

MASK PATHOLOGY REVIEW

1st Quarter 2019

Initiatives
Innovations
Accomplishments

12 ATTENDINGS
1,678 PERSONAL CONSULT CASES SIGNED OUT YEARLY
450 LAST AUTHOR PUBLICATIONS
21,980 DEPARTMENTAL CONSULTS SIGNED OUT YEARLY
600 FIRST AUTHOR PUBLICATIONS

4 TEXTBOOKS
AUTHORED

WOMEN IN PATHOLOGY

3 INSTRUCTORS

17 DIRECTOR
POSITIONS

51 FACULTY MEMBERS
14 ASSOCIATE ATTENDINGS
31,299 SURGICAL PATHOLOGY CASES SIGNED OUT YEARLY
1 SERVICE CHIEF ATTENDING
21 ASSISTANT ATTENDINGS



Memorial Sloan Ketterin
Cancer Center

MARIA E. ARCILA, MD

Unconventional Wisdom

Dr. Maria Arcila brings a unique background, broad expertise, and humble dedication to the Pathology Department.

By Hope Cristol

When Maria Arcila, MD, joined the Pathology staff after two fellowships here in 2008 and 2009, she anticipated a research career with a primary focus on solid tumor pathology. Although she had trained in both molecular diagnostics and hematopathology, she had developed a strong interest in solid tumors, particularly in lung cancer.

In her first few years at MSK, her primary focus remained on molecular biomarkers and resistance mechanisms to targeted therapies in lung adenocarcinoma. She led the initial work on detection methods for MAP2K1, ERBB2, and EGFR exon 20 mutation. Arcila, together with Marc Ladanyi, MD, Chief of the Molecular Diagnostic Service, and the thoracic oncology group, published the early, largest single-institution studies defining molecular and clinicopathologic characteristics of lung cancers with these alterations. This laid the initial groundwork for the initiation of MSK's current basket trials for ERBB2 mutations in lung cancer.

In addition, Arcila worked extensively on fine-tuning sample handling and extraction protocols that would maximize tissue availability for broad and sensitive molecular profiling of small samples and cytologic samples. This work has been crucial to the high success rate of testing at our institution.

Arcila's subspecialty training in molecular and hematopathology, as well as broad interests and ample exposure to clinical and surgical pathology, have opened new opportunities and leadership roles over the years. Today, as Director of the Diagnostic Molecular Pathology

Laboratory and Medical Director of Molecular Hematopathology, her work covers the spectrum of all testing performed in the lab – and includes accomplishments with direct clinical impact in both fields.

Broadening the Armamentarium of Assays

In recent years, Arcila has directed much of her energy toward the development, validation, and implementation of new assays in the clinical laboratory. "This is a huge effort by an entire group of highly qualified people with whom I am lucky and thankful to work," she says.

Outside of MSK-IMPACT for solid tumors, a major effort and success is MSK-IMPACT Heme: a broad, next-generation sequencing (NGS) assay for hematologic malignancies encompassing 400 genes. Its companion RNAseq assay covers 199 genes using anchored multiplex PCR. Arcila and her team have also developed several digital PCR assays for single gene assessment on cell-free DNA.

One truly novel area for Arcila, the lab, and the field, is minimal residual disease (MRD) assessment using patient-specific immunoglobulin heavy chain (IGH) and T cell receptor rearrangements found in lymphoid malignancies. She and her team established NGS for clonality testing for characterization of the disease-associated clone, and for monitoring this patient-specific clone at MRD level throughout the post-treatment course. Although similar technology has been used in several research laboratories, its use as a clinical assay remains a proof of principle

A UNIQUE PATH TO MSK

Many of our pathologists began their medical career here as fellows. Others came on board after years of practice at other institutions. Maria Arcila, MD, managed to do both.

She stayed on as an attending after her fellowships in 2008 and 2009. However, she had already been a practicing pathologist when she got here. Arcila was a pathologist for the U.S. Army, where she served our country for 16 years.

"My work as a pathologist in the military was primarily as Medical Director of the largest blood bank facility in the military, covering the eastern United States and responsible for most blood supply in support of Operation Iraqi Freedom," Arcila says.

and is not yet broadly applied in other institutions. To date, no guidelines have been established for this type of clonality assessment.

In a study published in March in the *Journal of Molecular Diagnostics*, Arcila and colleagues describe the clinical validation and implementation of immunoglobulin heavy chain clonality testing by NGS for routine characterization of B-cell and plasma cell neoplasms. In this large study, the authors found that "routine NGS clonality assessment is feasible and superior to

existing assays, enabling accurate and specific index clone assessment and future tracking of all rearrangements in a patient sample."

Setting Standards

Many of the assays in molecular diagnostics are based on novel and cutting-edge technology, so there are no established guidelines for their development, validation, and implementation. Arcila and colleagues are working to establish such guidelines, which she notes would help other institutions in establishing these

technologies in their own clinical labs.

"I rely on a team of talented and hardworking physicians, scientists, and technologists who give their all, at all times," she says. "Together, we have developed a combined experience that few other institutions have. With this as a solid background, additional opportunities have evolved to share the experience with other institutions."

Arcila has worked as a member of the task force to update the molecular testing guidelines for lung carcinoma put together by Association for Molecular Pathology (AMP), College of American

Pathologists (CAP), and the International Association for the Study of Lung Cancer (IASLC). She has also helped develop the new Guidelines for Validation of Next-Generation Sequencing-Based Oncology Panels prepared by AMP.

More recently, with another AMP task force, "we are now preparing the first guidelines for clonality testing by next-generation sequencing. And with the IASCL Latin-American chapter, we are working on bringing guidelines for the development and implementation of these assays in Latin America," Arcila says.

WOMEN ON THE TEAM

Arcila emphasizes the importance of her team in her accomplishments. She works with a very large group comprising pathologists, scientists, bioinformaticians, technologists, and support personnel.

Since this issue of *MSK Pathology Review* is shining a spotlight on many women in the department, Arcila points out some of the important roles of "very talented women in our group."

- **Ryma Benayed, PhD, Molecular Geneticist and Director, Clinical Next Generation Sequencing Laboratory:** "She led our team working on MSK-IMPACT solid and heme assays, and the targeted RNAseq assays," Arcila says.
- **Laetitia A. Borsu, PhD, Molecular Biologist:** led the development of cell-free DNA assays by digital PCR
- **Khedoudja Nafa, PharmD, PhD, Molecular Geneticist:** led the validation and implementation of the NGS clonality assays
- **Kseniya Petrova-Drus, MD, PhD, Assistant Attending Pathologist:** working on somatic hypermutation assessment by NGS
- **Jinjuan Yao, MD, PhD, Assistant Attending Pathologist:** working on the assessment of T cell lymphomas by NGS
- **Christine Moug, MD, Assistant Attending Pathologist:** working on digital PCR and rapid assays for minimal tissue
- **Justyna Sadowska, MBA, NGS Supervisor, Diagnostic Molecular Pathology Laboratory**
- **Nicole DeGroat, Manager, Hospital Operations (Molecular Diagnostics Service)**
- **Monika Kamalska-Cyganik, MA, Quality Assurance Manager, Molecular Diagnostics Service**



GET TO KNOW THE GYN TEAM

Find out what keeps Gynecologic Pathology attendings so busy – and so happily engaged in their work.

By Hope Cristol

The Gynecologic (GYN) Pathology team at MSK is uniquely tight-knit. Kay J. Park, MD, describes it as “cohesive and supportive.” GYN Pathology Director Robert Soslow, MD, says his team’s “academic interests are complementary and mutually reinforcing.”

There’s a ripple effect to this strong culture. “We consistently recruit great fellows. On evaluations, we get glowing reviews in terms of our teaching and enthusiasm,” Park says. “Another thing we do well is work closely with our disease management team. They’re very inclusive and respectful of what we do, and they give us a lot of support academically.”

Here are some other key facts about the positive and productive GYN Pathology team.

The Core Four

GYN Pathology comprises four staff physician-scientists: In addition to Soslow and Park, there’s Sarah Chiang, MD, and Rajmohan Murali, MBBS, MD, who is also a member of the Cytology Service.

Caseload

The team signs out roughly 8,000 cases every year. Broadly speaking, endometrial cancer is the most common diagnosis, followed by cancers of the ovary, cervix, vulva, and vagina.

Dynamic Roles

Most pathologists at MSK can relate to the GYN team’s days on service: reviewing slides with fellows, consulting on difficult cases with other pathologists, doing telepathology for the Josie Robertson Surgery Center. It’s the other days that are so varied among team members.



Kay Park, MD
Associate Attending
Director of Education, Department of Pathology
Vice Chair, Graduate Medical Education
Committee



Robert Soslow, MD
Attending
Director, Gynecologic Pathology
Fellowship Program



Rajmohan Murali, MBBS, MD
Associate Attending



Sarah Chiang, MD
Associate Attending

Murali is Medical Director of the MSKCC/Hunter College CUNY Cytotechnology School and Co-Director of the Clinical Autopsy and Last Wish Programs at MSK. He is also working on a book chapter for the reference textbook on melanoma, his other area of interest.

