



PATHOLOGY inSIGHT

Alumni Bulletin of Wake Forest University School of Medicine Department of Pathology

Primate Center Expansion Complete

It's taken more than 40 years, but the 74-acre turkey farm purchased in the early days of Comparative Medicine at Bowman Gray School of Medicine to house a pigeon colony and a growing population of monkeys is now a 200-acre campus with 32 buildings and nearly 150 faculty & staff.

Known informally as "the monkey farm," the Friedberg Campus was designated the Comparative Medicine Clinical Research Center in 1988 and grew into a nationally recognized facility for studying animal models of



The Friedberg Campus is the site of the Wake Forest University Primate Center

human diseases.

In 2007 the center was renamed the Wake Forest University Primate Center (WFUPC), reflecting its focus on primate research. Jay Kaplan, PhD, of Comparative Medicine, is its Director. The WFUPC is closely affiliated with Wake Forest's emerging Translational Science Insti-

tute (see page 2 for more about the TSI).

A just-completed \$3 million expansion to the Primate Center's campus added a new building and improved the housing facilities where about 1200 nonhuman primates live in a variety of settings.

There are two breeding colonies at WFUPC supported via P40 grants from the National Center for Research Resources (NCRR). They are specifically designated as national research resources, and both intramural and extramural collaborations with other researchers are

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VOLUME II ISSUE 1

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Rapid Tissue Processor Revolutionizes Lab

The Pathology Department's new Sakura Tis-



Laboratory Manager Lamar Jones with new Tissue-Tek Xpress

sue-Tek® Xpress® Rapid Tissue Processor doesn't look particularly exotic – it looks like a large laboratory cabinet with a monitor display and some glass doors. But systems like this one are revolutionizing laboratory tissue processing and slide preparation – dramatically decreasing turnaround times, reducing the use of (and exposure to) hazardous chemicals,

and producing high quality slides for analysis as well as research purposes.

This particular model, purchased recently by the Pathology Department, can process about 20 tissue samples in an hour. And thanks to its "continuous throughput" feature, technicians won't have to wait until there is a full batch of a particular tissue type to start

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Past issues of Pathology inSight are available online at <http://www.wfubmc.edu/pathology/alumni/>

The View from the Department Chair



Our mission here is to provide the best possible diagnostic care, educate students and

train physicians in pathology and its subspecialties, and to conduct cutting edge research. This issue of Pathology inSight describes some of our latest efforts in all of these areas. Many individuals contribute to the success of this department. You can find out more about them on page 7.

We have begun validating our new Rapid Tissue Processing technology with much success: high-quality results and faster turnaround times will make for better patient care.

Our involvement with the WFUHS Translational Research Institute is another way in which the Pathology Department is contributing to the improvement in patient care practices. We have a long history of collaborative research with other departments as well as researchers at other institutions; we are excited to be a part of the TSI's "research team" approach to conducting science.

Pathology's three research sections continue to grow. The Section on Lipid Sciences has moved downtown to the state-of-the-art Richard H. Dean Biomedical Research Build-

ing in the Triad Research Park, and Comparative Medicine's Friedberg Campus has become the WFU Primate Center, with major facility upgrades and expansions in its non-human primate populations. Tumor Biology's researchers remain on the Hawthorne Campus, where they recently released major findings regarding genetic factors in certain cancers and are set to begin a clinical trial of white blood cell transfusions as a cancer treatment, based on findings from their cancer resistant mouse colony.

-A. Julian Garvin, MD PhD

Find us online at <http://www.wfubmc.edu/pathology>

From the Bench to the Bedside: Translational Research

The Wake Forest University Translational Science Institute (TSI) isn't so much a place as it is a new conceptual home for research, one that opens up and welcomes collaboration across traditional departmental, academic, and administrative – and even institutional – boundaries.

The Department of Pathology's faculty are involved with the TSI at every level: Thomas Clarkson, DVM, (Comparative Medicine) is a member of the Leadership Council, and the department is well represented on the teams that support the Translational Programs. In all, about 20 Pathology Department faculty are involved in five of the twelve projects that have re-

ceived TSI funding so far.

