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Upfront
COVID-19 molecular testing advice

06 – 07

In My View
International moves bring many challenges

09

In Practice
Easing the burden on histopathology

38 – 41

Profession
From the laboratory... to the laboratory

46 – 48

Welcome to The Power List!

The people have spoken.
Look inside to see who's on the list for 2020!

16 – 35

In advanced ovarian cancer,

If you're not testing for HRD, you're not seeing the whole picture



1 in 2 women with HRD-positive tumors do not have a *BRCA1/2* mutation¹⁻⁴

Homologous recombination repair deficiency (HRD) testing identifies tumor characteristics — beyond *BRCA1/2* mutation — that make it sensitive to PARP inhibition.^{1,5}

Personalized medicine begins with personalized pathology. Discuss establishing a testing protocol for HRD in ovarian cancer with the multidisciplinary team at your institution.⁶⁻⁸

Learn more at testforHRD.com

BRCA, breast cancer susceptibility gene; PARP, poly ADP-ribose polymerase.

References: 1. Frey MK et al. *Gynecol Oncol Res Pract*. 2017;4:4. 2. Pennington KP et al. *Clin Cancer Res*. 2013;20(3):764-775. 3. Konstantinopoulos PA et al. *Cancer Discov*. 2015;5(11):1137-1154. 4. Ledermann JA et al. *Eur J Cancer*. 2016;60:49-58. 5. Watkins JA et al. *Breast Cancer Res*. 2014;16(3):211. 6. Cheema PK et al. *J Oncol Pract*. 2017;13(2):e130-e138. 7. Hoskins PJ et al. *CA Cancer J Clin*. 2017;67(6):493-506. 8. Sundin T. *Med Lab Manag*. 2019;8(11):6.



For many of us – especially in healthcare and adjacent professions – it’s easy to get lost in pandemic news because we’ve heard little else for months. But although COVID-19 remains at the forefront of our minds, we must not allow it to deflect our attention from other issues, such as racism, bias, and inequality, that affect us just as deeply.

Scientists are not above bias. We are not above mistakes or ignorance or prejudice – and we are certainly not above a degree of blindness to our own privilege.

This month’s editorial is short, because mine is not the voice we should all be listening to right now. Instead, I’ll take this opportunity to point you in the direction of other voices:

- **Valerie Fitzhugh** writes about her experience as a Black woman in medicine (and specifically pathology) to both inspire and educate (1).
- **Angelina Knott, Robin Suggs, and Timothy Craig Allen** propose a community-supported approach to role modeling and encouraging Black children to “dream big” (2).
- **Kamran Mirza** shares his experience of prejudice in pathology and offers lessons to be learned from the pathologist’s perspective (3).

I hope, as you read this issue and congratulate our 2020 Power List finalists, you’ll join us in celebrating the diversity that the laboratory can foster – and in asking a simple question: how can we do better?

Michael Schubert
Editor

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2. A Knott et al., “The Dream of Diversity,” *The Pathologist* (2019). Available at: <https://bit.ly/3fOw44R>.
3. K Mirza, “Microscopes, Ambulances, and Humanity,” *The Pathologist* (2020). Available at: <https://bit.ly/33M9pnt>.



Contents



03 **Editorial**
Listen
by Michael Schubert

On The Cover



A graphical representation of all things laboratory in honor of the Power List!

Upfront

06 Quick-read news on everything from COVID-19 testing data to an unusual variety of lymphoma – including recommendations for reforming the pandemic response.

11 Case of the Month



In My View

- 08 Nicola Parry shares her experiences in veterinary pathology and offers her top tips to those considering a career in the field.
- 09 International medical graduates face challenges when entering a new culture. Silvana Di Palma outlines these challenges and the risk they pose to wellbeing.

From The ASCP

10 **Leaders in a Post-Pandemic World**
Now, more than ever, the fresh perspectives new pathologists and laboratory medical professionals bring to the discipline are needed.



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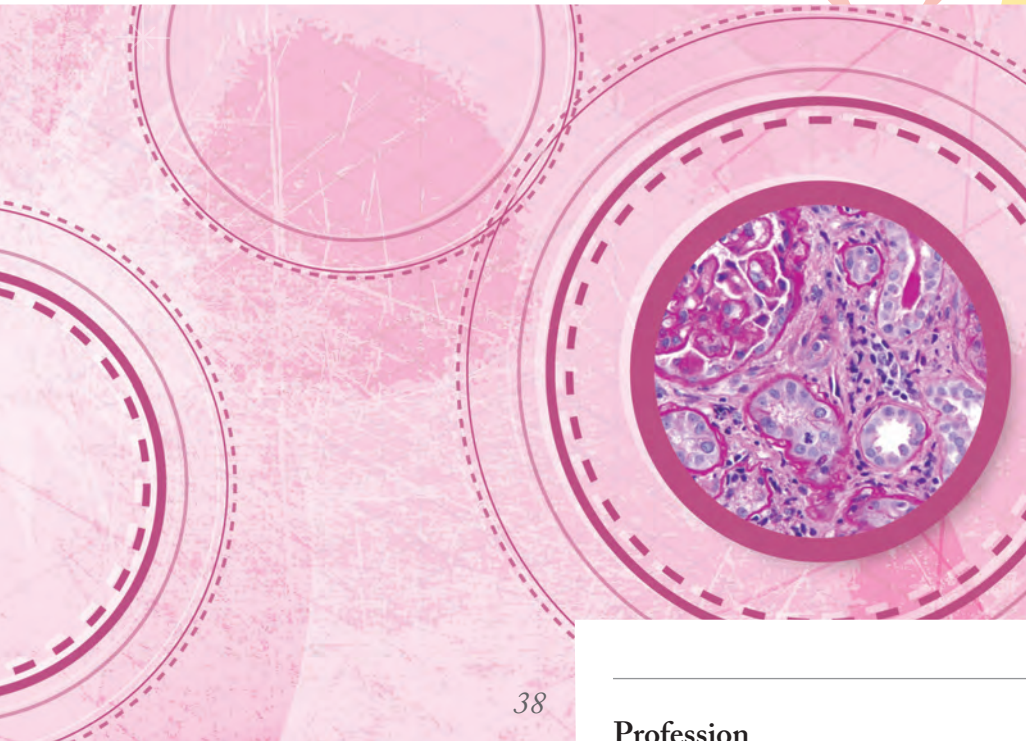
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38

Feature

- 16 **The Pathologist's 2020 Power List**
Reader-nominated and judge-selected, meet the winners of The Pathologist's 2020 Power List. This year, we focus on four categories: the social media stars, the educators extraordinaire, the linchpins of the laboratory, and the dreamers and discoverers.

In Practice

- 38 **Averting a Histopathology Crisis**
As demand for histopathology increases, the workforce is coming under extreme pressure. Could healthcare scientists with special training in histopathology reporting help shoulder the burden?

Profession

- 44 **Teaching the PAs of the Future**
Sarah Garner discusses how she implemented a new pathologists' assistant training program at Tulane University and why such programs are key to pathology's future.
- 46 **Compatible Careers: A Laboratorian's Journey**
From bench to bedside – not just a motto, but a career path for Constantine Kanakis and others like him, whose background in laboratory science inspires their interest in pathology.

Sitting Down With

- 50 **George J. Netto**, Endowed Chair, Department of Pathology, The University of Alabama at Birmingham, Alabama, USA.



In Focus: *T. rex* Lymphoma

Key features of Richter's syndrome of T-cell lineage

A new variety of non-Hodgkin lymphoma has been identified in Italy. Found in mature T cells and particularly malignant, it has been nicknamed “*T. rex* lymphoma,” after the similarly savage dinosaur. But what makes this cancer, officially known as Richter’s syndrome of T-cell lineage, so aggressive?

Non-Hodgkin lymphomas most commonly demonstrate a B-cell phenotype; less frequently, they may show a T or NK phenotype. Some are mature, their cells differentiated within primary lymphoid organs, such as the bone marrow or the thymus; others derive from immature elements with their cells still at a progenitor stage. In general, lymphomas come in two forms: indolent and aggressive. Indolent forms pose no imminent threat to the patient. Aggressive forms, in contrast, cause rapid deterioration in the patient’s health. If wrongly diagnosed and treated, such lymphomas can lead to death in a matter of weeks.

Indolent varieties of B lymphoma can also turn aggressive in time, an event

first described by Maurice Richter, the US pathologist who gave his name to the syndrome in 1928. In the rare cases when this happens, the transformation can involve a T-cell rather than a B-cell clone, thus generating a new T-cell lymphoma in the context of an underlying indolent B-cell lymphoma.

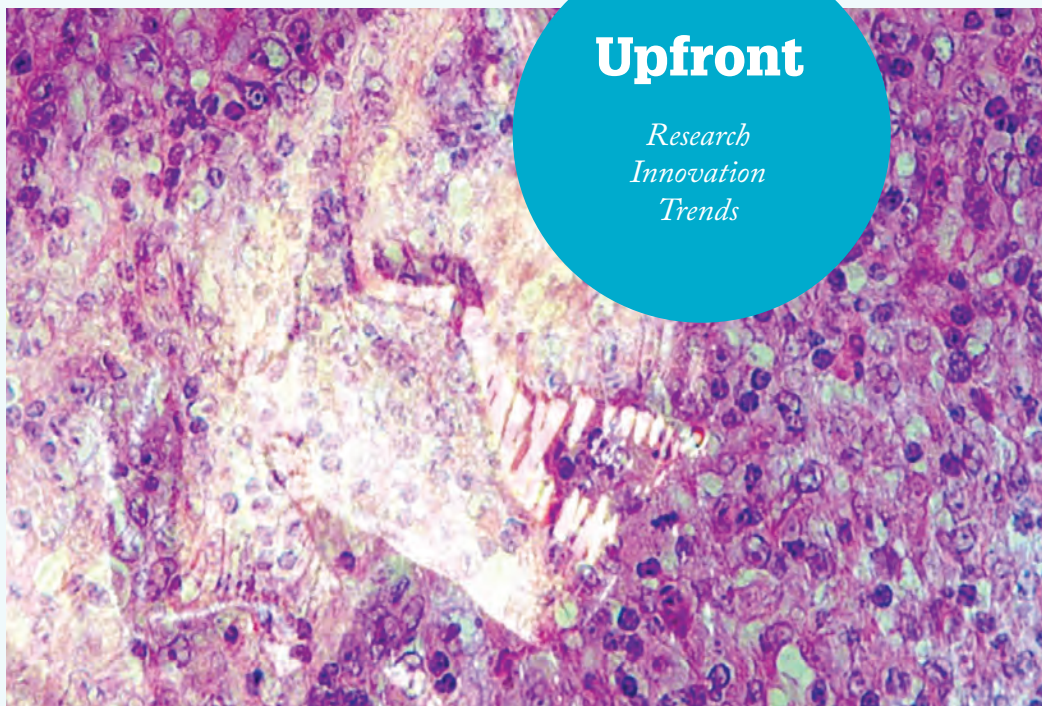
T-cell lymphomas are often aggressive, especially where an underlying indolent B-cell lymphoma has already undermined patient immune responses. Neoplastic B lymphoma cells are differentiated and release substances that dysregulate immune responses – which, in turn, can stimulate T lymphocytes,

increasing the likelihood of carcinogenic mutation. The risk is greater in patients undergoing chemotherapy, and the result is a rapid decline into immunodeficiency, which exacerbates disease progression.