Chiang was a speaker at the 17th Biennial Meeting of the International Gynecologic Cancer Society in Kyoto, Japan, last year. She also gave several

presentations at the 2018 U.S. and Canadian Academy of Pathology conference in Vancouver.

Park is Director of Education for the Pathology Department and Vice Chair of the Graduate Medical Education Committee at MSK. In Pathology, she is working with administration on a pilot study using POAs (pathologist office assistants) to assist pathologists with their daily caseload and offset some of the work from the fellows.

Speaking of Fellows...

GYN offers one fellowship position every year, and that slot is filled until 2021-2022. It’s a demanding role that offers invaluable experience.

For the first six months, fellows preview cases and have other typical fellowship responsibilities. The second six months, fellows work on service one day a week as a supervised attending: ordering ancillary studies, making sure cases are complete, and writing them up – though the attending on service signs them out. “It gives them the experience of what it’s like to sit on the other side of the scope without the pressure of actually signing out the cases,” Park says.

GYN fellows also work on research, prepare materials for tumor board, and have a range of administrative responsibilities.

Second Opinion Success Story

The Pathology Department is known worldwide for its expertise in rare and complex cases. Park shares the details of one particularly complicated GYN case.

The patient had been diagnosed previously with widely metastatic uterine leiomyosarcoma (LMS) with progression of disease. However, the GYN team noted that the morphologic and immunohistochemical features weren’t typical for LMS.

“We performed additional immunohistochemistry and found the tumor to be ALK positive. This and certain morphologic features suggested that [the patient actually

had] an inflammatory myofibroblastic tumor (IMT),” Park says. “Tissue was sent to Cytogenetics for FISH and to Diagnostic Molecular Pathology for Archer. Cytogenetics showed ALK gene rearrangement in 78% of cells analyzed, and Archer showed an IGFBP5-ALK fusion, confirming the diagnosis of IMT.”

The patient is now awaiting trial enrollment for ALK targeted therapy.

Research Interests

While the team’s published papers span a huge range of GYN neoplasms, every team member has a “sub-specialty,” Park says, “although Rob truly does everything.” The team’s research preferences include:

- Soslow: Endometrial and ovarian cancers, and recently, proposal and validation of a new classification system for cervical adenocarcinoma, the International Endocervical Adenocarcinoma Criteria and Classification (IECC).
- Park: Cervical cancer, specifically the clinicopathologic, morphologic, and molecular characterization of non-HPV associated cervical adenocarcinomas.
- Chiang: Sarcomas, including identifying novel types of high-grade endometrial stromal sarcomas harboring ZC3H7B-BCOR fusions and BCOR internal tandem duplications.
- Murali: Genomic and translational research of gynecologic (especially ovarian) neoplasms and melanoma,

including genotype-phenotype correlation studies.

The PhD Behind the Scenes

Britta Weigelt, PhD, Director of the Gynecology DMT Research Laboratory, is an integral part of the academic efforts for GYN Pathology. “She runs our research lab and works in close collaboration with all the GYN players in the institution, including the surgeons, the medical oncologists, and us,” Park says.

According to Weigelt, “Translational cancer research is a multidisciplinary endeavor. Working with members of the GYN DMT gives us a chance to combine our skill sets to ask the right questions, to get a better grasp of the complexity of the disease, and to translate our findings into benefit for cancer patients. There is an undeniable synergy between the unique skills of the GYN pathology team and what I can offer; together we have been able to address many questions that not only have fascinated pathologists for many years, but that may also have an impact on patient care. Currently, we are focusing on the understanding of the molecular underpinning of rare types of gynecologic cancers and on the analysis of the evolution and progression of gynecologic cancers.”

Coming Soon

Look for a fifth member to join GYN later this year. Herman Chui, MD, is currently finishing his GYN Pathology fellowship at Johns Hopkins.

CLOSE COLLABORATIONS

The GYN team frequently collaborates with the Molecular Diagnostics Service, which has resulted in “a whole flurry of exciting new discoveries,” Park says. These include:

- 1 A new category of uterine sarcomas with a novel NTRK fusion that is distinct from leiomyosarcomas and undifferentiated uterine sarcomas, and has the morphologic appearance of fibrosarcoma. The discovery has clinical applications, as there are now targeted therapies (Trk inhibitors) for tumors with NTRK fusions. Chiang was lead author on this paper, published in 2018 in *The American Journal of Surgical Pathology*.
- 2 Describing recurrent SMARCA4 mutations in small cell carcinoma of the ovary, hypercalcemic type: a highly aggressive ovarian cancer that affects young women. This also has important clinical implications as there are targeted therapies being developed for tumors that are SMARCA4 deficient. Soslow contributed to this paper, published in 2014 in *Nature Genetics*.
- 3 Demonstrating that tumors characterized as synchronous primaries in the endometrium and ovary are, for the most part, clonally related and therefore likely metastases from one site to the other. Weigelt was senior author of this paper, published in the *Journal of the National Cancer Institute* in 2016.

PIONEERING *SPIRIT*

Dr. Patricia Saigo was MSK's first female staff pathologist and the first woman to be appointed as Service Chief in Cytology, but she was remarkable long before that- and continues to lead an inspiring life.

By Hope Cristol

In 1959, Patricia Saigo, MD moved from one island, the Big Island of Hawaii, to another, the island of Manhattan, to attend Barnard College at Columbia University. It was a brave choice. She'd never seen the school, and returning home for a long weekend would be impossible.

"Today it may seem inconceivable that one would travel this distance without having visited the college, yet I did," Saigo says. "Jet planes were only then coming into their own, so I first had to travel from Honolulu to Los Angeles on a jet prop." That leg of the journey took 10 hours, nearly the same time it now takes for a non-stop flight from Honolulu to JFK. Not only was travel costly and time consuming, but calling long distance was also expensive. Even phone contact with family had to be infrequent.

"I came to New York completely alone and not knowing what my life was going to be," Saigo says. She had to blaze a trail for herself, by herself, at a time when just six percent of women completed four or more years of college (compared with 10% of men in 1959). And what a trail she blazed. Among her many achievements, Saigo became an Associate Attending Pathologist at MSK – the first woman to officially join the Pathology staff.

From her first steps in New York City until now, Saigo has boldly defined and redefined her life. In late 2018, she sat down with *MSK Pathology Review* to talk about it.



MSK: What role has gender played in your education or profession?

Saigo: [After Barnard,] I studied medicine at what was then Woman's Medical College of Pennsylvania. As both schools were restricted to women only, gender was not an issue. That was good for me. There was no consideration of what assessment the men would make of me personally or intellectually. Being with other strong, knowledgeable, opinionated women, and being able to discuss issues without the influence of gender, helped my development of self. Let me add, however, that we all enjoyed the social and intellectual exchange with men.

When I became a medical Intern at Lenox Hill Hospital, that was different. There was the occasional male patient who did not want to be examined by a woman. The fact that women were routinely examined by men was not even considered.

Now the acceptance of women as physicians has come to fruition. Some men have women doctors, and more television doctors are played by women. In the past, men with women doctors or dentists would make a point of telling me that, but now, as it has become commonplace, no mention is made of gender.

MSK: How did you choose pathology as a specialty?

Saigo: At the time, there were few group practices. Virtually every internist was a private practitioner. As I have no business acumen, I considered specialties in hospitals: anesthesiology, radiology, and pathology. Of these, pathology was the most interesting.

After completing my residencies in anatomic and clinical pathology, I considered studying blood banking as a subspecialty. However, one of my fellow residents, Dr. David B. Kaminsky, was very interested in cytopathology and thought that I would like it, too. He got me an application and an interview with Dr. Steven Hajdu. And so began my career at Memorial Hospital.

MSK: Did you know at the time that you were the first woman on staff in Pathology?

Saigo: Yes, I did. I knew that Dr. Sophie Spitz had been here before me but was not appointed to the staff despite her skills in pathology and her publications. (Learn more about Dr. Sophie Spitz and another early trailblazer on pages 14-15.) I, by

default, became the first woman to be appointed to a staff position.

There were very few women on staff in any department. One of them was the late Dr. Norma Wollner, wife of [former MSK pathologist] Dr. Stephen Sternberg. She was a vibrant woman. [Editors' note: Dr. Wollner, who specialized in pediatrics, pioneered the use of combination chemotherapy for children.]

Another who made an impression on me was Dr. Virginia Pierce who was a gynecologist, a pilot and maverick who helped me be independent.

MSK: You just toured cytology and surgical pathology at MSK. How have they changed since you retired in 1999?

Saigo: The amount of automation is beyond my wildest dreams. So many procedures that were done by hand are now automated, including the screening of Pap smears. Even the accessioning of specimens is automated. Being surrounded by paper was routine, but now data is all on monitors.

That cytology has come into its own, a respected and accepted method of diagnosis, is rewarding. When I was here, aspirations were done by internists, radiologists, and surgeons. Frequently, the material was inadequate for diagnosis. Now, I understand, the cytopathologist is in the OR for staging and other diagnostic aspects.

MSK: What has retirement been like for you?

Saigo: It has been wonderful. I have explored several activities. Now I go to the gym and exercise three times a week. This is also a social event, as I have been going to these 8:15 a.m. classes since January 2000 and several of us have made an informal group.