Wake Forest is one of 52 academic medical centers across the country to receive planning grants to en-

hance their efforts to join the National Center for Research Resources (NCRR)'s consortium of research institutions; the goal of the NIH-funded

program is to transform the way in which clinical and translational research is conducted, resources are shared, and results find their way into patient care practices.

There are currently ten *Translational Programs* in the works (visit

the TSI website at <http://www.wfubmc.edu/tsi/> for a complete list of programs), and Pathology Department faculty from the Sections on Lipid Sciences and Comparative Medicine play roles in four of these programs:

The Nonhuman Primates as Models of Human Disease Program supports TSI investigators who use primate models and data for their research as well as for future research development. Comparative Medicine's Jay Kaplan, PhD, Director of the WFU Primate Center, and Michael R. Adams, DVM, are co-leaders of the program, along with Anthony Comuzzie, PhD, of the Southwest Foundation for Biomedical Research.

The Research Design and Biostatistics Program, which will provide a single point of access to TSI investigators for support resources in

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The goal of the TSI is to transform the ways in which research is conducted, resources are shared, and results find their way into patient care practices.

Endowment fund supports resident research activities

Thanks to a generous legacy from the estate of Dorothy Ann Myers Morehead, widow of Dr. Robert P. ('Moose') Morehead, Pathology residents now have access to about \$10,000 a year to support their research activities and any related expenses, including travel to conferences to present their findings.

For example, third-year resident Dr. Amy C. Parsons recently used these funds to attend the 11th Joint Meeting of the International Society of Dermatopathology in San Antonio, where she presented a case report on renal cell carcinoma with no known primary tumor. Her pilot study on the role of contrast agents in nephrogenic systemic fibrosis — also supported in part by the Morehead Fund — recently led the FDA to require a warning label on these products.

Residents apply for money from

the Morehead Fund whenever they request research or travel support.

A similar endowment has been established to support faculty research activities and related expenses.

Your contributions to the Department or to directly to the Morehead Fund will help to promote and sustain this important activity in the Residency Training Program. You can make a donation online at <http://www.wfubmc.edu/onlinegift/> — simply note "Pathology Morehead Fund" or "Pathology Faculty Research Fund" in the designation field of the online form. If

you would like to consider establishing a similar fund in the name of a loved one, or you wish to include the Department of Pathology in your will or estate planning, please contact John Gillon, Senior Director of Gift Planning, WFUHS (1-800-899-

7128 or jgillon@wfubmc.edu).

Dr. Morehead succeeded Dr. Coy C. Carpenter as Chair of Pathology in 1946, when Dr. Carpenter became Dean of the School of Medicine. One of the original nine full-time faculty when the medical school was established in Winston-Salem in 1939, Dr. Morehead retired in 1973, having served the longest tenure of any Wake Forest medical faculty member until that time.

After his retirement, Dr. and Mrs. Morehead initiated a small endowment fund specifically to support residents' research efforts. Dr. Morehead died in 1998. In honor of her husband's loyal dedication to the department, Mrs. Morehead left a generous endowment to the fund upon her own death in 2005, and the fund's interest income is available for the research activities of all residents in the training program.

(TSI — Continued from page 2)

study design, data analysis, and data interpretation.

The Research Education, Training and Career Development Program will recruit and prepare researchers to conduct clinical and translational science (CTS) and will educate health professionals and research staff about CTS and implementation of best practices.

The Translational Technologies and Resources Program links biomolecular science to patient populations through efficient integration of infrastructure and human insight via its Technology Resource Groups.

Translational Teams: In addition to the Translational Programs, a total of 12 multidisciplinary research teams have received TSI funding to pursue or continue their work. Several of the teams include scien-

Learn more about the Translational Science Institute online
at <http://www.wfubmc.edu/tsi/>

tists from the Department of Pathology, along with investigators from WFU's Reynolda Campus, Virginia Tech, and the Virginia-Maryland Regional College of Veterinary Medicine.

Four teams were selected for \$125,000 *Science Awards*; these two-year awards support research projects that are preparing to seek more competitive extramural funding. Those involving Pathology Department faculty include studies in tissue engineering, experimental therapies for aggressive brain tumors, and potential stem cell therapy in a canine model of Duchenne muscu-

lar dystrophy.

Eight \$50,000 *Development Awards* went to teams working on innovative, early-stage research. These projects include analysis of a new approach to data sharing and informatics as well as investigation of an immune responses to genital papilloma virus infection.