Today’s cancer therapies are increasingly based on histological diagnosis and immunohistochemical and molecular profiling – which means personalized, precisely targeted treatment. To address lymphoma, we apply specific histotype-based protocols. Now that the “*T. rex* lymphoma” has been identified, we can offer more precise and effective therapy to patients with this serious pathology.

Upfront

Research
Innovation
Trends



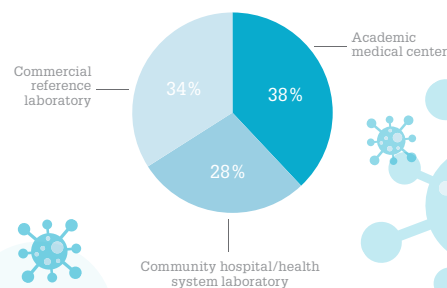
INFOGRAPHIC

Molecular Conclusions from SARS-CoV-2 Testing

Data from AMP's recent molecular testing survey

Laboratories are playing a crucial role in the fight against the SARS-CoV-2 pandemic in the face of numerous challenges. The Association for Molecular Pathology recently carried out a testing survey to document these efforts and experiences to help inform advocacy and clinical practice programs.

Data Demographics



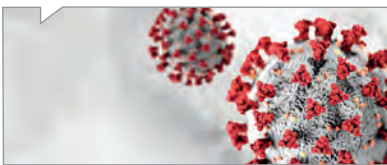


QUICK HITS

We round up the latest research in these bite-sized breakthroughs

Test Delivery

About 10 percent of pregnant women will develop gestational diabetes – and, of those, a further 30 to 50 percent will develop type 2 diabetes (T2D) within 10 years. A newly discovered metabolic signature that can predict with over 85 percent accuracy whether a woman will develop T2D could now lead to a test to identify those most at risk (1).



Under the Influence

A new study has found 19 previously unknown independent genetic risk factors for problematic alcohol use. The genome-wide analysis of over 435,000 people of European ancestry revealed 29 shared genetic variants associated with problematic drinking, including 10 previously identified risk factors (3).

Colorful COVID-19

An experimental diagnostic test for COVID-19 can visually detect the virus

in just 10 minutes. The simple assay uses plasmonic gold nanoparticles to detect a color change, which the researchers believe can reveal viral RNA as early as the first day of infection. The test is particularly attractive because it requires no advanced laboratory techniques (5).

Photo Opportunity

A new app could avoid the need for a blood test when diagnosing anemia by providing an instant estimate of hemoglobin count. The software, which works by analyzing a photo of the inner eyelid, could soon be available as a mobile app and would provide a faster, cheaper way for clinics in developing countries to better treat patients (6).

Immediate Imaging

Quickly and accurately assessing the level of kidney scarring that results from diabetes or acute kidney injury is difficult – but a new microscope might provide quick answers. The device, suitable for use in an operating room, uses unstained kidney biopsies to score the degree of tubulointerstitial fibrosis through fluorescence lifetime imaging. This can be combined with more traditional results to help determine long-term prognosis (7).

See extended article and references online at: tp.txp.to/qb-1.

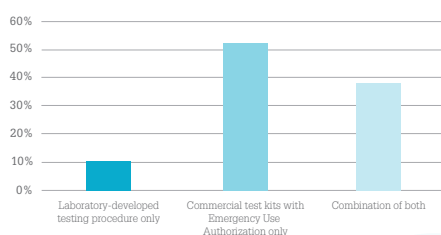
Reforming the Pandemic Response

Five key recommendations from the Association for Molecular Pathology

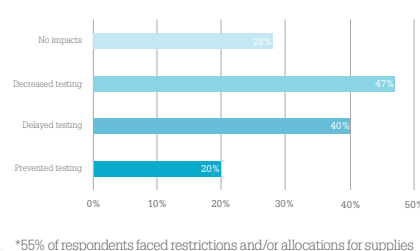
- Reassess the type and location of required testing services, from acutely presenting patients to “back to work” clearance, adapting methods to suit different scenarios.
- Prioritize allocation of testing methods and materials according to real-time feedback on clinical testing needs, which change over time.
- Improve communication and transparency between laboratories and suppliers so that labs can better prepare themselves around resource availability and shipment information.
- Ensure that labs coordinate regionally in real time to share any excess testing capacity, helping to prevent communication and resource bottlenecks.
- Standardize reporting formats and processes for infectious diseases through logistical support, defining minimal required data elements and preventing duplicate reports.

See reference on infographic below.

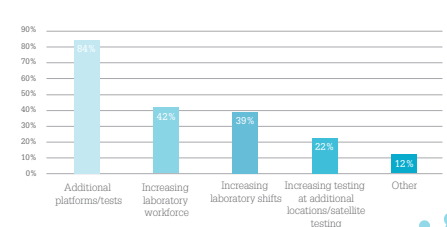
Testing Methodology



Impacts of Supply Chain Interruptions



Plans to Increase Testing Capacity



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Becoming a Veterinary Pathologist

Advice and recommendations for those interested in pursuing a career in animal health

By Nicola Parry, Independent Veterinary Pathology Consultant at Midwest Veterinary Pathology, Lafayette, Indiana, USA

Many pathologists are unaware of the veterinary arm of the discipline – and many veterinarians are unfamiliar with the full scope of a veterinary pathologist's work. As a result, many promising potential veterinary pathologists end up in other careers – and that's something I'd like to change by shining a light on our profession.

The general veterinary practitioner and the veterinary pathologist essentially have the same patient population, but the main difference lies in their client bases. As a general practitioner, my clients were the people who owned the animals I was caring for. However, as a pathologist, my clients are now the general practitioners themselves! And, because I'm also involved in research projects, I also have clients who are researchers in academic labs, biotechnology companies, and pharmaceutical companies.

With respect to skills needed, I think the two areas of work have more similarities than many people realize. For example, both types of vets work to diagnose and manage diseases in the same patients. Both areas of work rely on thorough investigations and interpretations of findings, as well as on excellent communication skills to ensure accurate messaging about what we've found. In both careers, we share the most important and clinically significant findings with our clients. And, if other issues are found, we let them know and explain that they're either of lower priority or clinically



In My View

Experts from across the world share a single strongly held opinion or key idea.

meaningless. Miscommunication isn't something we can totally avoid (we're only human, after all) but, by being thorough and precise, we can at least reduce the likelihood of miscommunications that can negatively affect patient (and client) care.

But there are clear differences. As the pathologist, I'm at an advantage because, when I'm interpreting my findings, I not only have the original expert interpretations of the general practitioner, but also additional findings from my own investigations. However, unless I'm doing a postmortem examination, I don't have access to the whole patient – I only have tissue samples and a written commentary from the general practitioner. Unless the diagnosis is cut and dried, this can be a disadvantage, because it can feel like putting together a jigsaw puzzle while some key pieces are missing. Working as a pathologist has further heightened some areas of my skills, such as problem-solving and analytical thinking. Although I also needed these skills in general practice, I need them more than ever now.

Those interested in pursuing a career in veterinary pathology will need to do a residency in pathology after completing vet school. The training programs are separate for anatomic pathology and clinical pathology, although there is some overlap between the two areas during training, so students will have to decide which subspecialty they would prefer to pursue before applying to residency programs.

People who haven't yet fully made up their minds about pathology as a career may want to try shadowing some pathologists to get a sense of the different areas of work available. Many places are very happy to organize this, so interested students could contact pathologists who work at vet schools, diagnostic labs, research labs, or government institutions. This is a good way for them to get an idea of the day-to-day work involved in different areas of pathology and see if it interests them.

Those who already know they want to apply will need to get their CVs ready! People who want to be competitive must make sure their CV helps them stand out. Useful additions might include work-shadowing experiences in different areas of pathology and with different animal species; attending pathology rounds sessions at a vet or medical school; research projects; journal publications; technical lab work; and teaching, especially on topics like animal diseases or the life sciences in general.

It's also important to find a mentor – someone who can guide applicants with the above, answer any questions they have as they go through the process, help them prepare a CV and applications, help them navigate their interviews, and write reference letters for them. And if any vet students or vets reading this are thinking about a career in pathology, I'll certainly be happy to answer any questions you might have or to help in any way I can!

The Challenge of Coming From Elsewhere

Migration and doctors in the UK's National Health Service



By Silvana Di Palma, Consultant Histopathologist and Professor of Clinical Medicine, University of Surrey, Training Program Director and Breast, Head & Neck & Thyroid MDT Lead Pathologist, Royal Surrey County Hospital, Guildford, UK

In the last few years, many studies have addressed the topic of problems suffered by doctors working in the UK's National Health Service (NHS). Most of them discuss similar issues – symptoms of burnout, mild to moderate depression, and anxiety. Although these are often referred to as “common mental health problems,” I view them as common *integration* problems. Participants report struggling to sleep, losing interest in their jobs, and problems with colleagues and patients.

Looking at the multicultural composition of doctors on the General Medical Council (GMC) register, I find myself wondering if migration has played a role in the development of integration problems. In particular, the question that has gradually come to mind is whether the discomfort some doctors experience could be related to the fact that medicine in the UK is very much “multicultural” – there are many doctors from other countries, and no two doctors will have had the same formative experiences.

Doctors who obtained their primary degrees and qualifications outside the UK have been given a specific label: international medical graduates (IMGs). Although the study of medicine can be very similar from one country to the next, the culture often varies from country to country – and that includes doctor-patient relationships, doctor-doctor relationships, and interactions with other staff in the healthcare system. But are these differences seen as a positive or a negative? Regrettably, IMGs experience the latter far more frequently. For example, data from IMGs attending the NHS Practitioner Health Program show that they are more likely than non-IMGs to be involved in regulatory or disciplinary processes, usually following a performance issue at work (1). The most common referral cases are problems with patients, colleagues, or staff mostly due to unwritten behavioral rules, cultural and social norms – essentially, problems with integration into the system. Some groups of doctors feel particularly at risk, leading the GMC's independent review to recommend, “The GMC should work with healthcare service providers, national bodies, and representatives of overseas doctors to develop a suite of support for doctors new to UK practice. This should include information about cultural and social issues, the structure of the NHS, contracts, and organization of training, induction, appraisal, and revalidation, professional development plans, and mentoring (2).”

I—an IMG myself—performed a systematic review to investigate the association between migration and integration into the NHS, and the results were both surprising and informative! I discovered:

- IMGs are a significant proportion of the medical workforce in western countries. However, despite their contribution to patient care, adapting to an unfamiliar healthcare system

in a new country has become increasingly difficult as the number of new IMGs grows.