I did ballroom dancing until my knee was injured, not dancing, but getting off the bus. So, that activity has ceased.

Then I tried to learn Japanese at the Japan Society, but my language skills are wanting. I was also a docent at their gallery.

The best thing that I did was become a tour guide and behind-the-scenes volunteer at the American Museum of Natural History. This has opened up the world for me, and I see the world around me so very differently. Not only that, but my fellow volunteers are so interesting. We are always learning and discussing. It reminds me of the interesting and dedicated people at MSK.





WOMEN

IN PATHOLOGY AT MSK

The progress, the challenges, the icons and more

By Hope Cristol and Sarah Virgo

Dedicating an entire issue of the *MSK Pathology Review* to women in the field of pathology raises an interesting question: In this day and age must we call out women's accomplishments separate from men's?

On the one hand, there's evidence to suggest that gender parity is well on its way – at least in some aspects of pathology. A 2015 research letter in *JAMA Internal Medicine* listed pathology as one of seven specialties in which women accounted for more than 50% of graduate medical education trainees. (The other specialties were obstetrics and gynecology, pediatrics, dermatology, internal medicine/pediatrics, family medicine, and psychiatry.) In another study, published in 2015 in the *Proceedings of the National Academy of Sciences*, researchers noted that the percentage of doctorates earned by women in the life sciences jumped from 15% to 52% from 1969-2009.

Closer to home, MSK's Department of Pathology clearly welcomes and supports women in the department. Our physician-scientists and research scientists occupy seats at almost every level, are first authors on a myriad of papers and of course bring vital expertise to clinical cases. Women represent approximately 60% of the faculty and nearly 50% of the current fellowship class. On the administrative side, women hold essential roles in departmental operations, from finances to laboratory management.

Despite such progress, gender inequality remains persistent in the sciences overall. Attrition and gender biases are two of many challenges addressed in medical literature. There's also the matter of unequal compensation, an unfortunate fact that extends to the field of pathology. Nationally, as in most professions, male pathologists earn more than their female counterparts, according to a recent Medscape survey comparing full time salaries.

The good news is that strong, progressive leadership can help resolve some of these issues. "Opportunities exist for department chairs and professional organizations to create targeted interventions to support career satisfaction, recruitment, retention, and career and leadership development for women in academic pathology," wrote the authors of a 2015 paper in the *Archives of Pathology & Laboratory Medicine*. Recently, MSK was named one of "the best places to work" by Glassdoor.com citing gender-based pay equality and opportunities for women as significant factors.



A Track Record of Inclusion

As an institution, MSK prioritizes diversity and inclusion – and not just for women. It’s worth noting that MSK was named a top hospital for diversity last year by BlackDoctor.org, and a leader on the Healthcare Equality Index from the Human Rights Campaign. Our internal Employee Resource Networks, including *MSK Women on the Move*, and the Program for Women Faculty Affairs promote networking, knowledge exchange, and extending services to both the organization and community.

But for this issue of *MSK Pathology Review*, the topic at hand is women in pathology, and MSK has long been linked with some of the most iconic. Elise Strang L’Esperance, MD, who co-founded the Kate Depew Strang Clinic for cancer detection in 1933, was initially an assistant to legendary MSK pathologist James Ewing, MD. The Strang Cancer Prevention Clinic was inaugurated at Memorial in 1940, and L’Esperance served as its Director from 1942-1950.

Sophie Spitz, MD, who worked as a pathologist at MSK – though she wasn’t given Attending status within the all-male physician staff – described the melanocytic lesions known as Spitz nevi in a 1948 article for *The American Journal of Pathology*. Learn more about them below and on page 15.

Progress Check

Thanks in part to Drs. L’Esperance and Spitz as well as evolving attitudes about women in medicine, the women physicians and doctorates in the MSK Pathology

Department today say they haven’t thought much about the role of gender in their own careers. They feel they have unprecedented freedom to pursue and achieve professional goals, as evidenced by their formidable and lasting contributions to the field of pathology – as well as the operations of the Department of Pathology – in remarkable ways.

However, there remains more work to be done in the name of equality. For example, only around 15% of academic pathology departments are chaired by women, according to the Association of American Medical Colleges. Dermatopathologist Melissa Pulitzer, MD, whose research is featured in this issue, feels that both women and men pathologists need to have appropriate compensation and clear leadership opportunities “without the subtle disadvantage that occurs because of traditionally (skewed) family dynamics in our society”.

So, getting back to the opening question of whether we still need to celebrate and call out the accomplishments of women in pathology, our answer is YES! This issue of the *MSK Pathology Review* highlights the challenges that women in pathology endured to pursue their professional pursuits. These pioneers forged the path that enables today’s women practitioners to be respected for their professional contributions to pathology practice. The accomplishments and mentorship highlighted in this issue will hopefully continue to be paid forward by future pathology professionals, both men and women, and level the gender playing field once and for all.



From left to right: Drs. Foote, Stewart and Spitz

ELISE STRANG L’ESPERANCE (1916-1943)

This barrier-blasting physician left behind a stunning legacy of accomplishments. In 1910, she became the first female assistant to renowned pathologist Dr. James Ewing. In 1942, she was the first woman to receive the Clement Cleveland Medal of the New York City Cancer Committee. L’Esperance was the first editor of the *Journal of the American Medical Women’s Association*, and the first woman to be a lead author of an article in *The Journal of Immunology*.

She is best known for founding (along with her sister, May) the Kate Depew Strang Cancer Prevention Clinic – named after their mother – in 1933. The clinic is widely considered the prototype for cancer detection clinics, and in 1940 it became the first medical facility to introduce the Pap test into practice. A few years later, a new building was constructed to house the Kate Depew Strang Cancer Prevention Clinic at Memorial Hospital Center; it was inaugurated in 1947. In 1951, L’Esperance earned the Lasker Clinical Medical Research Award for her work in cancer prevention. Upon her death in 1959, she bequeathed the funds necessary for the purchase of the first two tissue processing machines ever used in the Pathology Department at MSK.

The Strang Clinic model proved such a powerful tool in the early detection of cancer that dozens of clinics opened across the country and later allowed for the establishment of the Cytology Service at MSK. Today, the Strang Cancer Prevention Institute is known as the oldest continually operating cancer prevention institution in the world.



TWO PROMINENT PATHOLOGIST PIONEERS

MSK has always been home to some of the most important minds in medicine. Here, we pay homage to two iconic women in pathology: Elise Strang L’Esperance and Sophie Spitz.

SOPHIE SPITZ (1939-1942 AND 1945-1949)

She is one of the most recognizable figures in the history of pathology at MSK. In her famous research article, “Melanomas of Childhood,” she was the first to describe the histopathologic features of what we now know as Spitz nevi.

Her other research highlights include coauthorship of *Pathology of Tropical Diseases*, published by the Armed Forces Institute of Pathology, as well as studies on carcinogenesis. Spitz, an accomplished surgical pathologist, was a champion of women in medicine and an early advocate for Pap tests.

Spitz never earned the status of Attending during her time at MSK (though her husband, pathologist Arthur C. Allen, joined the staff in 1945), however, her work and impact no doubt paved the way for the first woman to be welcomed on staff: Patricia Saigo, MD.



By the Numbers

31,299

surgical pathology cases signed out yearly by women

1,633

personal consults cases signed out yearly by women

600

first author journal publications by women in the department

4

pathology textbooks authored by current women faculty



Inside the Business of Pathology

Pathology Director Christine England weighs in on what it means to have an administrative leadership role in the department.



Most people know Christine England, MBA, by her former title, Pathology Administrator. That title recently changed to Director – in every academic department at MSK – not because the position evolved, but because attitudes have.

“The term ‘administrative’ can seem like a lower-level support role. Changing the title from Administrator to Director has helped reinforce what the administrative side of the hospital does,” England says.

High quality, patient-centered care is a guiding principle for England’s work. Among her numerous responsibilities,

she oversees department operations and finances: ensuring that new investments are offset by revenue; compensation planning; and research operations, which involve securing funds for pathologists’ proposals. Her big-picture role, though, is serving as the engine that drives departmental improvements to meet institutional goals.

“I see my role as partnering with our Chair [David Klimstra, MD] to execute his strategic vision, translating the big ideas into action. For example, if he wants to focus on improving frozen section turnaround time, I’ll figure out the logistics, get the right people in the

Bottom (left to right): Shirley Vargas, Sandy Naupari, Maura McCormack, Shanna Guercio, Radhanglee Seenauth, Angela Scalise
Middle (left to right): Christina Virgo, Christine England, Dorota Rudomina, Nicole DeGroat, Jessica Wardrope, Sarah Cook Virgo, Jennifer Samboy, Rose Khoobyar, Cathy Kinlock
Top (left to right): Camille McKay, Lorraine Corsale, Karimah Quashie-Davis, Christina White, Monika Kamalska
Not pictured: Allix Mazzella, Arisleyda Infante, Mary Ann Friedlander, Norma Graham, Jenny Robbins, Angela Del, Laura Jeter, Camille Gonzalez, Anna Spiliotis, Allison Sigler, Janine Pichardo, Andrea Phillips, Justyna Sadowska, Annabel Canhao, Grecia Castro, Melissa Dellabate, Lina Larrahondo, Patricia Maldonado

room talking to each other, and keep the momentum going,” says England, who has 14 direct and 348 indirect reports. England’s management team, including a technical manager and administrative manager for just about every service, jointly oversees the department’s technical and administrative support staff.