The TSI structure promises to reward innovation and cooperation among scientists, and to speed the translation of scientific results into useful clinical procedures and products, and ultimately to enhance the standard of care.

Section on Lipid Sciences Moves Downtown



The Section on Lipid Science's facilities are currently located in the newly-renamed Richard H. Dean

Biomedical Research Building in downtown Winston-Salem's Piedmont Triad Research Park. The combination of superb facilities with proximity to colleagues and other resources provides a rich and vibrant interdisciplinary environment for Lipid Sciences' training programs as well as its research activities.

The Section, headed by Lawrence Rudel, PhD, has grown out of the Pathology Department's participation in fifty years of interdisciplinary research into the role of lipid metabolism in atherosclerosis and other human diseases.

Grants to the Lipid Sciences faculty and postdoctoral researchers accounted for about a third of the department's research funding in

FY2007.

The Section's education and training efforts include the PhD in Molecular and Cellular Pathobiology (or MacPath) and the postdoctoral Integrative Lipid Sciences, Inflammation, and Chronic Diseases Training Program, both of which are directed by John Parks, PhD. Gregory Shelness, PhD, is the associate director of the training program. Both programs benefit from the natural, ongoing collaborations and common research interests of a number of the established investigators located in the new facility.

The building, formerly known as "Biomedical Research Facility 1," opened in May of 2006. It has five stories, contains about 180,000 square feet, and was built at a cost of \$72 million. In addition to the Section on Lipid Sciences, it houses the offices and laboratories of the Wake Forest Institute for Regenerative Medicine as well as non-university tenants.



The Richard H. Dean Biomedical Research Building.

The Richard H. Dean Biomedical Research Building was the sixth addition to the Piedmont Triad Research Park, a planned 240-acre research campus. Expected to reach full development in the next two decades, the research park will feature up to five million square feet of laboratory, office, and mixed-use space as well as to provide many new jobs in the Triad and have a substantial economic impact on the region, according to planners.

Find more online at <http://www.wfubmc.edu/pathology/lipidsci/>

(Tissue Processor — Continued from page 1)

the fully automated system running.

A sample arriving from the operating room can be grossed, processed into slides ready for any further procedures such as blocking, microtomy, or special stains – and available for the pathologist to read in as little as two hours, making 'same day' diagnosis a possibility.

Up until very recently, laboratories have had to either immediately freeze surgical tissue samples to prepare slides for analysis or "fix"

them using large quantities of hazardous chemicals like formalin and xylene to prepare them for interpretation and/or storage. Freezing, however, doesn't always allow for precise selection of samples for analysis, and formalin fixation is not optimal for preserving a specimen's DNA, RNA, and the proteins necessary for the newest molecular diagnostic and classification techniques used in diagnosis and research.

The new system is also safer for technicians and better for the environment. It substantially reduces

the volume and toxicity of the chemicals required to process tissue samples; the Tissue-Tek® Xpress® requires about seven and a half liters of reagent solution (isopropyl alcohol, polyethylene glycol, mineral oil, and acetone) compared to more than thirty liters of reagents (including formalin and xylene) required to process a similar number of tissue samples in the lab's previous tissue processing system. And because it heats the samples uniformly with microwave technology, it uses less power than the old system as well.

Tumor Biology: New Frontiers in Cancer Research



With strong research and funding links to other research sections, Centers, and departments within the institution,

the Section on Tumor Biology's faculty are engaged in cutting-edge research in the causes of cancer, its treatment, and diagnosis. Mark Willingham, MD, is the head of the Section.

Research: Recently in the news was Kazushi Inoue, MD PhD, whose lab's findings include the first documentation of the involvement of the Dmp1 gene in human lung cancers; his team, which includes investigators from the Center for Human Genomics, found that the gene is non-functional in about 35 percent of non-small-cell lung cancers. Earlier studies with mice indicate that the gene activates tumor suppressors (known as p53 and Arf), and they believe that when the Dmp1 gene is deleted or is not functional, these suppressors are unable to stop

tumor growth. Dr. Inoue's team is currently investigating the role of Dmp1 in breast cancers.

