishments include the discovery of vitamin D, the identification of the three types of polio virus, the development of closed-chest heart massage (CPR), and the



first "blue baby" operation which opened the way to modern heart surgery. Hopkins was the birthplace of many medical specialties, including neurosurgery, urology, endocrinology and pediatrics.

Today, the Hospital, the School of Medicine, the School of Public Health and the School of Nursing constitute the Johns Hopkins Medical Institutions which are located on the East Baltimore campus. The Welch Library, also located on this site, collects current scholarly information, primarily electronic which supports the research and clinical needs of its clients. The collection includes more than 5,000 electronic journals, more than 400 databases, and more than 2,000 electronic books.

While a heritage of excellence is important, the Johns Hopkins Medical Institutions do not cling to the past. In the Spring of 2013, the new 1.6 million square foot Sheikh Zayed Tower and

The Charlotte R. Bloomberg Children's Center officially opened so that they can better respond to health care needs of today and tomorrow. Already, great strides have been made by our faculty in transplantation, in treating once recalcitrant cancers, and in forestalling the most common forms of blindness. The School of Public Health is concerned with health problems related to the environment and improvement in the organization and delivery of health services. Although Hopkins draws patients and scholars from all over the globe, the Medical Institutions remain committed to serving the health needs of Baltimore and Maryland.

Department History

The Department of Pathology has played a significant role in the Johns Hopkins Medical Institutions since the opening of the Hospital in 1889 and the School of Medicine four years later. Indeed, Pathology was one of the original departments created. Moreover, the first endowed professorship at The Johns Hopkins University was the Baxley Professor of Pathology, the first professor to be appointed in the School of Medicine was the Professor of Pathology, and the first hospital building to be opened and operational was the Pathological Building.

The first Professor of Pathology was Dr. William H. Welch, a remarkable man whose influence on the Hospital and School of Medicine remains unsurpassed. Because the Pathological Building was completed in 1886, three years before the Hospital was opened and seven years before the first class of medical students was enrolled, Dr. Welch instituted a series of postgraduate lectures and began investigative work in a variety of areas. He was ably assisted by William T. Councilman, who later was appointed Shattuck Professor of Pathological Anatomy at Harvard University. Over the ensuing years, a group of young physicians was assembled whose work and subsequent careers had a profound effect on American medicine, and pathology in particular. They included Francis Mall, William S. Halsted, Simon Flexner, Joseph Bloodgood, Eugene Opie, W.G. MacCallum, Dorothy Reed, Homer Wright and

Walter Reed, to be followed by George Whipple, Milton Winternitz, Stanhope Bayne-Jones, Ernest Goodpasture and numerous other luminaries.

The range of the Department's activities has expanded considerably since its founding. This is nowhere more apparent than in the Residency Training Program. Significant expansion of training has occurred in surgical pathology and gynecologic pathology, together with the advent of training in interpretation of liver, renal, gastrointestinal and heart biopsies. Cytopathology, neuropathology, immunopathology, molecular pathology, forensic pathology, fine needle aspiration, and specialty areas in clinical pathology were all introduced within the last 30 years to keep pace with the increasing scope of pathology. Research training has been expanded and fully integrated into the house staff training programs.

The traditions of research and teaching started by Dr. Welch have been maintained conscientiously by successive directors: William G. MacCallum (1917-1944), Arnold R. Rich (1947-1958), Ivan L. Bennett, Jr. (1958-1969), Robert H. Heptinstall (1969-1988), John H. Yardley (1988-1992), Fred Sanfilippo (1993-2000), J. Brooks Jackson (2001-2014), and Ralph H. Hruban (2015-present).

The service, research and training activities in pathology at Hopkins are thoroughly integrated. The clinical laboratories are fully merged within the Department of Pathology; the research activities in the department are integrated by disciplines with divisions representing the major academic and teaching efforts and spanning all service divisions in the Hospital; fellow-ship training programs are focused on organ systems or service subspecialties. The Residency Training Program is restructured to provide an integrated experience in anatomic and clinical pathology, and to increase responsibility for house staff in each service rotation following an initial experience in all areas during the first two years.