Of course, the term “support staff” doesn’t capture the extent and importance of those roles at one of the top cancer centers in the world. At MSK, the technical and administrative teams are vital to both patient care and research. They make sure that turnaround times

are met, positions are staffed, and processes continually evolve as new regulatory requirements are placed on the field.

Currently, England and some of her team members are exploring how to structure IT systems so that pathologists can generate reports without tedious amounts of clicking and administrative burden. England and her team also make sure the labs are always inspection-ready. “We’re constantly under regulatory surveillance: every two years by the New York State Department of Health, every three years by The Joint Commission,” she says. The department now holds

multiple laboratory permits and a footprint at nine off-site MSK locations.

The administrative side of hospital operations tends to be a field dominated by women, so England doesn’t feel that her gender has ever posed an obstacle to her rise to leadership. Still, it’s hard to not notice that across the board, hospital administrators are predominantly women, and medical leadership is predominantly male. England said that in the future, she hopes to see a diverse group of men and women working collaboratively together on both the administrative and medical leadership teams at MSK.

Why I chose Pathology

The women in the Pathology Department – just like the men – bring with them perspectives from different institutions, career paths, even countries. The reasons they chose careers at the microscope are as unique as they are.

“

I see pathology as the science and art of medicine. It requires a keen eye for details, expertise in pattern recognition, strong analytic skills, and broad medical knowledge. In the era of personalized medicine, pathologists serve a central role in providing diagnostic, prognostic, and predictive information that has direct impact on treatment decisions. I find my work stimulating, challenging, and rewarding.”

Hannah Y. Wen, MD, PhD
Associate Attending Pathologist
Director, Breast Pathology Fellowship

“

The most immediate attraction for me was the microscopy aspect of it. I have liked the microscope right from the beginning, and I enjoy the challenge of deciphering the varied morphological patterns of the diseased tissues under the microscope.”

Jinru Shia, MD
Attending Pathologist, Gastrointestinal Pathology
Director, Gastrointestinal Pathology
Director, Gastrointestinal Pathology Fellowship Program

“

I chose pathology because it's a field in which I am constantly learning and being challenged as well as performing meaningful work. Surgical pathology results are essential for a patient's diagnosis, and molecular pathology results are increasingly important for further patient management.”

Jaclyn F. Hechtman, MD
Assistant Attending Pathologist
Gastrointestinal Pathology and Diagnostic Molecular Pathology

“

I chose pathology after my medical school rotation in cutaneous lymphoma with Dr. Eric Vonderheid at Hahnemann University Hospital, when I realized that I was good at managing diagnostic uncertainty for the clinical care of complex patients, particularly in the context of a dedicated team of experts.”

Melissa Pulitzer, MD
Associate Attending Pathologist
Dermatopathology

“

I chose pathology because it is the field where science meets medicine. I wanted to be at the forefront of where scientific advances are translated into clinical care – and there is no better place for this than pathology.”

Natasha Rekhtman, MD, PhD
Associate Attending Pathologist
Thoracic Pathology and Cytology

Women in the Lab

Women hold up half the sky, according to an old Chinese saying. In MSK's Department of Pathology, women at every level make important contributions to lifting and supporting the vital work across all areas throughout the department. This helps to ensure excellence in diagnosis and patient care.



SILVIA BABORE | Silvia is a Lead Cytotechnologist. She has spent her entire career, more than 30 years, at MSK.

When I was in college I thought about going to medical school, but then I started to learn about other medical careers, including cytotechnology. After I graduated I ended up enrolling in MSK's cytotechnology training program. At the time it was an independent program, but it's now part of Hunter College.

As a cytotechnologist, I prepare and examine slides of different types of human cells. When I started out, most of my job involved working in the lab with Pap smears. Now, thanks to advances in the practice of pathology, I spend most of my time in procedure rooms alongside the radiologists and surgeons.

Increasingly, tissue samples are obtained using less-invasive methods like fine-needle aspiration biopsies. After the doctor does the biopsy, we are right there to prepare a slide from the material. We can make an assessment about whether it contains enough cells for the pathologist to do a work-up and make a diagnosis. Knowing right away whether the procedure was successful allows the patients to avoid having to come back and possibly undergo a more risky procedure.

Because I've been here for a long time, I'm now very involved in mentoring and training – both students in the cytotechnology program as well as cytopathology fellows.



ANNABEL CANHAO | Annabel is a Pathologist Assistant. She has worked at MSK for seven years.

As a Pathologist Assistant I am responsible for the gross examination, photography and the dissection of anatomical pathology specimens including harvesting tissue for our biobanking research department and providing fresh samples for specific testing such as flow cytometry and cytogenetics. I am also responsible for providing training to all newly hired PAs, graduate pathology students and assisting the surgical pathology fellows during their grossing rotations.

Being a Pathologists Assistant for MSK is like no other and I am very fortunate to be here. The complexity of our specimens allows for continuous learning of anatomy. With every case there is the opportunity to work with our outstanding surgeons, pathologists and fellows in assisting with orientation of the specimen and understanding the clinical history to better approach the specimen. At a smaller institution I may not have the ability to dissect cases of such complexity.

What I find rewarding about being a Pathologists Assistant is that I am part of an amazing group of professionals that assess disease processes so that the patient receives the best care and treatment possible in a timely fashion. The patients we serve benefit from the quality of our tissue dissection and gross descriptions.



ANDREA ROSADO | Andrea is a Pathology Office Assistant. She has been at MSK for three years.

I work in diagnostic molecular pathology (DMP). I handle many of the administrative duties for that lab. But I really enjoy branching out and I'm always open to exploring new ventures and new projects. In addition to molecular pathology, I work with people in molecular genetics, cytogenetics, and bioinformatics.

Although I never interact directly with the patients, I still find it rewarding to be able to help them from behind the scenes. If there's something that needs to be done quickly, a last-minute request, I find a way to get it done in a timely manner. I always imagine the patient and their family members waiting to get their results. Because I've had several people in my own family who have been diagnosed with cancer, I can put myself in their shoes.

I also help members of my team in other ways, including preparation of scientific manuscripts for publication, putting together references, and searching clinical information to find whatever data is needed.

MSK is a great place to advance your career because everyone provides so much support. I've gotten involved with attending special events for women staff members and have been able to do networking through these events. The culture here is very positive and encouraging.

Women in Pathology Leading the Way



MAF

Mary Ann Friedlander

Mentors: Patricia Saigo, MD, Maureen Zakowski, MD, Natasha Rekhman, MD, PhD and Rose Marie Gatscha

I have been fortunate to have many mentors, internal and external to MSK. Dr. Patricia Saigo was an outstanding teacher, insightful pathologist and mentor. She, along with other pathologists (Drs. Maureen Zakowski and Natasha Rekhman) and supervisory cytotechnologist, Rose Marie Gatscha, were my role models. They were active in local and national professional societies and encouraged me to do the same. They led their professional lives by example and provided guidance and support to follow their lead. It was Dr. Saigo who encouraged me to submit my first project as an abstract, and it was accepted as my first poster presentation. My first ASC meeting introduced me to another world of the cytotechnology profession. I learned that CTs could contribute to the profession well beyond the microscope and discovered new interests.



JH

Jackie Hechtman, MD

Mentors: Jinru Shia, MD and Christine Iacobuzio-Donahue, MD, PhD

Dr. Shia is the director of gastrointestinal pathology service team and fellowship. Even though she is prolific in research and signs out a high volume, she is approachable, available, and enthusiastic. Jinru is passionate about teaching and has helped countless MSK pathology alumni and junior faculty develop and fine tune their diagnostic skills as well as shape their careers as academic pathologists.

Dr. Iacobuzio is a pathologist by training and directs the David M. Rubenstein Center for Pancreatic Cancer Research. In addition to her own research, she has taken on an active role in mentoring junior faculty- not only through setting up formal research in progress meetings but also making herself available via one on one meetings with junior faculty to discuss current research projects and provide direction and mentorship when needed.



MM

Maura McCormack

Mentor: Mary Ann Friedlander

Having Mary Ann as a former manager and now colleague has made all the difference in my career. Her constant support and guidance has pushed me to always aim higher and constantly do my best. As I continue to grow in my career, I will be forever grateful and indebted to the lessons and mentorship she has provided me.



SCV

Sarah Cook Virgo

Mentors: Lindsay Picard, Mary Ann Friedlander and Christine England

I have been very fortunate to have several mentors during my time here at MSK. Three in particular have had a significant impact on my career: Lindsay Picard, Mary Ann Friedlander and Christine England.

Lindsay was my first manager in my first role in Pathology and set the bar very high in terms of professionalism and effective communication. At the time, I was unfamiliar with the nuances of pathology and she never hesitated to take the time to teach me new techniques and expose me to new projects within the lab. Her willingness to allow me to engage in a wide range of projects fostered several of the relationships that I maintain to this day.