Research continues involving the colony of cancer resistance mice; the team, led by Zheng Cui, MD PhD, has documented the immune system activity in the mice as they destroy the cancer cells. They have established that the resistance can be successfully transferred from one individual to another, and that this property diminishes as the mice age.

Based on these findings, Dr. Cui's team about to begin seeking human volunteers for a clinical trial to determine the safety and efficacy of white cell transfusions from healthy donors as a cancer therapy.

Facilities: Two of the Section's lab facilities, the Cellular Imaging Core and the Viral Vector Core Lab, are considered Core Laboratories under the Comprehensive Cancer Center grant, which supports the efforts of affiliated investigators who use these facilities in their research. The Viral Vector Core Lab uses viruses to transfer very small pieces of ge-

netic information for research purposes. The Cellular Imaging Core is a full-service microscopy facility available institution-wide for diagnostic as well as research purposes. Formerly known as Micromed, the facility includes advanced equipment as well as skilled technical support staff for both electron and confocal microscopy.

Diagnostic Services: Dr. Willingham is the director the Molecular Diagnostics and the Polymerase Chain Reaction (PCR) Laboratories. PCR-based technology enables the detection of DNA specific for certain microorganisms or genes; the Molecular Diagnostics lab offers *in situ* hybridization procedures, immunofluorescence, and a variety of antibodies for immunoperoxidase procedures. The Steroid Receptor Laboratory, under the direction of Tim Kute, PhD, offers tests for estrogen and progesterone receptors; Her-2-neu and MIB-1 studies by immunohistochemistry, and flow cytometry on primary and metastatic breast carcinomas.

(Primate Center — Continued from page 1)

strongly encouraged. A third colony is supported by investigator-initiated research grants. The Center also maintains an extensive repository of tissue samples and data from over 11,000 monkeys – both New and Old World species, and this information is available to researchers as well.

The larger of the two NCRR-supported breeding colonies, which arrived here from UCLA last February, includes over 400 vervets, also known as African green monkeys (*Chlorocebus aethiops*); they live in 16 breeding groups descended from a group of

vervets born in St. Kitts, West Indies, and acquired in the mid-1970s. This unique colony is of particular inter-



New arrivals: a colony of vervets (African green monkeys) has taken up residence at the WFUPC.

est to researchers, in part because its genetic history is so well documented. The population has been managed to optimize studies about diet, temperament, aging, and chronic disease risk.

The second colony consists of specific pathogen free (SPF) cynomolgus monkeys (*Macaca fascicularis*); these animals are defined by their absence of certain diseases, and the colony will facilitate and expand research on fetal and early developmental programming of risk for chronic and degenerative diseases.

WFUPC's colony of bonnet macaques (*Macaca radiata*) is one of only two such colonies in the US; the ani-

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Alumni Notes

Pathology Fellows:

Dr. Jolene Clouse, this year's Forensic Pathology fellow, will be leaving Winston-Salem this summer for Indianapolis, IN, to work as a forensic pathologist there.

Dermatopathology fellow **Dr. Sarah Walsh** is returning to St. Louis, MO, where she will be joining Drs. Daniel Santa Cruz and Mark Hurt at Cutaneous Pathology.

Dr. Ezra Ellis, hematopathology fellow, will be moving with his wife and their one-year-old daughter to Idaho Falls, ID, where he will join a private practice with three other pathologists that covers several hospitals and handles 24,000 surgical cases a year. He notes that Idaho Falls is close to the Tetons, Yellowstone, and Sun Valley and encour-

ages fellow WFU Pathology alumni to stop by and say hello when passing through town.

Pathology Residents:

Dr. Franklin Moore will be completing his residency and beginning a fellowship in Molecular Genetic Pathology at Oregon Health & Sciences University in Portland, OR.

Dr. Zhaoli Lane will be joining the Pathology staff at the Henry Ford Hospital in Detroit, MI, upon completion of her residency.

Pathology Faculty:

Former faculty member **Dr. Greg Davis** recalls his time and colleagues here at Wake Forest during the early 1990s with great respect

and affection. Dr. Davis is now a Professor of Pathology and Laboratory Medicine at the University of Kentucky. He is currently Director of Residency Training, Autopsy, and the Forensic Consultation Service. In addition, he reports that he is Chair of the College of American Pathologists' Forensic Pathology Committee and the Technology Assessment Committee.