- Most studies have focused on three main causes of difficulty for IMGs: the role of language/communication barriers, working in an unfamiliar world, and lack of familiarity with the legal and professional framework.
- Some countries have concentrated their efforts on identifying resources to support IMGs, rather than exploring the underlying causes of their difficulties.
- Other countries, the UK, for example, have focused on medico-legal aspects – including concerns about medical practice and patients' ill-founded fears about the safety risks IMGs may pose.
- There has been little exploration of the possibility of creating awareness of the impact of migration on IMGs' wellbeing. By focusing on mental health problems, studies may give the false impression that doctors migrating from other countries bring such problems with them. As a consequence, the general population may doubt IMGs' ability to provide safe and compassionate care. How can you care for someone else if you can't care for yourself?

The last sentence resonates with Hippocrates' Corpus, which states that, if a doctor is well-presented and well-dressed, patients will not have reservations about their ability to provide care. This last point, of course, is tongue-in-cheek – but it betrays a stark reality: that IMGs, despite being fundamental to many healthcare systems, face significant challenges integrating into them. It's my hope that, by spreading awareness, we can change the way we assist new doctors in integrating into our countries and our lives.

Please see references online at: tp.txp.to/article/IMGs

Leaders in a Post-Pandemic World

Welcoming new pathologists and laboratory professionals at a tumultuous time in healthcare

By E. Blair Holladay

Right around now, the future clinicians of the US are starting their medical residencies. Typically, it's a time filled with both excitement and anxiety – the start of an intense, all-consuming period in their lives. But now, in a year that has been rocked by a pandemic and upended by major social and economic issues, we can easily say that 2020 will be a unique experience for medical residents.

And maybe that's not a bad thing.

As leaders in healthcare – and as the cornerstone of patient testing – pathologists and laboratory professionals undoubtedly have the expertise to know that there will most likely be a second wave of the virus, that it will affect more people, and that many countries are still at risk. But we don't have a crystal ball. There is a lot we don't know about how the SARS-CoV-2 crisis will play out. We can't predict when – or how – this pandemic will end. Nor can we say exactly what the future will hold after it ends, so we will continue to adapt and to learn from research and discovery.

The ability to pivot and adapt practice patterns as needed will be one of the first skills pathology residents and medical laboratory scientists learn as they enter the field – and it is a skill that will serve them throughout their careers. Normally, it is learned over time, but the past six months have shown us that time is not



always available.

The post-COVID-19 world is going to look vastly different than it did before and its challenges are unprecedented. But one of the greatest things about every new wave of scientists that enters pathology and laboratory medicine is the fresh perspective they bring to the field. No matter what kind of world we live in, leaders are always needed – and leadership is not an easy role to assume. For some, it comes naturally; others must work toward it one step at a time. Leadership requires flexibility, constant diligence, and the ability to evolve based on what's happening in the moment, as well as what may come in the short and long term. With the launch of the ASCP Town Hall events, we've seen current and future leaders in action, joining us as expert panelists to discuss the latest research and share their experiences around COVID-19. Without their knowledge, we wouldn't be as well-positioned as we are within healthcare, and we wouldn't be driving progress toward better patient care.

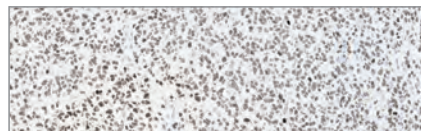
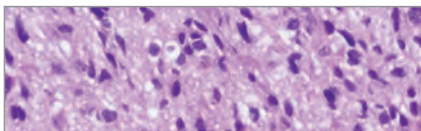
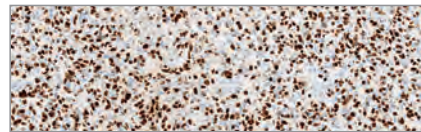
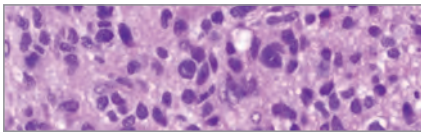
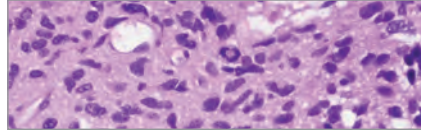
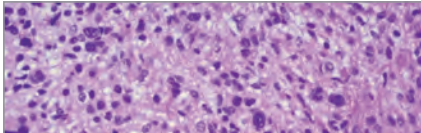
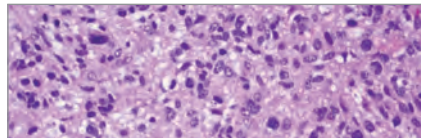
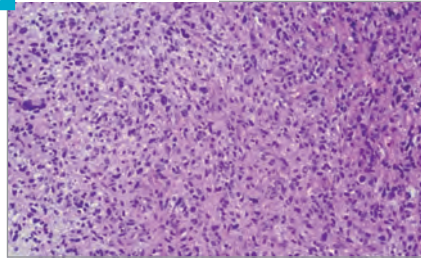
These experts – along with new

“We can easily say that 2020 will be a unique experience for medical residents... and maybe that's not a bad thing.”

pathologists and medical laboratory scientists – will be informing the next phase of COVID-19 diagnoses. Although it's not ideal to enter a new career in the middle of this kind of worldwide upheaval, now is the perfect time for the new perspectives these individuals will bring. This is an opportunity to learn, grow, and innovate – not only for themselves, but for the profession overall.



CASE OF THE MONTH



A five-year-old girl presented with headache and vomiting for one week. MRI showed a large, round, relatively well-circumscribed tumor measuring 6x5x4.5 cm in the right thalamic region. The lesion displayed heterogeneous signal intensity and showed enhancement of its superomedial aspect, which also contained an irregular area of necrosis. A biopsy was obtained and a diagnosis of diffuse midline glioma, H3K27 mutant, was made.

Which statement about diffuse midline glioma is true?

- Despite its name, it is typically not found in the midline.
- It often lacks high-grade histologic features, but is still considered grade IV.
- The diagnosis includes midline gliomas that are diffusely infiltrating but have not been tested for the H3K27M mutation.
- The prognosis varies based on the histologic features.

Answer to last issue's Case of the Month...

b) Disseminated histoplasmosis

Disseminated histoplasmosis is a systemic infection caused by *Histoplasma capsulatum*, a dimorphic fungus. Most *Histoplasma capsulatum* infections are asymptomatic; however, those with

impaired cell-mediated immunity are at risk of developing a severe systemic infection. *Histoplasma capsulatum* is among the most common fungi found in bone marrow specimens and is rarely found in peripheral blood smears. In tissues, *Histoplasma capsulatum* var. *capsulatum* consists of 2–4 μm yeasts with narrow-based budding, crescent-shaped eccentric chromatin, and a pseudocapsule

caused by cytoplasmic retraction. Yeasts are typically inside phagocytes; however, extracellular forms are also possible. Systemic histoplasmosis can be associated with hemophagocytic lymphohistiocytosis (as in this case).

Submitted by Efrain Gutierrez-Lanz, University of Michigan, Ann Arbor, Michigan, USA.

To register your guess, please go to <http://tp.txp.to/0820/case-of-the-month>
We will reveal the answer in next month's issue!

Precision Oncology Flourishes In-House

The UK is headed toward test centralization – but the value of in-house testing must not be underestimated

The UK's 100,000 Genomes Project reached its goal of sequencing 100,000 entire patient genomes in December 2018. Capitalizing on this success, January 2019 saw the establishment of a new, nationally commissioned Genomic Medicine Service that harnesses seven Genomic Laboratory Hubs around the country. The goal is to standardize the criteria for whole genome sequencing and targeted panel tests, simplifying patient pathways and reducing social inequalities – but is this democratization of genetic testing the best option for all institutions? We spoke to Tanya Ahmad, Consultant Medical Oncologist in London, to discover her personal outlook on in-house testing versus centralization.

What is your background in medical oncology?

I've been practicing as a lung cancer consultant for over nine years, a role that began just as precision medicine was beginning to flourish. I currently work across two institutions, which puts me in the interesting position of seeing things from two different perspectives. At one of my institutions, all testing is currently conducted in-house. All samples from the diagnostic teams (lab) – from CT-guided lung biopsies to EBUS/bronchoscopies – are sent to the histology lab on our campus. Once we've established a diagnosis of lung cancer, the sample is subject to immunohistochemistry tests and, following that, the curls of the tissue block are sent to our affiliated molecular pathology lab. Although these

three steps are all carried out within one institution – i.e., “in house” with all the benefits – it is a relatively large campus and we have observed that even small changes, for example, to the location of the pathology labs, can potentially impact the delivery speed of test results.

The pathology pathway at my other institution is more complex because three geographically distinct hospital sites have merged. Biopsies performed in one location must often be transported to another for basic H&E/IHC examination – and then molecular testing is further outsourced to another central lab. Experiencing the two contrasting strategies in parallel is like having my own controlled experiment in which I can directly compare in-house and somewhat centralized testing.

Why do your institutions approach things differently?

It's a combination of historical pathways, institutional politics, and the availability and quality of local support services. At the institution that conducts in-house testing, we've practiced molecular pathology for many years and we were routinely carrying out next-generation sequencing (NGS) before most other trusts. We also have a strong academic and research focus, so testing was already part of our standard pathway. In contrast, at my other institution, two district general hospitals merged with a larger teaching hospital. This meant that many services and departments were drastically reconfigured over the course of two years. We transformed from a place that conducted all testing in-house (before the advent of routine molecular testing for cancers), first to sending samples to another city and then back to sending them to other centers in London. Trust mergers often involve the reconfiguration of many services and pathways, a process dictated by the consolidation of expertise and various other cost implications of centralizing services.

Having seen both sides of the story, what's your opinion on test centralization versus regionally conducted testing?

There is a lot of heterogeneity in terms of cancer services, care pathways, and patient outcomes across the UK, part of which might be related to rapid diagnostics and patient access to clinical trials and certain drugs. The attraction of centralization is that some peripheral hospitals without adequate resources or academic expertise can access NGS, providing more detailed information about a patient's tumor than otherwise possible. Having access to a central hub that facilitates this can improve patient care – even in the face of increased turnaround times. However, in a center that already has the facilities and expertise to carry out NGS testing and other more sophisticated genomics, centralization is unlikely to add any benefit. If you already have a system that works in-house, centralization can introduce pitfalls, such as complex lab standard operational procedures, longer turnaround times, or increased risk of losing samples in transit.

From my point of view as a medical oncologist, one of the main benefits of in-house testing is the personalized service. I know the individual multidisciplinary team (MDT) colleagues dealing with samples because I meet and talk to them every week and, if an issue arises, I can contact them directly and informally to discuss the problem. Good MDTs improve integration between pathologists, radiologists, and oncologists, all of whom might previously have worked in separate silos. There's an interest in each other's specialties and, as a result, a deeper understanding of the nuances with individual cases. For example, I can call my colleagues about a particular patient and explain that, although we would usually request NGS testing for

EGFR, this is a very young individual who is extremely unwell. Their demographic raises strong suspicion of an *EGFR* mutation so, instead of waiting two weeks for the NGS results, we'd like to request a rapid *EGFR* test with a 48-hour turnaround time so that we can begin treatment faster. With centralized testing, each sample is anonymous – just tumor material with a serial number, perhaps lacking detailed clinical information that might help with analysis. It's harder to have the same nuanced conversation with a central laboratory, because you don't know the person you're speaking to and they may not be as invested in the case as your in-house pathology colleagues. In my opinion, this is another aspect of “personalized” care.