Living in Baltimore

Baltimore is a spirited city - a unique blend of historic charm, ethnic heritage and urban vitality. In the midst of a sweeping renaissance that has brought a lively, cosmopolitan atmosphere, Baltimore has retained the distinctive flavor of its past as a port city on the Chesapeake Bay. The nationally acclaimed Inner Harbor is the centerpiece of the city's renaissance.

Surrounded by such landmarks as the National Aquarium, the Maryland Science Center, the U.S.F. Constellation and the Baltimore Maritime Museum, the Inner Harbor is a waterfront showcase, featuring shops, restaurants, harbor cruises and a variety of activities year-round. Summer brings a splash of colorful festivals celebrating Baltimore's cultural and ethnic heritage. Fort McHenry, birthplace of "The Star-Spangled Banner," offers a glimpse of Baltimore's past, as does the B&O Museum - which celebrates the inception of the railroad - the Maryland Historical Society, Peale Museum and Carroll Mansion. Visits to the homes of Edgar Allan Poe, Babe Ruth and H.L. Mencken provide a look into the lives of some of Baltimore's most famous citizens.

Baltimore's cultural scene is as diverse and alive as the city itself. The Meyerhoff Symphony Hall is home of the Baltimore Symphony Orchestra. The elegant Lyric Opera House, the Peabody Conservatory and the outdoor stages of Merriweather Post Pavilion, Pier 6 and Oregon Ridge play host to every musical taste from classical and jazz to country and rock.

Theater-goers will find the bright lights of Broadway at the France-Merrick Performing Arts Center-Hippodrome. Center Stage, the city's outstanding repertory company, as well as the Theatre Project, Arena Players and numerous other theaters offer a wide variety of entertaining productions from classic and contemporary to modern dance and experimental performance works.



For lovers of the visual arts, the renowned Cone Collection of early 20th-century works by Matisse and Picasso is housed at the Baltimore Museum of Art. The Walters Art Museum holds a magnificent collection of Oriental, Egyptian and European art and artifacts. Exhibitions at the Maryland Institute College of Art and numerous private galleries around town make for a lively contemporary art scene.

Sports fans enjoy Orioles baseball, Ravens football, and the Blast indoor soccer team along with the yearly Governor's Cup yacht race on the Chesapeake Bay. The Preakness, second jewel in the Triple Crown of Horse Racing, is run each year at Pimlico Race Course. Hopkins lacrosse and University of Maryland football and basketball also enliven the sports scene.

AMTRAK services Baltimore at Penn Station, close to the Hospital. There is frequent service to Washington, D.C. (30-minute trip), to Philadelphia (1 1/2-hour trip), and New York (2 1/2-hour trip). The Baltimore-Washington Thurgood Marshall International Airport (BWI) is 20 minutes from the city and offers a full range of national and international flights daily.

Housing

While the Hospital does not provide on-campus housing for house staff, there are numerous attractive and affordable places to live within easy commuting distance. Throughout the city, many older neighborhoods, some dating back to 1799, have been carefully restored and now offer a diverse mix of housing types to rent or buy. For those who prefer a more suburban environment, there are many residential communities within 20 minutes of the Hospital.



Neighborhoods:

Fells Point, just south of the Hospital, is one of the few remaining urban waterfront residential communities on the East Coast. The rowhouses and apartments of neighborhoods such as Butcher's Hill and Canton provide exceptional views of the harbor and city skyline.

South and west of the city, the historic neighborhoods of Federal Hill, Otterbein and Ridgeley's Delight have undergone extensive renewal in recent years and now offer a charming mix of row home and apartments, both old and new.