Mary Ann Friedlander is known very well across MSK as being an "idea person", someone who is always thinking of new ways to improve the current infrastructure and someone who is always receptive to others' ideas. During some of our discussions on projects, she's taken opportunities to not only learn more about the work being done but to offer suggestions on potential next steps. When faced with a difficult task, Mary Ann is frequently the first person I lean on for advice or in looking for a partner to brainstorm with. Her contributions to my career are truly immeasurable.

Christine England is someone who I am impressed by daily and someone who I value very much in my current role. As Director, she's charged with so many different tasks on a daily, monthly and yearly basis but seems to handle each of them effortlessly. Regardless of the circumstances, her door remains open and she never hesitates to discuss concerns or issues that someone may be having. I have frequently looked to her for guidance on what to do in a difficult situation. Christine is practical, intelligent and well respected by staff, yet she still manages to be kind in her exchanges with others. I have thoroughly enjoyed working with Christine and look forward to the future of Pathology under her direction.



CV

Christina Virgo

Mentors: Jennifer Samboy and Sarah Cook Virgo

Jennifer has been both a supervisor and mentor for me. With over 11 years of experience and dedication to MSK she is truly an accomplished and inspiring person to work with.

Sarah Cook Virgo is an incredible woman and mentor. With over 13 of experience in the department, she never hesitates to provide guidance and insight to anyone who asks. Her compassion, professionalism and creativity are apparent in everything she does. She is someone I truly respect and admire.



BK

Brie Kezlarian, MD

Mentor: Natasha Rekhman, MD, PhD

The impact Dr. Natasha Rekhman has had on my career is immeasurable. In addition to giving me invaluable guidance, she is such a powerful role model for achieving excellence through hard work, long hours, and dedication to one's craft.



LC

Lorraine Corsale

Mentors: Jennifer Samboy and Patricia Saigo, MD

Jennifer has not only been a wonderful mentor for me personally while taking on a new coordinator role, but her involvement with implementing digital imaging in our department has been substantial. Our digital imaging department would not be where it is today had it not been for her dedication, energy, skill and unending work days!

Dr. Patricia Saigo was the only female pathologist in our department for so many years and in a male dominated field. I had the pleasure of working with her for a few years before she retired. She worked alongside and went up against the best of them. She had the fortitude to blaze that trail for not only women pathologists but she also held a space for all women in our department.



HW

Hannah Wen, MD, PhD

Mentor: Edi Brogi, MD

Dr. Brogi is an attending pathologist and the director of the breast pathology service. She has published over 120 peer-reviewed articles and review articles as well as numerous book chapters on breast pathology. In particular, she contributed many chapters in *Rosen's Breast Pathology* (4th edition, 2014), *Rosen's Breast Pathology - Diagnosis by Needle Core Biopsy* (4th edition, 2017), and the *WHO Classification of Breast Tumors* (5th edition, 2020). She is a past (2017-2019) President of International Society of Breast Pathology (ISBP). She is a selected mentor of the USCAP Mentoring Academy inaugurated at the 2018 annual meeting, and an honored mentor at the 2019 USCAP annual meeting.

I started working with Dr. Brogi when I was a breast pathology fellow in 2009-2010. She continued to serve as my mentor when I joined the breast service as a junior faculty member in 2010. She supported and guided me throughout my fellowship training, transition to junior faculty, and career advancement. She has a keen interest in teaching and mentoring, and has demonstrated extraordinary commitment and effectiveness as a mentor. To this day, I continue to seek her advice on a daily basis. She always provides insightful guidance. Her role as a mentor extends beyond her impact on my professional activities within the institution. She also sets an example and encourages me to actively participate in national and international professional and educational activities. Her work ethic, dedication, and enthusiasm inspire me.



JS
JENNIFER
SAMBOY



CW

Christina White

Mentor: Muriel Washington

My first job in a histology laboratory was as a volunteer. After 4 months, I was offered a full-time position by the owner of a small family owned lab in Portland, Oregon. The owner, Eddie Roberson instilled in me the importance of histology and the impact histo-technicians/technologists have on overall patient care. However, Muriel instilled in me the proper etiquette and technique that helped develop me into a great technologist. She critiqued my sections daily, she guided my hands while grossing specimens and verified my productivity; she didn't allow me to falter or stay stagnant. She pushed me to be the best and put forth my best at every phase in my understanding of the laboratory. I can directly see her impact on my success in the laboratory as a QA Manager and my love for the field of histology.

Building Legacies

In the spirit of building legacies, *MSK Pathology Review* asked women in the Department of Pathology “what aspect of your work to date do you think will have the most lasting impact?”

Tejus A. Bale, MD, PhD

Assistant Attending Pathologist, Neuropathology and Diagnostic Molecular Pathology

As Maya Angelou said, “You have no idea what your legacy will be.” In that spirit, I think some of the most impactful things I am working on are those that are most useful in daily clinical practice.

I am finishing up a comprehensive analysis of FGFR-altered gliomas across histologic grades, affecting both pediatric and adult populations. I think it will provide a great deal of clarity for pathologists and clinicians, particularly in light of emerging FGFR-targeted therapies, as this group of tumors has been historically lumped in with other entities despite their unique molecular and clinical features.

I am also very proud of the work done and continued efforts with colleagues in Diagnostic Molecular Pathology to validate new clinical tests, including MSK-IMPACT for cell-free DNA from cerebrospinal fluid. These hold the potential to completely alter how we diagnose, monitor, and treat patients with CNS tumors.

Ryma Benayed, PhD

*Assistant Attending Molecular Geneticist
Director, Clinical Next Generation Sequencing Laboratory, Molecular Diagnostics Service*

I feel impactful when supporting our promise in providing the best clinical care to our cancer patients. I work with a wonderful group of colleagues on the clinical validation and laboratory implementation of cutting-edge molecular assays (e.g. MSK-IMPACT, MSK-ACCESS) which, utilizing high-throughput next generation sequencing instruments, enable a comprehensive molecular characterization of patient tumors that can potentially influence patient diagnosis and treatment. My recent efforts were focused on improving our overall sequencing strategy by studying the benefit of RNA sequencing (MSK-FUSION a.k.a “Archer”) in the detection of targetable fusions that are technically challenging to detect in the DNA. This work has demonstrated that 13% of the patients we studied and were previously negative by DNA sequencing were positive for targetable events. Streamlining a complementary DNA/RNA sequencing based approach in our molecular diagnostics service has already made a difference to a number of our patients.

Finally, one of my biggest sources of inspiration are women in pathology who perform extraordinary work as laboratory technologists. They work somewhat behind the scenes, but the value of their work is infinite. As busy women in the workforce and at home, it is sometimes hard for them to focus on career development and personal growth. I’m committed to women’s empowerment and through my daily collaborations with them I’m hoping that my biggest career impact is to help influence the best career decisions for our female technologists.

Christine A. Iacobuzio-Donahue, MD, PhD

*Attending Pathologist
Director, Rubenstein Center for Pancreatic Cancer Research*

To date I consider my most important contribution to the field of pathology to be the implementation of research autopsies into the study of pancreatic cancer. This approach has established tissue resources to address some of the most fundamental questions related to this problematic tumor type such as the evolutionary timeline of pancreatic carcinogenesis, quantitative estimates of intratumoral diversity, and most recently establishment of a unifying paradigm for clonal heterogeneity and transcriptional subtypes. This unconventional methodologic approach has been transformative to my career professionally, yet it has also been immensely gratifying on a personal level to connect with so many patients and their families experiencing end of life issues. My work would not be possible without these courageous individuals.

Jennifer L. Sauter, MD

Assistant Attending Pathologist, Thoracic Pathology and Cytology

As a junior pathologist who transitioned from a fellowship at a different institution to faculty here at Memorial Sloan Kettering, my most impactful work is definitely yet to come. One particular study from my fellowship that has impact within thoracic pathology is a clinicopathologic study of SMARCA4-deficient thoracic sarcomas published in *Modern Pathology*. This was one of the first studies to describe this entity. We showed that the morphologic features are distinctive and can be recognized by pathologists and that identifying these tumors has clinical impact, as these tumors behave very aggressively and are associated with very poor survival. Here at MSK, I am developing an academic interest in the pathology of pleural tumors. I have been fortunate to have extensive opportunities to work collaboratively with colleagues within the Thoracic Disease Management Team who also study mesothelioma. We currently are working to identify biomarkers that may be useful in the treatment of this very aggressive disease.

Carlie Sigel, MD

Assistant Attending Pathologist, Gastrointestinal Pathology and Cytology

Most of our patients in the fine needle aspiration (FNA) service are filled with anxiety about the procedure and uncertainty regarding how the results will affect themselves and their family. When we are done with the procedure and they rise from their chair with a Band-Aid in place and thank me I feel the greatest sense of pride in my work because it is immediate and deeply personal. I am confident that I can provide information they did not have before they sat down.

In addition to my work in our FNA Clinic, my focus is pancreaticobiliary cytology. I have published studies on pancreatic mucinous, acinar, and neuroendocrine neoplasms, which have built a reputation for myself as an expert on the cytologic diagnosis of these specimens.