General interaction with colleagues is another benefit; delayed results can still occur in house – but, unlike with centralization, you can easily pick up the phone and speak to the pathologist. They can then check where the sample is in the pathway and call back within minutes to confirm when the results will be available. When I've sent samples externally, there is a phone number to call, but the person on the other end often can't provide much of an update and I'm left waiting for a response. The process becomes much longer and more challenging, which is why in-house testing can be beneficial for institutions whose internal labs possess all the clinical information and technical facilities to fully trust their results. It's also important to maintain laboratory skills and academic expertise within the institution; molecular pathology is a fairly niche subject, especially as more actionable, but rare molecular targets are identified. Therefore, centralization of molecular analysis may compromise the training and experience of newer generations of pathology colleagues who won't be exposed to it without internal facilities.

What are the consequences of an extended turnaround time for patients? Delays are potentially clinically harmful – especially for lung cancer patients, who often present in the advanced stages of disease and with comorbidities that affect their suitability for treatment. An inadequate test result or a lost sample could be the difference between starting treatment within days or within weeks – and, because patients need to be relatively fit for certain therapies, rapid deterioration can mean they miss the opportunity for treatment entirely.

Long turnaround times are also frustrating for the patient. After being diagnosed with lung cancer, it's often possible for them to see the oncologist on the day they receive the news – but my scope for discussing any systemic treatment with them is limited until I have all the molecular test results. Even with optimally functioning in-house testing, this can take up to two weeks (during which the patient must sit at home, knowing their diagnosis, but anxiously awaiting next steps in management). That's extremely difficult even without delays, so any extension in turnaround time as a result of centralized testing can have a significant negative impact on patient experience and outcome.

Are there any other potential risks of test centralization?

There have been occasions when samples were lost due to the convoluted nature of centralization. There are more opportunities for errors because there are several steps in the process that are out of my institution's control. Every step is someone else's responsibility – and when we tried to identify issues using pathway mapping for our pathology services, it merely revealed how complex each step was. One solution we derived from this mapping was to coordinate the specimen bags by color to highlight the most urgent samples for couriers.

This minor change made a noticeable improvement to turnaround times, emphasizing how much variation there can be at each stage of the process.

Another concern is ownership. Who takes responsibility for the samples once they leave the trust? If the courier gets lost or the samples are misplaced, do you wait for someone to search for them while the patient deteriorates? Or do you return to the patient, apologize, and obtain another biopsy? The latter might ensure faster results, but biopsies can be unpleasant, taxing, and sometimes inconvenient experiences – plus, there's always an element of risk. Why should the patient have to undergo another procedure because there's a flaw in our pathway?

From an academic perspective, I completely understand how central testing benefits certain services. However, I don't think those advantages apply equally to all hospital trusts – and I'm not convinced that implementing “blanket” centralization was necessarily the best move in the UK, especially when we are striving to reduce cancer treatment waiting times. We've already found that molecular test centralization can be time-consuming with respect to both admin and turnaround times. Whether this problem improves or worsens as throughput at central lab hubs increases remains to be seen. It's clear that institutions without an effective testing service of their own can certainly benefit from test centralization – but, for others, supporting and maintaining effective and efficient in-house testing remains the best way to optimize patient care.

Tanya Ahmad is a Consultant Medical Oncologist in London, UK.


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Comprehensive Genomic Profiling

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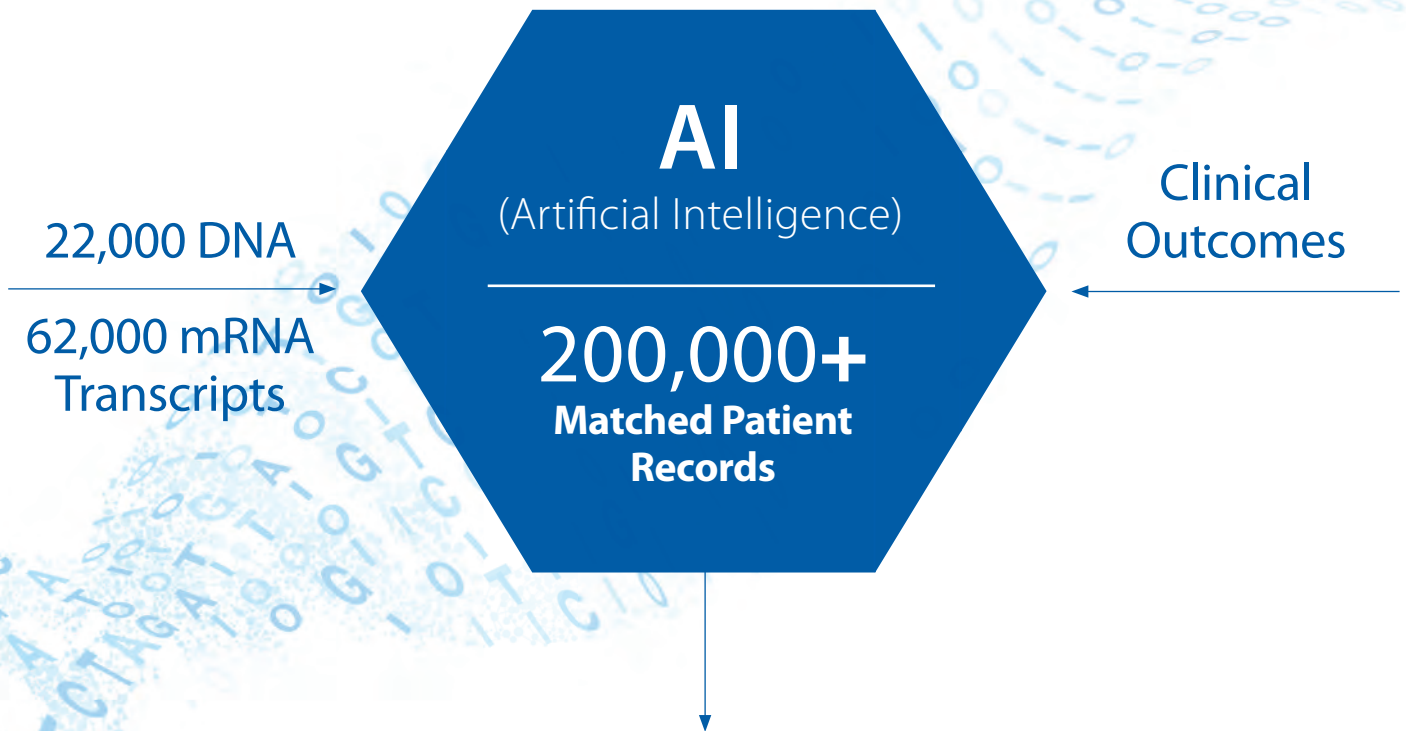
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THE POWER LIST

From motivating mentors to trailblazing innovators, social media gurus to laboratory medicine heroes, it is the inspirational individuals who make laboratory medicine such a fantastic field. You nominated and our expert judging panels deliberated – and now, we proudly showcase this diversity of talent in The Pathologist's Power List.

A SOLID FOUNDATION

A Solid Foundation celebrates the educators, mentors, and selfless individuals who go above and beyond to support others.



Phillip McKee

Phillip is a retired dermatopathologist with an interest in melanoma. He has authored many textbooks on the pathology of skin disease and is described by nominators as “a hero in his field.” Phillip set up a Facebook group in 2017 called McKee Derm, which proved

a great success and now has over 15,000 members. The group’s aim is to help residents and fellows with difficult dermatopathology cases by providing a space to share and discuss opinions. Phillip was awarded The American Society of Dermatopathology’s Founders’ Award in 2019 to recognize his outstanding contributions to the field.

Christina Arnold

As Associate Professor of Pathology at the University of Colorado, Christina has a passion for creating the next generation of leaders in pathology through both faculty development and her work with medical students. She harnesses her considerable following on Twitter to assemble exciting, interactive teaching sessions and share mentorship, support, and tips for students. “These times call on us individually and collectively to rethink our role in the world and how we can be better humans,” says Christina. “We must call out injustices and uplift the voices of those who have been discriminated against by centuries of institutional racism.”

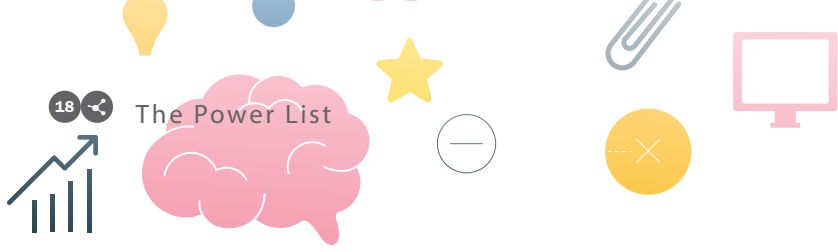


Bernadette R. Espiritu

Bernadette is Professor of Pathology at Our Lady of Fatima University in the Philippines. With the original career goal of becoming a schoolteacher, Bernadette has always had a passion for education – and this shows in her work as training officer for

pathology residents and medical technology interns at East Avenue Medical Center. She served as President of the Philippine Society of Pathologists for two consecutive terms and emphasized education throughout. Nominators say, “Not only is she a great educator, but also an intelligent mentor who donates her time despite her busy schedule.”





Diana Desai

“A phenomenal physician and outstanding educator,” nominators say of Diana, Assistant Professor of Pathology and Associate Director of Transfusion Medicine at Northwell Health. Serving on the College of American Pathologists’ Clinical Pathology

Education Committee, Diana has battled to maintain the highest educational standards in the face of the COVID-19 crisis and its unique challenges. She has high personal ambitions and recently completed a Master of Business Administration course, which she hopes to harness to transition into leadership roles in the future.



Melissa R. George

Melissa is Interim Chair of the Department of Pathology and Medical Director of Transfusion Medicine at Penn State Health Milton S. Hershey Medical Center. She has a distinct passion for teaching and mentoring and takes responsibility for preparing learners for real-life scenarios

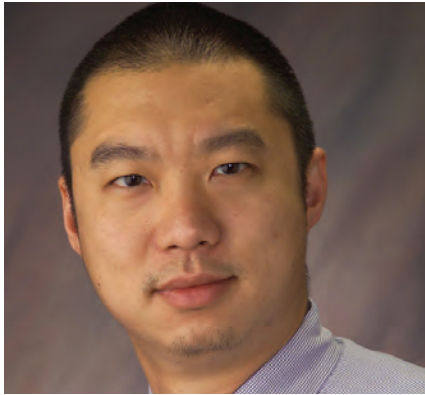
to ensure the best patient outcomes. For example, Melissa holds an annual clinical pathology on-call workshop to fully prepare night workers, which has now been adopted by other residency programs. “Teaching and mentoring require you to study the student or mentee and take their strengths and weaknesses into account, catering to their individual learning needs,” says Melissa.