Mount Vernon, an elegant community of streets lined with restaurants, shops and galleries, is the cultural and historic heart of Baltimore City. Once the home of such notable figures as Emily Post and George Peabody, Mount Vernon today offers a variety of historic townhouses, modern high-rises, condominiums and apartments.

Bolton Hill, to the northwest, recalls Baltimore's Victorian era with stately 19th-century brownstones and tree-lined streets.

The neighborhoods surrounding the Johns Hopkins University present an eclectic mix of students, professionals and families. Housing ranges from the brownstones, row homes and high-rises of Charles Village to the garden

communities of Roland Park and Homeland. A shuttle service runs daily from the University to the medical campus.

Farther north and west of the city, but still within easy commuting distance of the Hospital, the suburban communities of Towson, Mount Washington and Owings Mills offer a wide variety of housing, including highrise and garden apartments, townhouse complexes and single-family homes.

Wherever you choose to live, a touch of open space is never far away. More than 30 parks are scattered about the city from the rolling landscapes of Druid Hill Park, Patterson Park and Lake Roland to numerous community commons and squares with fountains and statuary.

Recreational Activities

Living in Baltimore is ideal for taking advantage of the many recreational activities available in Maryland. In fact, there is hardly a pastime boating, fishing, skiing, hiking-that cannot be found within an hour or two of the city.

The Chesapeake Bay, bountiful with seafood including Baltimore's favorite oysters and blue crabs, offers swimming, sailing, motor boating and fishing. Along the Eastern Shore, flat terrain dotted with country towns and fishing villages makes for delightful bicycling and sightseeing. The beaches of Maryland, Delaware and New Jersey are easy day trips from Baltimore, as is Assateague Island, Virginia, a seashore wildlife preserve where campers can view pelicans, herons and wild ponies roaming free.

Historic Annapolis, the state capital and home of the United States Naval Academy, is a town for architecture buffs, boaters and seafood lovers. Only 45 minutes from Baltimore, it offers beautifully preserved 18th-century mansions and historic landmarks along with harbor cruises, sailing schools, antique shops and restaurants.

Washington, D.C., with its myriad historical and cultural attractions, is about an hour's drive from Baltimore. In addition to the Air and Space Museum, the Museum of American History, the National Gallery and the Hirshhorn and Phillips collections, Washington and its Georgetown area offer a wide variety of restaurants, specialty shops and bookstores.

The state parks of Western Maryland, between the Blue Ridge and Allegheny Mountains, are spots for hikers and campers. Deep Creek Lake, a year round resort, offers a variety of water sports in the summer and skiing both downhill and cross-country in winter at nearby Wisp Resort. The C&O Canal, which extends from Cumberland in Western Maryland to Georgetown in Washington, D.C., offers picnicking, fishing and horseback riding.



Canoeing and rafting are especially popular along the C&O Canal and on the white water of the Potomac and Youghiogheny Rivers. A little closer to home, the rolling countryside just outside of Baltimore offers a variety of opportunities for relaxation, including horseback-riding, paths for bicycling, jogging and hiking, and numerous parks and reservoirs for a quiet afternoon in the fresh air and sunshine.

In addition, the Denton A. Cooley Recreation Center, located on the Hospital campus, offers complete recreational facilities, including tennis courts and an Olympic size outdoor swimming pool as well as handball, racquetball, squash and basketball courts, an elevated running track, exercise machines, whirlpool and sauna.

Application Process

Each year, the Department of Pathology has six to eight PGY-1 openings. All positions are filled through the National Resident Matching Program (NRMP). The standard time schedule for the match is followed, and the department abides strictly by the rules and regulations of the NRMP. Applicants are strongly encouraged to complete their application in late summer or fall prior to graduation.

Applications, official transcripts, USMLE scores, Dean's letter and three letters of recommendation must be submitted through the Electronic Residency Application Service (ERAS) [<http://www.aamc.org/audienceeras.htm>]. Foreign applicants must contact the ECFMG office in order to access ERAS.

All inquiries about the application process or training program should be directed to:

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