Are you a Pathology Department graduate? Former Pathology Faculty, Resident, or Fellow? Let us know what you're up to!

Email Pathology inSight at pathalumni@wfubmc.edu or write to us at the address on the back page.



A family group of Cynomolgus monkeys

Primate Center—(Continued from page 5)

mals in residence here are from a multigenerational pedigree, and have been comprehensively characterized for their growth, physiology, neurochemistry, and behavior. The existence of several distinct family

groups of these monkeys allows researchers to study the interplay between genetic and environmental factors.

In addition to the Tissue and Data Repository and the Colony Resources, the WFUPC supports and encourages extramural collaboration through its Visiting Scholar Program. Several post-DVM training programs, including a clinical residency in the care of nonhuman primates, are conducted at the WFUPC campus.

Most recently, the WFUPC has initiated a Community Outreach Program for children in grades K-12 and their teachers. Visits and tours are designed to educate young visitors about careers in science as well as about nonhuman primates and their role in biomedical and translational research.

Learn more about the Primate Center and its research activities at <http://www.wfubmc.edu/wfupc/>.

Pathology Department Staff: Who are we?

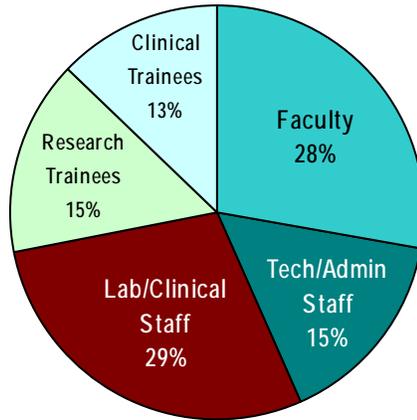
The Department of Pathology currently employs 188 people, including 52 faculty members, 51 clinical and research trainees, 54 laboratory and clinical staff, and 29 technical support and administrative staff.

Nearly half of the faculty belong to the Anatomic and Clinical Pathology (AP and CP) groups, which provide clinical and diagnostic services for hospital patients in addition to their teaching, training, and research activities.

Anatomic Pathology includes the Autopsy Service, Surgical Pathology, Hematopathology, and Cytopathology, as well as subspecialists in Dermatopathology, Neuropathology, and Renal Pathology.

Clinical Pathology includes the Blood Bank and the Blood & Marrow Transplant Service as well as

WFUHS Pathology Staff & Faculty



Clinical Chemistry, Microbiology, and the Molecular Diagnostics Labs.

The Section on Comparative Medicine includes clinical specialists in Veterinary Pathology and Laboratory Animal Medicine in addition to its research faculty. Lipid Sciences and Tumor Biology are primarily research faculty.

Almost half of the department's current trainees are house officers and fellows in the Pathology Residency Training Program, with the remainder including graduate students, research fellows, and clinical fellows and residents in the Veterinary Pathology, Laboratory Animal Medicine, and Comparative Medicine programs.

The laboratory support group includes not

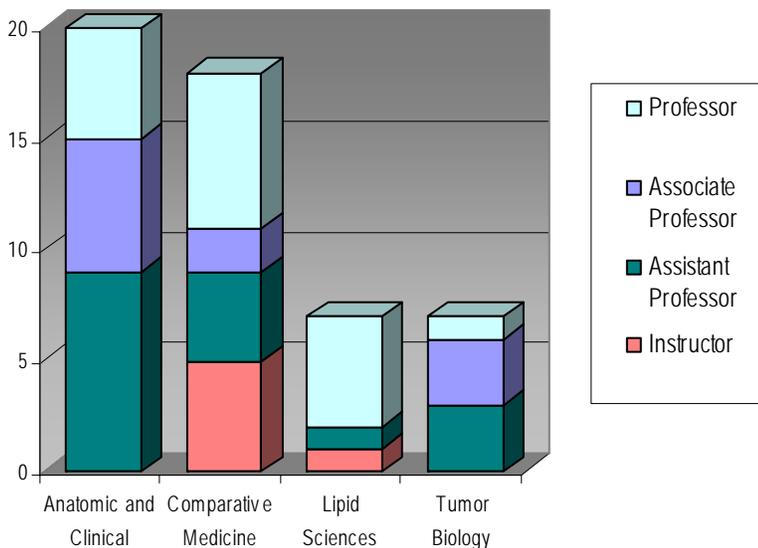
only numerous lab technicians, but also research assistants, a medical/autopsy photographer, and specialized electron microscopy technicians.