Daniela Hermelin

Daniela is Assistant Professor of Pathology at Saint Louis University School of Medicine and Associate Medical Director of Transfusion Medicine Services at SSM Health Saint Louis University Hospital. She is described by nominators as a master educator and commended for her active use of social media to teach and share knowledge about blood banking and transfusion medicine with the next generation of doctors. Her best advice? “Find mentors who resonate with your interests and can help guide your personal journey – and, most importantly, stay true to yourself and pursue the area of pathology that gets your blood flowing!”





Jonhan Ho

Jonhan is Assistant Professor of Dermatology and Pathology and Director of the Dermatopathology Unit at the University of Pittsburgh Medical Center. An active user of social media, he uses his online clinical sharing platform, KiKo, to discuss dermatopathology cases and educate others. "Someone once asked me what I would deliver a TED talk on," says Jonhan. "The answer is, 'How to build great things across many generations.' I want to build a culture and infrastructure that empowers doctors to push the limits of medicine and allows them to efficiently hand off knowledge and values to the next generation."

Abbas Agaimy

Trained in both Sudan and Germany, Abbas can now be found at University Hospital Erlangen in Germany, where he is Professor and Deputy Director of Pathology and specializes in gastrointestinal stromal tumors. He is always keen to help both young and experienced pathologists in developing countries by carrying out workshops and assisting with the publication of scientific papers. Described by nominators as the "go-to professor for the review of difficult histopathology cases," Abbas regularly discusses complex cases and even sends out paraffin tissue blocks for free to help others to learn.

Yawale Iiyasu

Yawale is Associate Professor of Pathology at Ahmadu Bello University in Zaria, Nigeria, and President of the West African Division of the International Academy of Pathology. Having served as Chief Consultant Histopathologist in the Nigerian Army from 1994–2006, he now coordinates the activities of various African societies and is responsible for training pathologists in Nigeria. "We mentor students from across Nigeria, West Africa, and even the East African sub-region more broadly," says Yawale. "We encourage them to develop abstracts and support their efforts to obtain bursaries so that they can attend global pathology meetings and expand their horizons."



Sundaram Challa

Sundaram is a pathologist at Basavatharakam Indo-American Cancer Hospital and Research Institute in India. Having recently retired as Senior Professor and Head of the Department of Pathology at Nizam's Institute of Medical Sciences in India, she played a key role in the establishment of neuropathology services in her laboratory and is actively involved in the diagnosis of brain tumors, neuroinfections, and neuromuscular diseases. Nominators say she is a fantastic teacher whose wisdom and experience has benefited many postgraduate students and budding pathologists.

Syed T. Hoda

Syed is Clinical Associate Professor and Director of Bone and Soft Tissue Pathology at NYU Langone Health and Director of Surgical Pathology at NYU Langone Orthopedic Hospital. His creative spirit and forward thinking clearly shine through in his teaching; one student said, "I always thought pathology was dull, but he single-handedly changed my mind with the best preclinical lectures I have ever seen." Syed uses social media to present easily digestible cases and is dedicated to increasing the visibility of pathology. "A strong mentor doesn't open doors for you, but supports you as you open doors for yourself," he says.



L. Jeffrey Medeiros

Jeffrey is a Professor of Pathology and Chair of the Department of Hematopathology at The University of Texas MD Anderson Cancer Center in Houston. As one of the nation’s – and world’s – most respected hematopathologists, he has authored over 1,000 peer-reviewed publications and has played a key role in training many successful hematopathologists. We asked him about the future of the field. “I have concerns about the future of pathology education, in particular the current popular approach of teaching an organ system that includes pathology with medicine physiology. I am worried that pathology is getting de-emphasized.”



Anil Parwani

Anil is Professor of Pathology and Vice Chair and Director of Anatomical Pathology at The Ohio State University. He successfully established one of the first digital pathology implementations in the US, which now serves as a model for other institutes. Anil has mentored and trained many who are now leaders in this field – but what does he think are the most important qualities in an educator? “Be a good listener, be patient, and understand who your audience is so that you can share knowledge that is relevant to them at that point in their career.”

Kamran Mirza

As Assistant Professor of Pathology and Laboratory Medicine at Loyola University Stritch School of Medicine in Chicago, Kamran is a prominent user of social media who uses his platform to create educational tools. Nominators praise his excellent advocacy work for laboratory medicine professionals and say he is “leading the way for residents, medical students, and laboratory technician students to shine.” On the impact of COVID-19, Kamran says, “The silver lining was renewed enthusiasm for novel pedagogical applications, using resources and methods people wouldn’t have otherwise considered. For example, over 50 people answered my call and together we created PathElective.com!”



Severino Rey

As Head of Pathology at Hospital Manises and Associate Professor of Pathology at Universidad Católica de Valencia in Spain, Severino is described by nominators as a “tireless motivator, an enthusiastic professor, and an example to others.” Chairing several foundations aimed at promoting

the development of anatomical pathology worldwide, he is renowned by his students for delivering innovative teaching and personal mentoring. His advice for others? “Don’t settle for a simple image captured on a slide; study it, understand it, and be prepared to reproduce those findings in other cases and teach them to those with less experience.”





Anna Sapino

“A mentor can become a model of life who not only teaches how to overcome failures, but also conveys enthusiasm, determination, and a desire to work,” says Anna, Professor of Pathology and Scientific Director of the Candiolo Cancer Institute in Italy. In her role as President of the Italian Society of Anatomic Pathology, Anna is committed to improving the landscape for patients and colleagues alike. Nominators say she is a “wonderful and extremely hardworking person,” praising her unwavering desire to help, teach, and collaborate with others.



Rajendra Singh

Rajendra is a Professor, Director of Dermatopathology, and Associate Chair for Digital Pathology at Northwell Health. His virtual slide platform, PathPresenter, provides free access to over 30,000 whole-slide images and attracts over 2,000 daily users across the globe. Rajendra also helped create the Digital Anatomic Pathology Academy, an innovative educational resource for those wanting to work with digital slides. “Pathology education is undergoing a digital revolution and teaching is moving from classrooms to the cloud,” says Rajendra. “People from anywhere in the world can now be taught by the best educators without even leaving their homes.”

Snjezana Tomic

Snjezana is Professor of Pathology at the University of Split School of Medicine in Croatia, where she plays an active role in teaching medical students and training clinical residents and fellows. She always strives to promote collegiality and collaboration between pathologists from neighboring countries and regularly delivers international lectures to raise the profile of pathology. A teacher for over 25 years, her students consistently name her the best educator they have experienced and describe her as “a talented and charismatic lecturer who leaves an indelible footprint wherever she teaches.”



Gregory J. Tsongalis

“I believe one of the most important qualities of a mentor is flexibility,” says Gregory, Professor of Pathology and Laboratory Medicine at The Audrey and Theodor Geisel School of Medicine at Dartmouth and Director of the Laboratory for Clinical Genomics and Advanced Technology. “That flexibility must be embedded in what you teach, how you teach, and whom you teach. The world is changing and our knowledge base is expanding – so, as a mentor, you need to stay current.” Gregory has mentored many and taught courses around the globe, expanding the reach of his cutting-edge work.



Melissa Upton

Melissa is Professor Emeritus of Pathology and Associate Director of the Pathology Residency Program at the University of Washington. As past president of the ASCP, she worked tirelessly to enhance diversity and empower leadership potential within the organization. It is a testament to her success that the ASCP have now launched a Diversity and Inclusion Committee, which aims to recruit underrepresented groups into the field and provide education to build inclusive workspaces. “The COVID-19 pandemic has caused a rapid switch to global virtual education that exemplifies a way to build a connected, worldwide community of investigators and learners,” says Melissa.



LAB HEROES

Lab Heroes is for influential and highly respected professionals in the laboratory.



Cherie Beckett

Cherie is a Biomedical Scientist in Microbiology at the Princess Alexandra Hospital NHS Trust in Harlow. Described by nominators as a “true leader and inspiration within microbiology,” Cherie founded #IBMSChat, a monthly Twitter gathering of biomedical scientists from across the globe,

to share ideas and advice. She received the IBMS Amazing Individual Award in 2019 for her excellent advocacy work and regularly uses social media to promote biomedical science. “The COVID-19 pandemic has thrust our profession into the limelight – and we have an obligation to raise its profile and positively promote the work we do,” says Cherie.



Matthew Burdett

“My favorite thing about the field I work in is that each day is different and there is always something new to learn,” says Matthew, Medical Technical Officer at Unilabs in London. As a trainee biomedical scientist, he was among the winners of the IBMS Mary MacDonald award in 2019, reflecting his passion and dedication for the field. Nominators praise his professional approach and willingness to learn and teach others, demonstrated through his work as a STEM Ambassador. Matthew has great potential and participates in regular outreach activities to help others pursue a career in biomedical science.



Sarah Garner

“I feel very fortunate to be able to impact patients’ lives; I can’t think of anything more rewarding,” says Sarah, pathologists’ assistant and Director of the Pathologists’ Assistant Program at Tulane University in New Orleans. She has a clear passion for her profession and is trailblazing in her use of Instagram to share photos of surgical pathology specimens and demonstrate the variety of opportunities her work entails. Having single-handedly developed the curriculum for the pathologists’ assistant program at her institution, Sarah’s fantastic teaching and natural desire to help others make her a clear role model to students.

Charlene Gettings

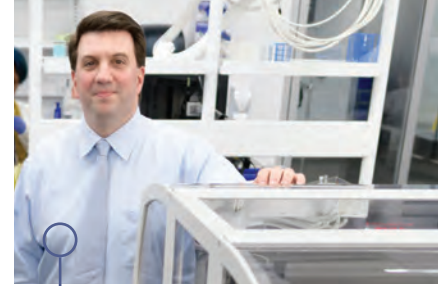
As Anatomic Pathology Manager at UChicago Medicine, Charlene is an active and inspiring pathologists’ assistant who has progressed into a laboratory management role. She is renowned for her attention to detail and her dedication to helping residents in the gross pathology lab, providing outstanding training and assisting with complex specimens. Charlene is a passionate advocate for the profession and has traveled extensively to improve the visibility of pathologists’ assistants. “The presence of laboratory medicine professionals on social media continues to grow and is the easiest way to showcase how interesting and fun our field of medicine can be,” says Charlene.





Sanja Cirovic

Sanja is a Molecular Biologist in the Laboratory for Molecular Pathology at the University of Belgrade. Renowned by her colleagues for her kind personality and great patience, she has worked tirelessly to bring molecular pathology into everyday practice for Serbian pathologists, organizing multiple courses to demonstrate its value. “In the era of precision medicine, the role of the medical laboratory is essential,” says Sanja. “Molecular and genomic techniques have clear value for providing the best patient care.”