Laetitia Borsu, PhD

Associate Attending Molecular Biologist, Diagnostic Molecular Pathology

Since joining the Pathology Department, I am proud to have developed and implemented multiple (what I like to call) “rescue” molecular assays in order to process insufficient, limited and rush patient samples that could not be analyzed by any other assay currently offered in our clinical lab.

My last achievement has been to lead the technical development of non-invasive, sensitive, short turnaround time clinical digital PCR as well as amplicon-based NGS assays on cell free tumor DNA in the blood. This “liquid biopsy” approach is revolutionizing the management of specific groups of cancer patients at MSK, including patients who cannot undergo or lack adequate tissue for conventional biopsy, patients with advanced disease in whom we cannot biopsy every metastatic site, and patients being assessed for treatment response or progression.

Meera Hameed, MD

Attending Pathologist, Bone & Soft Tissue and Diagnostic Molecular Pathology
Chief, Surgical Pathology Service

Pathology is currently at a crossroad as it is evolving from a purely descriptive discipline to one firmly rooted in modern scientific and technologic advances. In this special era, I am proud to be a member and serve as Chief of Service of Surgical Pathology at MSK which hosts 94 nationally and internationally recognized faculty members (54 women). Besides preserving our world-class tradition of clinical excellence, we have taken the initial steps to expand microscopic pathology to digital and computational pathology so as to remain at the forefront of next generation pathology. As part of this initiative, I have been appointed as Co-Director of the newly created Center for Digital and Computational Pathology at MSK established with the aid of a generous grant from the Warren Alpert Foundation. The goals of the Center are to establish a fully digital workflow, explore novel imaging technologies such as confocal microscopy, and to develop deep learning machine algorithms to enable artificial intelligence-based support for diagnosis, prognosis, and therapeutics. I believe with our tradition of excellence in Pathology at MSK, we are well poised to lead pathology along these new paths.

With respect to my clinical interests, I am a bone and soft tissue and molecular pathologist. I am interested in studying rare bone tumors such as chordomas and chondrosarcomas. Both are chemoresistant and so it is important to search for new insights and potential targets for therapy in these neoplasms. Specifically, in chordomas my research involves exploring chromatin remodeling and in chondrosarcomas the role of IDH mutations in disease progression and possible targeted therapeutics in collaboration with clinical colleagues.

Kay J. Park, MD

Associate Attending Pathologist, Gynecological Pathology
Director of Education, Department of Pathology
Vice Chair, Graduate Medical Education Committee

What I consider my most impactful work so far: The study of gastric-type endocervical adenocarcinoma, a rare form of cervical cancer that is unrelated to human papillomavirus (HPV) infection.

My colleagues and I confirmed the absence of HPV in these tumors and described their extremely aggressive nature, which is much worse than conventional, HPV-associated endocervical adenocarcinomas. This has important clinical implications. As HPV-only screening and HPV vaccinations increase, there could be delayed or missed diagnoses and thus an increase in relative incidence of these aggressive tumors.

We are currently working on the molecular underpinnings of these tumors as well, perhaps for future targeted therapy options.

Laura H. Tang, MD, PhD

Attending Pathologist, Gastrointestinal Pathology

The most rewarding aspect of my career at MSK is that every day I learn something new from our patients, my colleagues, and talented trainees. I enjoy the challenges of daily clinical practice and the intellectual inspiration of translational investigation in the field of neuroendocrine, upper GI, and appendiceal malignancies. This experience has allowed co-authorship of AFIP fascicle 4th Ed of *Tumors on the Intestines*, UICC Manual of Clinical Oncology 9th Ed, and upcoming 5th Ed WHO *Tumors of the Digestive System*, the development of 18 GI cancer reporting protocols for CAP; member of an expert panel of AJCC 8th Ed and expert panel of the International Collaboration on Cancer Reporting (ICCR).

I hope to continue my career path and be privileged to constructively share my experience with the next generations of pathologists.

Natasha Rekhtman, MD, PhD

Associate Attending Pathologist, Thoracic Pathology and Cytology

I feel the most impactful part of my career so far has been writing and editing the book, *Quick Reference Handbook for Surgical Pathologists*. I started writing that book as a resident, and it appears to have captured concepts in a way that speaks to trainees in pathology. It is immensely gratifying to know that this book helps many residents and fellows learn the basics of pathology. In the just-completed second edition, I was fortunate to work with many talented contributors on the updates, and I hope this edition will continue to be useful.

On the research side, I think a recently completed study with colleagues on the thoracic and molecular teams will be most impactful on both pathology and clinical practice. In that study, we defined clonal relationships among multiple lung carcinomas using MSK-IMPACT and made several novel and very interesting observations about unexpected clinicopathologic and morphologic features of intrapulmonary metastases.

Mariko Yabe, MD, PhD

Assistant Attending Pathologist, Hematopathology Service
Director, Bone Marrow Laboratory

I was a hematologist/heme-oncologist at one of the most prominent institutions in Tokyo, Japan. I was amazed and fascinated by the impact of pathologists in management of hematological malignancies and was brave enough to switch my career to pathology after I moved to the US. Now I feel proud of being a faculty at MSK and enjoy daily practice with my pathology and medicine colleagues.

As the medical director of Bone Marrow Laboratory, I oversee all functions of the laboratory as well as education for staff and fellows. I have led the efforts for development of advanced practitioner roles for bone marrow technologists. This initiative yielded major improvement in our process and reduced pathologists' workload.

One of the most exciting programs I am involved in is the MSK clonal hematopoiesis (CH) clinic which opened recently to monitor cancer patients with a genetic risk of developing hematologic malignancies. I work as a designated hematopathologist who takes care of all bone marrow biopsies from the CH clinic. This helps facilitate communication with our clinical team and has brought great collaboration. CH is considered as a precursor to various myeloid neoplasms. Recent progress of treatment for neoplasms resulted in increasing cancer survivorship, but unfortunately this has led to an increase in the incidence of therapy-related myeloid neoplasms. Our study demonstrated that screening of CH in cancer cohorts is critical for the development of risk-adapted treatment decisions. I would like to continue working on the molecular profiling of CH/therapy-related myeloid neoplasms to further prevent the development of therapy-related myeloid neoplasms.

Women in Pathology

1849



Dr. Elizabeth Blackwell becomes the first woman to earn a medical degree

1866



The Ladies' Board of New York, which assists in the establishment of MSK is formed under the direction of Elisabeth Hamilton Cullum

1894



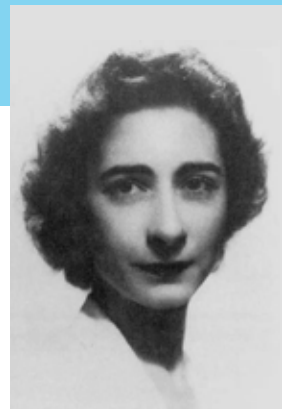
Dr. Maude Abbott completes her MD at Bishop University and is hired by McGill University's Pathology Department after being refused entry to the McGill University Medical School solely because of her gender. She is considered a pioneer in the field of cardiology and is responsible for laying the foundation for other women to enter the field of medicine

1916



Dr. Elise Strang L'Esperance joins the Department of Pathology and later establishes the Kate Depew Strang Cancer Prevention clinic in 1933

1945



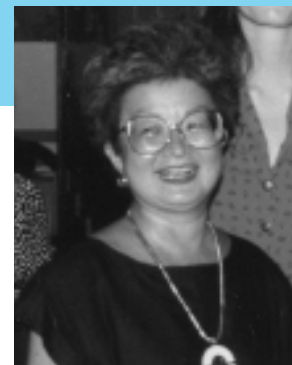
Dr. Sophie Spitz authors the Pathology of Tropical Diseases which continues to serve as a reference for juvenile melanoma

1948



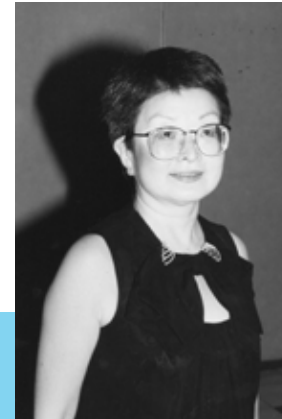
The term "Spitz Nevus" is coined for Dr. Sophie Spitz' "juvenile melanoma"

1991



Dr. Patricia Saigo is appointed Chief of the Cytology Service

1994



Dr. Patricia Saigo receives the prestigious American Society of Cytopathology Papanicolaou Award

2005



Dr. Maureen Zakowski becomes the first woman to be promoted to Attending in the Pathology Department at MSK

2010



Dr. Meera Hameed becomes the first woman to hold the Service Chief, Surgical Pathology position

2011



Dr. Melissa Pessin is appointed Chair of the Department of Laboratory Medicine at MSK

2014



Dr. Edi Brogi is the first female MSKCC pathologist to be an editor of the *WHO Classification of Breast Tumors* (upcoming 5th ed). She is also the first woman to serve as Associate Editor of *Rosen's Breast Pathology* textbooks (4th and upcoming 5th ed.)