Administrative and technical staff make up only 15% of the department's personnel. The administrative staff manages the clinical billing; administers the department's financial, human resources, and payroll responsibilities; and provides administrative and clerical support throughout all the sections.

The technical staff supports the department's computers, servers, and video conference and A/V gear. They also provide data entry and processing for both clinical and experimental data and ensure that all patient-related data use complies with HIPAA guidelines.

The technical support group also manages the pathology image archives, handles special programming needs, and maintains the Department's websites. You can find links to all the departmental webpages online at <http://www.wfubmc/pathology/>.

Faculty Tenure by Section



FIND US ONLINE:

<http://www.wfubmc.edu/pathology/alumni/>

ONLINE GIFTS:

To make an online gift to Pathology, go to <http://www.wfubmc.edu/onlinegift>. In the designation field, please note "Pathology Discretionary Fund."

LEAVE A LEGACY:

You can make a lasting and profound impact on groundbreaking research, state-of-the-art medical education and outstanding patient care. Consider including Wake Forest University Health Sciences/Department of Pathology in your will, or naming us beneficiary of a retirement plan or insurance policy, or establishing a charitable annuity or trust that will pay you an income for life. For more information, please contact John Gillon, Senior Director of Gift Planning, Wake Forest University Health Sciences, 800-899-7128 or jgillon@wfubmc.edu.



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In the Next Issue:

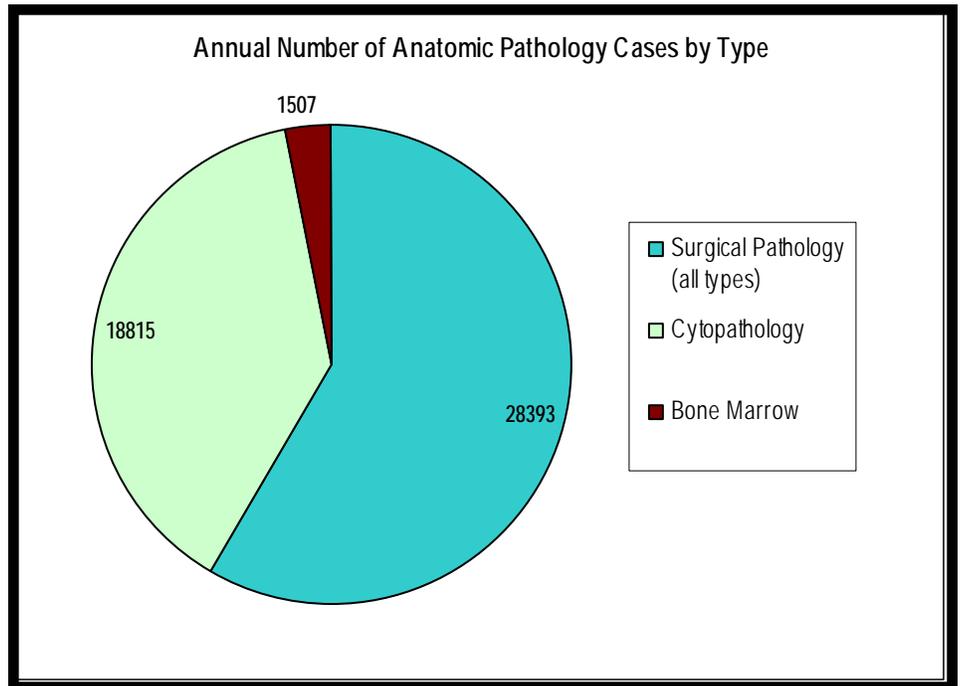
Our Fall, 2008 issue will include profiles of retiring faculty members, introductions to new residents and fellows, and news from our graduate programs as well as research highlights, noteworthy publications, and recent awards and honors.

Please send any updates, information, and story ideas to us at the address at left, or email us at pthalumni@wfubmc.edu

- the Editors

Pathology inSight is produced twice a year by the WFUHS Department of Pathology. If you would like to be added to (or removed from) our mailing list, please email, call or write to us and let us know.

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