Mark F. Gendron

Mark is Quality Manager in the Department of Laboratory Medicine at Memorial Sloan Kettering Cancer Center in New York. He works tirelessly to champion the clinical laboratory and provide quality laboratory services for patients every day, which his peers say makes him a true lab hero. Mark has gone above and beyond his duty throughout the COVID-19 crisis, securing testing supplies, coordinating emergency staffing schedules, and working with research colleagues to validate additional testing and increase capacity. His proudest achievement? “Achieving a full digital transformation of our quality management system and implementing a database culture at Memorial Sloan Kettering.”



Ian Davies

After working as a biomedical scientist for 20 years, Ian is now a Senior Lecturer at Staffordshire University, where he leads a degree apprenticeship in Healthcare Science – a program he developed himself to create a sustainable and agile pathology workforce. Ian received the NHS England Chief Scientific Officer’s Award for Excellence in Education Delivery in 2018 – but his students are his proudest achievement. “The Healthcare Science course helps those from nontraditional backgrounds pursue a career in biomedical science. Widening the opportunities to participate benefits the whole workforce from a diversity of experiences.”



Hatice Beşeren

Hatice has been working as a macroscopic technician and cytotechnician for 10 years and can be found at Kafkas University Medical Faculty Hospital in Turkey. Nominated for her enthusiasm for sharing grossing tutorials on Twitter, she is a strong advocate for the use of social media as a tool for education. What would she change about the field if she could? “I helped establish a pathology technicians’ association in Turkey because I was aware of the educational void in this area. I want all macroscopy technicians to be better trained and more qualified to further promote this specialty.”

E. Heidi Cheek

Heidi is a pathologists’ assistant and Assistant Professor at Mayo Clinic in Rochester. She helped create a lumpectomy course using breast tissue from consented autopsies to teach trainees how to approach the specimens. Heidi also lectures on grossing and tumor staging guidelines and assists residents with autopsy by creating tutorial videos. Her greatest achievement? “Helping expand the scope of practice for pathologists’ assistants. At Mayo Clinic, we pioneered a placenta rotation in which they not only perform the gross examination, but also preview the microscopy, consult cases, and prepare them for signout.”



Jessica Hoff

Jessica is a Technical Specialist in Molecular Diagnostics in the Department of Microbiology and Immunology at the Medical College of Wisconsin. In anticipation of the COVID-19 pandemic, Jessica and her

team worked tirelessly to develop, validate, and operate laboratory-developed tests in under seven days. Not only that, but she also proceeded to expand testing to four platforms to ensure a durable supply chain. Nominators describe Jessica as a “phenomenal example of the best that laboratory medicine has to offer.”



Cory Nash

“I believe that laboratory professionals need to understand their worth in medicine,” says Cory, a pathologists’ assistant at UChicago Medicine. “We need to appreciate how important our job is and transform our intellect and passion into self-confidence.” Cory has taken gross pathology education to the next level with his “Gross Photo of the Week” on Twitter, where he has built a considerable following. His leadership and innovation earned him a place on the 2019 ASCP 40 Under Forty program, which he says is his proudest achievement. Nominators praise his willingness to assist trainees and commend his unwavering professionalism and enthusiasm.



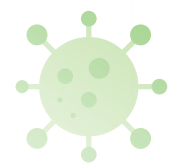
Jo Horne

Jo is an Advanced Practitioner Healthcare Scientist in Cellular Pathology at University Hospital Southampton NHS Foundation Trust. Specializing in gastrointestinal and hepatobiliary histopathology, she was crowned Biomedical Scientist of the Year for 2019 by the IBMS. Jo was the first person in the UK to pass a histopathology reporting diploma program – and she is a passionate advocate for career development of Healthcare Scientists working in pathology. Her advice? “For those who are further ahead in their career, don’t forget how difficult it can be at the start. Be the person you needed when you were at that early stage!”

Jesse McCoy

“I am an artist at heart,” says Jesse, a pathologists’ assistant at Chesapeake Regional Medical Center. Described by nominators as a leader and proud advocate of her specialty, Jesse’s background as an art illustrator has helped her play an instrumental role in the development of the illustrations for the American Association of Pathologists’ Assistants Grossing Guidelines. “My passion is creating artistry of patients’ disease processes through the art of grossing, painting an accurate histologic picture for the pathologist. My canvas is a 3.0 x 2.5 x 0.4 cm cassette and my media are tissue ink and finely trimmed tissue!”





Meghan Pickard

“Pursue any learning opportunity that excites you, even if it’s not immediately applicable to your current situation,” advises Meghan, a pathologists’ assistant at the University of Minnesota. She first became involved with the American Association of Pathologists’ Assistants as a Student

Delegate, but worked her way up to serve as Education Committee Chair. Meghan is instrumental in promoting the profession, writing articles and delivering webinars to encourage participation. “It’s an established enough field that most of the initial heavy lifting is over, but still a young enough field that it’s exciting to work on new initiatives and directions,” says Meghan.



Hayley Pincott

Hayley is an Associate Practitioner in the Oral Pathology and Microbiology department at Cardiff and Vale University Health Board. Dedicated to raising the profile of her field, she is a STEM Ambassador and regularly participates in outreach events to engage children and adults in science. “I would love to change the recognition we get as a workforce, both from the public and other healthcare professionals,” says Hayley. “When I participate in outreach events, the public are really interested in what we do; it’s always a positive experience and a great opportunity to demonstrate the scope of our various disciplines.”

Malcolm Robinson

After 43 years as a biomedical scientist, Malcolm retired in 2019 to focus on the charity he founded. Set up in honor of a young cancer patient who was curious about diagnostic medicine, Harvey’s Gang has now expanded to over 100 laboratories and provides tours for

young patients and their families. Not only do these tours help children understand their illnesses and treatments, but they also introduce healthcare scientists to the patients they wouldn’t usually meet. “I want to continue building Harvey’s Gang to educate and empower young patients who are going through so much in their healthcare,” says Malcolm.



Rodney E. Rohde

Rodney is Associate Director of the Translational Health Research Initiative, Professor in the College of Health Professionals, and Program Chair for Clinical Laboratory Science at Texas State University. Nominators commend his commitment to spreading useful health information on social

media during the COVID-19 pandemic, helping to curb the spread of infection. Terming himself a “hybrid professional,” Rodney entered medicine in 2002 after a decade as a public health microbiologist and molecular epidemiologist. “If I could change one thing about our profession, I would like to see us become a licensed profession in all states of the US,” says Rodney.



Maria Roussakis

As a medical laboratory technologist specializing in hematology at McMaster University in Hamilton, Maria has a clear passion for the lab. She is a proactive user of social media and set up the #MedLabChat hashtag, which brings together laboratory medicine professionals from around the

world to discuss issues and provide support. Maria writes regular blog articles and records podcasts that nominators call inspiring and engaging. Her advice to those starting out? “Build a professional network through your workplace, volunteering initiatives, attending conferences, or social media. By expanding your network, you meet people with whom you can learn and collaborate.”

Jon Wagner

Jon is Lead Pathologists’ Assistant at Diagnostic Pathology Medical Group, Inc., in Sacramento. As Editor-in-Chief of the American Association of Pathologists’ Assistants Crossing Guidelines, his vision and dedication helped deliver a collection of over 90 illustrations that serve as a practice

aid and teaching tool for those in the gross room. Nominators call him an “inspiring leader who is always looking to advocate for, and raise awareness of, pathologists’ assistants.” His proudest achievement? “Leading and engaging with hundreds of experts all devoted to crafting a single document that helps us provide the highest level of care for our cancer patients.”



David Wells

David is a biomedical scientist currently working as Head of Pathology at NHS England’s COVID-19 Testing Cell. Nominators term him an “unsung hero of the COVID-19 pandemic who has been a calm and steady voice as the NHS built a nationwide testing service from scratch.”

David has shown strong leadership and remains a leading voice for improving pathology’s visibility. “Our field is filled with some of the finest clinicians and scientists, all of whom have recently demonstrated their ability to respond to an international health emergency quickly and effectively, supporting innovation and technology adoption,” says David.

BIG BREAKTHROUGHS

Big Breakthroughs highlights trailblazers working at the cutting edge and driving the field forward.



Siraj Ali

Siraj is currently Vice-President – Clinical Development at EQRx. His significant contribution to the scientific and medical literature via early seminal work on mTOR is highly praised by nominators. Siraj has also worked on cancer genomics – and he is now

blazing a new trail in clinical development. “As our collective understanding of the complexities of human disease increases, it will continue to magnify the impact that pathologists have on patient care,” says Siraj. “I’m proud to work in a role where I can use both this knowledge and my pathology training to help improve access to life-changing medicines.”

Fátima Carneiro

Fátima is Professor of Anatomic Pathology at the Medical Faculty of Porto and head of the Department of Anatomic Pathology at Hospital Sao João. As well as making multiple discoveries in the field of gastric cancer, Fátima has served as President of the European Society of Pathology (ESP) and has represented Portugal in the committee for the European Commission’s Seventh Framework “Cooperation” health program. “The most unexpected moment of my career came when I discovered I was to become President of the ESP,” says Fátima. “It was a challenge that led me to the most demanding experience of my career.”



Rohit Bhargava

Rohit is Director of the Cancer Center at Illinois and Founder Professor of Engineering at the University of Illinois at Urbana-Champaign. Pioneering the concept of using chemical imaging to perform stain-free pathology, Rohit has developed technology that harnesses optics to measure

the chemical composition of tissue without dyes or stains. Using artificial intelligence, the data can be represented as traditional stained images – and the chemical content allows greater insight than morphology alone. The funniest moment of his career? “Originally trained as an engineer, I once asked why an NIH lecture on prostate cancer was focused solely on men.”



Jonathan Bakst

Having progressed from pathologists' assistant to lab manager, Jonathan is now Regional Administrative Director of Laboratory Services at Loyola University Health System, Chicago. A former ASCP 40 Under Forty winner and member of the American Association of Pathologists' Assistants Board of Trustees, his efforts toward championing the pathologists' assistant profession are second to none. We asked him about the effects of the pandemic on his work. "COVID-19 has had a huge impact across all laboratories, including staff levels, interactions, and our daily operations – but it has brought the best out of laboratory colleagues and leaders."



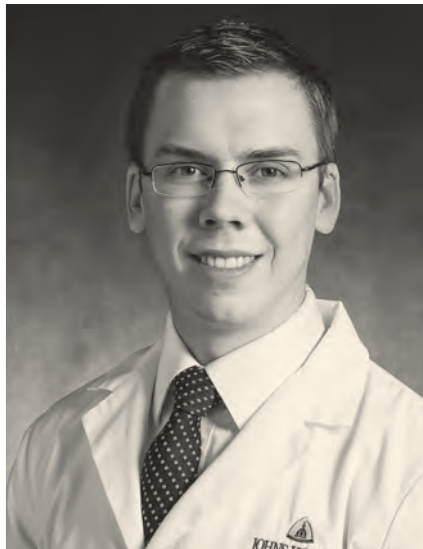
Sarah Coupland

Sarah is George Holt Chair in Pathology and Honorary Consultant Histopathologist at the University of Liverpool. Running one of NHS England's four supraregional eye pathology services, Sarah also leads the Liverpool Ocular Oncology Research Group and is molecular pathology lead for the North West Genomic Laboratory Hub. Her accolades include a 2019 RCPATH Excellence Award and the International Council of Ophthalmology's Eye Pathology Award. "The pandemic has actually brought me closer to my research team. I used to rush between buildings, cities, and countries – but a lot of time can be saved through virtual platforms."