MELISSA PULTZER, MD

Change Agent

From challenging diagnostic aphorisms to mentoring leaders, dermatopathologist Melissa Pulitzer is creating a better future for patients and physicians

By Hope Cristol and Melissa Pulitzer, MD

There are some people who can be described fairly, though not thoroughly, in a single word. Visionary. Pioneering. Compassionate. Industrious. But anyone would be hard-pressed to so neatly sum up dermatopathologist Melissa Pulitzer, MD.

Like her colleagues, Dr. Pulitzer is making a lasting impact on her subspecialty through research on rare malignancies. She is the Pathology Department expert in cutaneous hematolymphoid disease, in particular the primary cutaneous lymphomas, a heterogeneous group of monoclonal B and T-cell proliferations involving the skin, which comprise the majority of her research efforts. Her complementary and collaborative research interests include immunologic disorders related to cancer and cancer therapies that manifest in the skin such as graft versus host disease and immunotherapy reactions, the use of novel in vivo imaging technologies such as confocal microscopy and optical coherence tomography to improve the diagnosis and treatment of skin cancer, and cutaneous neuroendocrine tumors.

Dr. Pulitzer is also passionately outspoken about matters of diversity and inclusion as they bear upon professional development and community in a workplace that aims to nurture its highly skilled clinical and academic practitioners. Through teaching and mentorship, Pulitzer takes every opportunity to provide meaningful awareness of - and to consider and model approaches to - inequities in the field, whether related to gender, race or ethnicity, or to differences in competencies and expertise.

Cutaneous Lymphoma Research Highlights

Cutaneous lymphoma (CL) is a challenging diagnosis. Benign or low grade skin lesions can mimic malignant

ones, which may result in “massive overtreatment of patients who don’t have malignancies,” Pulitzer says. Conversely, some aggressive lymphomas do not get recognized until late in the course of disease. The problem lays not with the physicians, but rather their diagnostic tools, which are poor at predicting individual’s disease courses or response to therapy.

The International Society for Cutaneous Lymphoma recently developed an algorithm to help physicians diagnose the most common CLs with greater consistency. Yet even with such tools, there remains a vast need to improve diagnostic and prognostic accuracy and to increase therapeutic options and predictors of therapeutic response, particularly in some of the rarest forms of the disease. Pulitzer’s research is making vital contributions in these areas.

Framing many of her contributions to the field, Dr. Pulitzer’s 2017 article in *Clinics in Laboratory Medicine* addresses the clinical, histologic and immunohistochemical characteristics of the currently classified cutaneous T-cell lymphomas, including the common mycosis fungoides, and the rare primary cutaneous gamma delta T-cell lymphoma. Her work with large scale collaborations with groups such as the Cutaneous Lymphoma International Consortium are better defining prognostic and therapeutic response predictive clinicopathologic characteristics of mycosis fungoides, while on a national level, Pulitzer and colleagues are working to better define and treat the rare and challenging aggressive lymphomas.

A multicenter research collaboration on cutaneous lymphoma, published in *Modern Pathology* in 2017, adds to a paucity of evidence about aggressive epidermotropic T-cell lymphoma, a rapidly evolving malignancy with a

5-year overall survival of 32% and a median survival of 12 months. The researchers found that allogeneic stem cell transplantation was effective in a small group of patients. Pulitzer and colleagues also identified early signs of the disease, often misdiagnosed as more common conditions such as eczema or psoriasis, highlighting an absence of clinicopathologic ulceration within two thirds of patients upon initial presentation that may have contributed to initial misdiagnosis of almost one half of patients with mycosis fungoides. These and other findings underscore the importance of improving diagnosis and therapies for this rare but aggressive disease. Similar collaborative efforts are currently underway to learn more about non-mycosis fungoides T-cell lymphoma in skin on a clinical, histopathologic and molecular level.

A recurring theme in Pulitzer’s work is assessment of histopathologic and molecular boundaries between benign immunologic reaction patterns and malignant proliferations and the close examination of biomarkers said to make such distinctions. In 2019, Pulitzer’s *Histopathology* publication reported on TCR-delta positivity not only in aggressive gamma delta T-cell lymphomas and mycosis fungoides variants, but also in regressing CD30+ lymphoproliferative disorders, expanding the differential diagnosis for TCR-delta positive disease. In 2019, in the *Journal of the American Academy of Dermatology*, Pulitzer and colleagues describe the common occurrence of follicular mucinosis, a reaction pattern typically used to diagnose CL, in the setting of numerous non-CL hematolymphoid malignancies. They found that a clinical pattern of papular lesions, in the absence of clinical plaques and/or alopecia and the histopathologic absence of epidermal exocytosis were



not associated with the development of CTCL over a mean follow up of 4 years and could be therefore more comfortably be regarded as reactive/inflammatory lesions rather than a second malignancy. Previous work has challenged the use of biomarkers including both large cell transformation (in mycosis fungoides) or CD30 to define lymphoid malignancy.

Publication Highlights

Pulitzer has contributed extensively to both journals and books on various cutaneous hematopathologic disorders, as well as her secondary interest, cutaneous neuroendocrine tumors. Below is a small selection of her research collaborations in the past few years.

Recent Journal Publications on cutaneous lymphoma:

- Pulitzer M, Geller S, Kumar E, Frosina D, Moskowitz A, Horwitz S, Myskowski P, Kheterpal M, Chan A, Dogan A, Jungbluth A. TCR- δ expression and $\gamma\delta$ + T-cell infiltrates in primary cutaneous gamma-delta T-cell lymphoma and other cutaneous T-cell lymphoproliferative disorders. *Histopathology*, 2018 Oct;73(4): 653-662.
- Geller S, Myskowski PL, Pulitzer M. NK/T-cell lymphoma, nasal type, gamma/delta T-cell lymphoma and CD8-positive epidermotropic T-cell lymphoma – clinical and histopathologic features, differential diagnosis and treatment. *Semin Cutan Med Surg*. 2018 Mar;37(1):30-38
- Warren S, Kheterpal M, Myskowski PL, Moskowitz A, Horwitz SM, Pulitzer M. Unrelated immunodeficiency states may impact outcomes and immune checkpoint molecule expression in patients with mycosis fungoides: A clinicopathologic case-control study. *J Am Acad Dermatol*. 2017 Nov 10.
- Guitart J, Martinez-Escala ME, Subtil A,

Duvic M, Pulitzer M, Olsen EA, Kim E, Rook AH, Samimi SS, Wood GS, Girardi M, Junkins-Hopkins J, Ivan DS, Selim MA, Sable KA, Virmani P, Pincus LB, Tetzlaff MT, Kim J, Kim YH. Primary cutaneous aggressive epidermotropic cytotoxic T-cell lymphomas: reappraisal of a provisional entity in the 2016 WHO classification of cutaneous lymphomas. *Modern Pathology*, 2017 Jan 27.

- Marchetti MA, Pulitzer M, Myskowski PL, Dusza SW, Lunning MA, Horwitz SM, Moskowitz AJ, Querfeld C. Cutaneous manifestations of human T-cell lymphotropic virus type-1 associated adult T-cell leukemia/lymphoma: a single-center, retrospective study. *J Am Acad Dermatol*. 2015 Feb;72(2):293-301.
- Pulitzer M, Myskowski PL, Horwitz SM, Querfeld C, Connolly B, Li J, Murali R. Mycosis fungoides with large cell transformation: Clinico-pathologic features and prognostic factors. *Pathology*, 2014 Dec;46(7):610-616.

Recent Journal Publications on other cutaneous hematopathologic disorders:

- Geller S, Gomez CJ, Myskowski PL, Pulitzer M. Follicular mucinosis in patients with hematologic malignancies other than mycosis fungoides: A clinicopathologic study. *Journal of the American Academy of Dermatology*. 2019 Feb; 80(6):1704-1711.
- Ogunrinade O, Terrano D, Chiu A, Pulitzer M. CD30 expression is rare in myeloid leukemia cutis; a study of 55 cases and implications for routine diagnostic algorithms. *American Journal of Dermatopathology*. 2017 May; 39(5): 351-357.
- Xu B, Naughton D, Busam K, Pulitzer M. ERG is a useful immunohistochemical marker to distinguish leukemia cutis from non-neoplastic leukocytic infiltrates in the skin. *American Journal of Dermatopathology*, 2016 Sep; 38(9): 672-7.
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The Good Fight

What makes Pulitzer such a unique force in the department isn’t just her dogged pursuit of better diagnosis and treatment options; after all, we expect that kind of excellence and commitment from our pathologists. She is also a staunch advocate for equal opportunity, parity, and recognition in the Pathology Department and beyond. She hopes she can improve some of the culture that puts individual practitioners at a disadvantage.

“In a diverse workforce like ours, we cannot use the same measuring stick (for success) for every person,” she says. “I was a child of the... feminist movement whose job was to carry to the torch into the next era”. Pulitzer argues that this requires concerted effort by leadership to foster individual’s strengths in the context of (rather than despite) demographics.

She is doing her part to foster a cultural shift that increasingly celebrates achievements of individuals who aren’t conventional award and title winners. “You want to have a workplace where you’re deeply ingrained in the team,” she says. Pulitzer actively learns and teaches ways promote team integration, despite potential biases and obstacles pathologists may face.