Toby C. Cornish

"I am confident that current histopathology-based companion diagnostic testing for immune checkpoint inhibitors will be replaced by image analysis," says Toby, Associate Professor and Medical Director of Informatics at the University of Colorado. His team was the first to demonstrate that mismatch repair deficiency alone is sufficient to predict response to PD-1 blockade, and that intratumoral CD8+ T cell density is also sufficient to predict response to checkpoint inhibitors. He has served in national and international leadership positions and nominators describe him as "a world leader in AI and machine learning."



Jonathan Dudley

Jonathan is a molecular pathologist at John Hopkins Medicine in Baltimore. His research focuses on the application of oncogenic biomarkers to the detection of cancer in solid tumors. His development of a next-generation sequencing assay to detect bladder cancer from cfDNA in the supernatant of urine cytology specimens earned him the Young Investigator Award from the Association for Molecular Pathology and the Benjamin Castleman Award from USCAP. "My best advice would be to find mentors who will listen to your ideas and give you the freedom to pursue them," says Jonathan.



Jesús M. Paramio

Jesús is head of the Molecular Oncology Unit at CIEMAT and head of Cell and Molecular Oncology and Genitourinary Tumors at University Hospital 12 de Octubre in Madrid. His research connects epigenetics and immunotherapy in the context of metastatic bladder cancer and has provided new potential biomarkers of sensitivity to immune checkpoint blockade therapy. "Future advances in cancer treatment might make more patients susceptible to immunotherapies and open new opportunities for people with otherwise incurable neoplasias," predicts Jesús.



Zoltan Laszik

Zoltan is a Professor of Clinical Pathology at the University of California, San Francisco (UCSF), where he specializes in surgical and renal pathology. Zoltan and his team are among the earliest adopters of digital pathology in the US after a desire to decrease the time taken to share frozen sections among his institution's three hospitals resulted in a digitally enhanced workflow – and a large internal validation effort that turned into a major success story. Today, Zoltan and UCSF are approaching a 100 percent digital pathology operation.



Richard Huang

As a Clinical Informatics Fellow at Massachusetts General Hospital and Harvard Medical School in Boston, Richard is bringing to light the importance of regulatory science in pathology. “I believe we should engage with regulators, policymakers, and patient advocacy groups, because the field of pathology also exists outside the walls of academia and industry,” says Richard. He strives to achieve this through delivering national and international presentations, contributing to government engagement, and co-organizing a global collaborative alliance to advance the field of pathology through regulatory science.



Hamid Tizhoosh

A Professor in the Faculty of Engineering at the University of Waterloo, Hamid leads the world's largest AI and machine learning lab focused exclusively on image search in pathology. As the first to harness content-based image retrieval to search for similar cases, Hamid has opened many eyes to the potential of AI-powered image search. His best advice? “Working in an area where new ideas may potentially disrupt decades-old workflows might not be rewarding in the short run – but sticking to one's vision and learning from the objective critiques of others are vital to reach the shores of certainty.”



Anant Madabhushi

Anant is a Professor of Pathology and Director of the Center for Computational Imaging and Personalized Diagnostics at Case Western University in Cleveland. His work in pattern recognition, computer-aided diagnosis, and quantitative image analysis has improved cancer diagnostic and prognostic accuracy. His prediction for the future? “The role of AI and computational pathology in precision medicine represents a huge opportunity to use routinely acquired images for modulating disease outcome and predicting therapeutic response. These technologies can provide an affordable alternative to molecular companion diagnostic assays.”



Alex Greninger

Alex is an Assistant Professor in the Department of Laboratory Medicine and Assistant Director of the Clinical Virology laboratories at the University of Washington Medical Center in Seattle. Described as a leader in virology, Alex was instrumental in facilitating the first SARS-CoV-2 diagnostic test outside CDC or public laboratories. He helped educate the public about the challenges labs face, putting pressure on policymakers and enabling other labs to ramp up testing. “My proudest achievement is using my training to start early testing for COVID-19 in Seattle, helping our community and protecting its healthcare workers.”



Ashishh Raichura

As founder and CEO of Scanbo, a digital ecosystem for health data, Ashishh is a scientist-turned-entrepreneur seeking to revolutionize clinical pathology by providing affordable and accessible medical diagnostics. He invented a point-of-care device that



collects personal health data and shares it with medical professionals across the world. "Using dry chemistry for most of the common blood tests has been the most important breakthrough," says Ashishh. "This has never been attempted before and its role in the development of the technology – especially for WBC and neutrophil analysis – is key."



Christina Zioga

Christina can be found at George Papanicolaou General Hospital in Thessaloniki, where she works as a Consultant Cytopathologist. Her big breakthrough was the invention of the ABCDE algorithm for medical image

interpretation, which can be applied across pathology, radiology, and nuclear medicine. Her proudest achievement? "Being the first academic from Greece to receive a TEDMED scholarship and subsequently appearing among the top 10 influencers and most prolific tweeters at the event, with upward of 46,000 impressions."



Bernard Schaan

Laboratory staff around the world are accustomed to spending long periods manually filing and sorting slides and samples – but Bernard, Laboratory Manager at Ontario's Peterborough Regional Health Centre from 2009 to 2019, saw an opportunity. Partnering with an engineering company,

he created an automated slide sorting and filing system that saves staff valuable time – and is now receiving global interest. "My proudest achievement is completing a Master's in Business Administration, which enabled me to work with funding bodies to help them understand why the laboratory is as instrumental to patient care as frontline personnel," says Bernard.



Richard Scolyer

Richard is Co-Medical Director and Consultant Pathologist at Melanoma Institute Australia, Senior Staff Specialist in Tissue Pathology and Diagnostic Oncology at the Royal Prince Alfred Hospital and NSW Health Pathology, and Clinical Professor at The University

of Sydney. A world leader in melanoma pathology, Richard provides a clinical consultation service for the diagnosis of difficult pigmented lesions, receiving over 2,000 cases from around the world each year. "Whatever you do, make sure you enjoy the process – because it's through passion and fulfilment that you will have success and achieve things," says Richard.



Karen L. Kaul

As Chair of the Department of Pathology and Laboratory Medicine at NorthShore University Health System, Karen has been a consistent advocate for the laboratory community, both in the media and in her service to professional societies. Having overseen testing for COVID-19 since the

start of the pandemic, Karen has ensured that her institution has remained at the forefront throughout. “Our laboratory has performed over 80,000 tests since March, helping not only our patients, but also other hospitals, nursing homes, and the state,” she says. “This difficult period has highlighted the tremendous value of a strong clinical laboratory to ensure good patient care.”

Aishwarya Ravindran

As Chief Resident of Anatomic and Clinical Pathology at Mayo Clinic in Rochester, Aishwarya is committed to education and research. Her contribution to the discovery of exostosin 1/exostosin 2-associated membranous nephropathy recently earned her a Best Trainee Abstract Award from the Renal Pathology Society. The most unexpected moment of her career so far? “I was honored to receive Mayo Clinic’s Dr. Hobart K.B. Allebach Fellowship in Pathology award in 2019 – and it inspires me to constantly work to improve and advance our field of laboratory medicine and pathology.”



Karen Villar Zarra

“In the next five years, I see an ultrasound machine becoming part of every pathology department so that pathologists can be more active in the tissue-obtaining process,” says Karen, a pathologist at Hospital Universitario del Henares in Madrid. Described by nominators as

a leader in interventional pathology in Europe, she is an expert in ultrasound-guided procedures that ensure optimal tissue sampling for faster and more confident diagnosis. During the COVID-19 crisis, Karen developed a protocol for tissue sampling with ultrasound-guided core needle biopsy to minimize the likelihood of infection for those performing procedures.

THE SOCIAL NETWORK

The Social Network features social media users who have harnessed online platforms for education, outreach, and community-building.



Eduardo Alcaraz Mateos

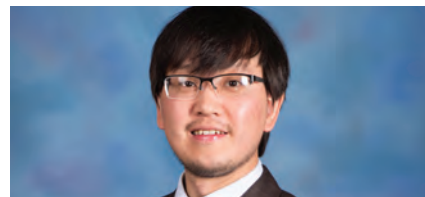
Eduardo is a pathologist and cytopathologist at the Morales Meseguer University Hospital in Murcia, Spain. An active social media educator with a following of over 5,000 on Twitter, he uses his online presence to discuss cases and provide advice. Eduardo is

described by nominators as “a pioneer who helps to increase the visibility of pathology as a specialty for medical students, both within his institution and on social media.” He says, “Social media contributes greatly to the visibility of our profession while also allowing us to build strong relationships with colleagues from across the world.”



Ahmed Kalebi

Ahmed is Founding Partner, CEO, and Chief Consultant Pathologist at Lancet Group Laboratories, East Africa. Not only does he harness his large social media network to educate colleagues and the public, but he also appears regularly on mainstream media to raise the profile of pathology and laboratory medicine. Having founded a laboratory that has grown to employ over 15 pathologists and serve thousands of patients daily, he is a renowned mentor across the continent. His advice? “Don’t obsess or worry about followers on social media – I had as much fun when I had a handful as I’m having now!”



Woo Cheal Cho

Woo is a Dermatopathology Fellow at the University of Texas MD Anderson Cancer Center. As well as posting educational content on social media, he also has a keen eye for #PathArt and regularly shares his own stunning images from under the microscope. His favorite aspect of social media? “The opportunity to learn new things every day. On Twitter, for example, rare entities are so common that users are regularly exposed to these ‘once-in-a-lifetime’ cases!”

Raimundo Gerônimo da Silva Júnior

A surgical pathologist at the Lapac laboratory in Teresina, Gerônimo Jr. is an avid user of social media to share illustrated cases that facilitate discussion and educate others. He posts regular tutorials and mentors many junior pathologists across the world. Nominators enjoy his fun and innovative use of Twitter to improve global education and praise his willingness to help others use social media to absorb and spread their own knowledge. “I was unaware of the true power of social media until, at USCAP in 2019, I found myself surrounded by followers from around the world who wanted to interact!”



Syed Z. Ali

Syed is a Professor of Pathology and Director of the Division of Cytopathology at Johns Hopkins Medicine. His research interests include diagnostic issues and prognostic factors of clinicopathologic analyses. As Past President of the American Society of Cytopathology and Chair of the International Board of Cytopathology, Syed still finds time to share stunning cytopathology images and contribute to online discussions with his broad social network!



Julie Feldstein

Julie is Professor of Pathology, Molecular, and Cell Based Medicine at Mount Sinai Health System in New York. In her field of hematopathology, she plays an active role in teaching medical students, residents, and clinical and research fellows both nationally and internationally. Julie is

especially active on Twitter and uses the platform to conduct outreach work and curate interesting content on hematologic malignancies. “Social media allows us to share our field with medical students, trainees, clinical colleagues, and others,” says Julie. “In recent challenging times, our global pathology family continues to support and inspire each other.”