One way she has worked toward her goals in promoting opportunities for others is through extensive student, resident, and fellow mentoring, including within the Office of Diversity’s Medical Student Summer Pipeline Program, the NCI funded Medical Student Summer Research Fellowship Program, the American Society of Dermatopathology (ASDP)’s mentorship committee, and Barnard College’s women’s career program. One of her recent mentees, Shamir Geller, won the 2019 Cutaneous Lymphoma Foundation’s Young Investigator Award on a joint research project. She also actively seeks out new talent of all backgrounds when putting together the many educational courses that she participates in running in national organizations such as the ASDP.

In New York, “I spend a lot of time teaching at the microscope... Modeling ways in which one can overcome other people’s discrimination is probably the most effective thing I can do,” Pulitzer says. “This is possibly what people might argue as privilege, but at the end of the day I get my work done, I do the best I can for my patients, I mentor and teach, and I care about my institution.”

CYCLE FOR SURVIVAL

MEMORIAL SLOAN KETTERING | EQUINOX



TEAM CAPTAIN | Sarah Cook Virgo

I have had the privilege of working for MSKCC for nearly 14 years, all within the Pathology Department. In that time, I also underwent treatment for melanoma, receiving excellent care from my colleagues. Long ago I decided to devote my life to patient care and to enhancing the patient experience. My role as team captain for our Cycle for Survival team, Pathology Pedals has allowed me to give back to the institution I love and to the mission we serve.



TEAM CAPTAIN | Amanda Beras

When I was 15 my best friend was diagnosed with stomach cancer. So, when I heard about CFS I knew it was something I wanted to be a part of. Luckily, he has been cancer free for the past 15 years. I have been a team captain for four years and within that time I have had 2 family members beat cancer and two friends lose their fight, motivating me to keep participating.



TEAM CAPTAIN | Emily Lin

The members of the Precision Pathology Biobanking Center look forward to this event every year and we are excited to see our team grow through the years. We ride for our patients, for the research we contribute to, and for the people we love. I personally ride for my grandfather, who passed away from leukemia when I was in high school.

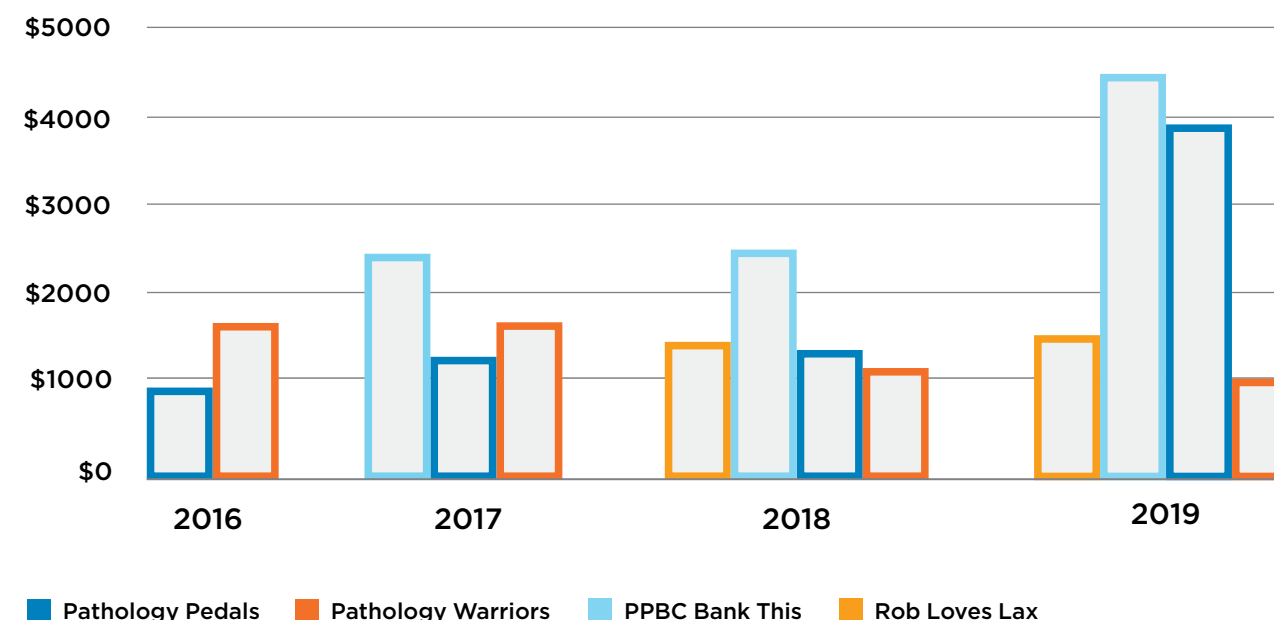


TEAM CAPTAIN | Lorraine Corsale

We ride in memory of Rob Paterson, a dear family friend, a lacrosse coach for both of my sons and a mentor to many. This team was formed with the help of the Paterson family and the Pace University lacrosse community. We ride in the honor of his spirit: he believed in being kind and just to all even when it wasn't easy, helping others and having fun. Cycle for Survival has not only raised money so that others may not have to suffer as he did but it has provided a space for those who love him to come together to laugh, reminisce and heal with a purpose.



Pathology's Cycle for Survival Teams



JESSICA WARDROPE, MA, MLS (ASCP)^{CM}

Manager, Hematopathology Service

By Hope Cristol



What brought you to MSK seven years ago?

My background is in clinical laboratory science. I'm a NYS-licensed and ASCP [American Society for Clinical Pathology] certified clinical lab technologist. After college, I worked for a pharmaceutical company in the immunotoxicology lab, where I learned flow cytometry. I became very interested in that, so I went to graduate school to get my Master's degree in biotechnology. Then I was hired as a technologist in the clinical flow cytometry lab here at MSK.

How did your career evolve from technologist to Hematopathology Service manager?

I worked my way up from a technologist to quality specialist and then supervisor for the Cell Marker Laboratory. When there was an opening for my current position, it was suggested to me that I consider applying. I've been in this operational role for two years, but I

think that because I've worked on the other side, it's easier for me to relate to the staff and find ways to make our work more efficient.

What are the major responsibilities of your role?

I oversee both the admin and technical operations of the Hematopathology Service, which includes the Cell Marker Lab, the Bone Marker Lab, and the Proteomics Lab. I'm responsible for regulatory compliance, LIS/IT solutions, recruitment and staff development, operational issues, budget development, and development of workflow processes with other pathology and lab medicine services. This also includes evaluating new theories, technologies, technological equipment advances, and methodology changes.

I also oversee the administrative support structure, which includes POA [physician office assistant] activities, transcription support, research support, and hemepath attending pathologist support. I represent the Service during The Joint Commission and New York State Department of Health inspections, follow up with specimen issues, and provide education for the different services in the Department of Medicine.

Another large part of my role is research. I help coordinate collaborations with industry, which involves working with them to determine the scope of work, preparing a budget, working with legal to review contracts, and coordinating the logistics of a study.

What's one example of your role in education?

Interventional Radiology (IR) is starting to perform bone marrow aspirations, which is rare for that service. They weren't sure of our

protocol to collect and submit this type of specimen. I reached out to one of the IR doctors, and we decided that I would come and give the IR physicians and nurses an education lecture so they can better understand the requirements to submit this type of specimen.

What are some of your strengths as a manager?

I try to keep in mind what people's goals are and how I can help them. If I have somebody talented who's thinking about leaving because they've hit a career plateau, I'll look for ways to keep them at MSK. I work closely with the other managers in various services/departments, so I'll send them resumes from people on my team when I know the open positions align with the great qualities and skills of my team members.

With the growth of MSK as an institution, the Hematopathology Service now spans two locations, the main campus and the Center for Laboratory Medicine on 64th street. A third location is coming this year at the David H. Koch Center for Cancer Care. I have had to work out the logistics to ensure the quality of patient care remains unaltered. This includes coordinating specimen transportation, developing new workflows for laboratory testing, and creating the most efficient processes between clinical teams and hematopathology.

Off the clock, what do you enjoy doing?

When I go on vacations, I try to do something adventurous. I think most people wouldn't expect that about me because usually I'm more reserved. I've been on the Nevis Swing in New Zealand, the biggest canyon swing in the world. I've been skydiving, canyoning, and caving, and I go fishing when I can.

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@MSKPathology had the privilege of hosting high school students from STEM Academy High School for a tour of our Histology Lab, Gross Room and Cytology Scope Rooms as part of our ongoing mentorship programs. #FutureLabProfessionals #PeopleofPathology

The Maude Abbott Lecture is a prestigious presentation given by a revered authority in pathology who has contributed & continues to contribute to the advancement of pathology in the areas of teaching, research & clinical practice. Congratulations to our Chair, Dr. David Klimstra!

#WomensHistoryMonth Sophie Spitz, MD, known for her foresight in advocating the use of the pap smear, produced the beautifully illustrated atlas, Pathology of Tropical Diseases. Her term "juvenile melanoma" became synonymous with her name and was renamed Spitz nevus

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COVER: Maude Abbott Lecture at the 2019 USCAP Annual Meeting with Dr. David Klimstra

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