Frank Ingram

Frank is a pathologist at Presbyterian Pathology Group in Charlotte. An active user of Twitter to engage with colleagues and post interesting images for others to learn from, nominators call him a “fountain of knowledge who shares amazing cases.” His favorite aspect of social media? “In my current position in community practice, I don’t get to interact with trainees – so it gives me an opportunity to contribute to medical student and resident education. That said, I definitely learn more than I teach on pathology social media; it’s a big part of how I stay updated in my field.”

Jerad Gardner

“There are pathologists living across the globe whom I have never met – yet, thanks to social media, I consider them close friends or extended family,” says Jerad, an Associate of Geisinger Medical Laboratories, where he specializes in dermatopathology and sarcoma pathology. He has a huge following across Twitter, Instagram, Facebook, and YouTube, platforms he uses to educate, engage with colleagues, and advocate for the profession. Especially impressive is Jerad’s YouTube channel, on which his almost 25,000 subscribers are treated to daily educational videos. Nominators term him the “king of social media” and praise his articulate teaching style.



Sara Jiang

Sara is an Associate Professor of Pathology specializing in cytopathology and surgical pathology at Duke University in Durham. Her strong online presence can be seen through regular posts about cytology, her involvement with #FNATuesday, and her creative flair in YouTube pathology parody videos! Nominators commend her relentless energy and drive to better the field through education and advocacy on social media and beyond. “So many unexpected projects have materialized from social media – not just research projects, but also creative projects that harness the energy and imagination of pathologists,” says Sara. “Sharing our personality as a pathology community is crucial.”

Adam L. Booth

As one of the most well-known and accomplished pathology trainees worldwide, Adam is currently a Gastrointestinal/Liver Fellow at the Beth Israel Deaconess Medical Center in Boston. Realizing the power of social media early in his residency, he began engaging with colleagues on Twitter and quickly became a prolific and prominent user. His advice for those starting out on social media? “Set up a clear profile, follow organizations and individuals in your field, step out of your comfort zone, and join the discussion! Importantly, before posting anything, ensure it protects patient privacy and doesn’t say something you could regret.”





Eric O. Konnick

“My favorite connections have been with the patients who are active on social media,” says Eric, Assistant Professor and Associate Director of the Genetics and Solid Tumor Laboratory at the University of Washington. “Witnessing their successes, struggles, and questions helps me focus on the people behind every sample.” Throughout the pandemic, Eric used Twitter to educate others about the policy pitfalls and nuances that affected access to testing. His communication of the bureaucratic challenges encountered as his institution received FDA authorization doubtless helped ease the way for others.



Lara Pijuan

As a pulmonary digital pathologist and cytopathologist at Hospital del Mar in Barcelona, Lara is a true leader in the pathology social media community. She coordinates the digital pathology club in the Spanish Society of Pathology – and her peers recognize and respect her commitment and the leadership qualities that shine through in everything she does. “Patients and their future are my motivation every day,” says Lara. “Knowing the direct impact that our diagnoses have on the treatment pathway has helped me to understand just how important pathology is.”



Sean R. Williamson

Sean is a genitourinary pathologist at Henry Ford Health System in Detroit. He has built a considerable social network, which he uses to share interesting genitourinary cases and engage with others in his field and beyond. Admired by residents and colleagues alike, Sean has won Teacher of the Year at his institution for three consecutive years – a testament to his enthusiasm and dedication to helping others. “Online lectures promoted on social media can receive thousands of views. This teaching often reaches under-resourced countries with few pathologists per capita and infrequent access to academic pathology education,” says Sean.



Vidya Monappa

“#PathTwitter is a wonderful platform for anyone who loves to learn and teach to interact with pathologists across the globe, make new friends, and probably instigate future collaborations,” says Vidya, Associate Professor of Pathology at Kasturba Medical College in Manipal. She was nominated for her top-quality educational posts on Twitter. Her advice for newcomers? “Just observe in the beginning; do not be intimidated by the surplus of information being bestowed on you.”

Matthew Cecchini

“There is a wealth of pathology expertise across the globe and social media is the framework that connects many of these individuals and resources,” says Matthew, a Fellow in Pulmonary Pathology at Mayo Clinic in Rochester. Described by nominators as “a leader of the next generation and a rising star of social media and pathology,” Matthew is dedicated to helping others and conducts Twitter quizzes, online lectures, and slide sessions to assist trainees with their board preparation. A generous educator, he also puts together tweetorials and creates YouTube videos to coach others in thoracic pathology.



Michael Williams

Michael is a third-year pathology resident at SUNY Upstate Medical University in Syracuse. Despite his young age, Michael shows a keen desire to maximize the potential of social media, sharing cases and engaging in discussions with other residents and more senior colleagues. Starting out as a surgery intern before switching to pathology, his proactive advocacy work helps encourage others into the profession. “I love tweeting interesting cases that I experience as a resident and learning from the resulting comments,” says Michael. “Equally important are the connections and mentorships I have forged – and the lifelong friendships with fellow pathologists.”





Constantine E. Kanakis

Constantine is a first-year pathology and laboratory medicine resident at Loyola University Medical Center. With a background in medical laboratory science, he spent nearly a decade working in clinical laboratories before turning to pathology, a career path that has shaped his ability to

connect people of all disciplines and levels of practice. Nominators praise his online lectures on the COVID-19 pandemic and the testing problems faced, especially in New York City. “The growing number of pathologists on social media is proof positive that it’s a continuing influence, both for content as well as addressing our pipeline problem,” says Constantine.



Aatur D. Singhi

Aatur is Assistant Professor of Pathology at the University of Pittsburgh Medical Center. A surgical pathologist specializing in gastrointestinal, liver, and pancreatobiliary pathology, Aatur uses Twitter to teach and discuss both common and rare entities. His followers are particularly impressed

with the stunning cases he posts, which nominators say are even better than those found in textbooks. “Social media has had a tremendous impact on both the discussion of research and clinical education,” says Aatur. “It has been a great platform for communication during the COVID-19 pandemic and an effective tool to deal with current events.”

Pranav Patwardhan

A resident pathologist at the University of Pittsburgh Medical Center, Pranav runs the educational Facebook page “Understanding Pathology,” which provides a platform for over 7,000 medical students to share and discuss practical tips. He is a pioneer of the algorithmic approach to organ systems,

which highlights relevant diagnostic features. His most unexpected moment? “I wrote an article titled The Art of Algorithms last year in The Pathologist. I was surprised and honored that it made an international impact – one pathologist mentioned that it was discussed during a departmental meeting and others said how useful it is for medical students.”



Sanjay Mukhopadhyay

A founding member of the well-established pathology Twitter community, Sanjay is Director of Pulmonary Pathology at Cleveland Clinic. He played a key role in creating the #PathTweetAward, an annual competition to find powerful educational posts. Nominators commend his tweetorials

and desire to educate and encourage others to learn through social media. “It gives extraordinary power to pathologists, bypassing traditional strongholds of power, such as societies, journals, and institutions,” explains Sanjay. “The combination of speed and reach is unbeatable, whether you use social media for education, research, or networking.”



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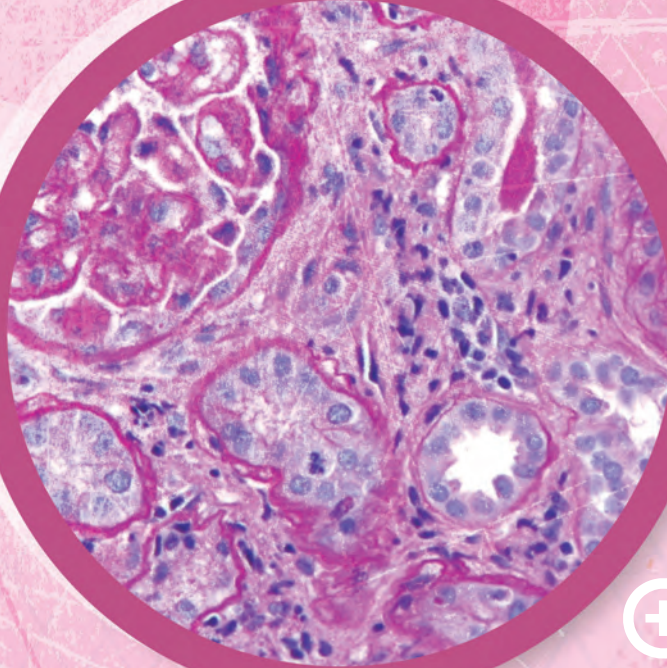
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38–41

Averting a Histopathology Crisis
Increased demand for histopathology services has not been matched with enough recruitment in the UK, resulting in backlogs and case outsourcing. Could healthcare scientists alleviate the pressure on histopathology labs? Jo Horne looks at the latest evidence...

Averting a Histopathology Crisis

How can healthcare scientists ease the burden on histopathology labs to reduce turnaround times for patients?

By Jo Horne

There is a well-established histopathology workforce crisis in the UK. It's a critical situation caused by an ever-increasing demand on services without a corresponding rise in appropriately trained staff. Because only 3 percent of diagnostic laboratories currently have enough staff to deliver their reporting workload (1), backlogs and case outsourcing are increasingly commonplace. The shortage can lead to longer turnaround times that leave patients waiting for results, ultimately impacting their treatment plans – and potentially even their outcomes.

Histopathology dissection and reporting has traditionally been conducted by medically qualified practitioners who have completed the recognized national training scheme. But, over the last 15 years, healthcare scientists have begun to take on some of these advanced clinical practice roles in the same way that nurses and other non-medically qualified practitioners have assumed new responsibilities in other specialties. For example, consultant-level practice in cervical cytology is well-established for healthcare scientists – as is histological dissection, although the latter practice is still sporadic within UK laboratories. In some departments, scientists lead almost all dissection; others, in contrast, continue to see dissection delivered only by medically qualified pathologists. Laboratories are increasingly seeking to transform their

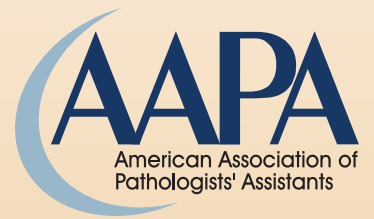
workforce with a more varied skill mix (2) – and assigning new duties to healthcare scientists has been identified as a way to improve pathology services across the board. Faster turnaround times and lower financial burden (3) release pathologists to focus on reporting and other crucial roles, leaving healthcare scientists to deliver the higher-volume, less specialized work.

Piloting the future

In 2012, a small cohort of healthcare scientists began training in histopathology reporting as part of a collaborative pilot project between the Royal College of Pathologists and the Institute of Biomedical Science (IBMS). Although training was modeled on the existing medical histopathology curriculum, the program took a modular approach and offered only gastrointestinal or gynecological pathology as initial options. These specialties were chosen because they were judged to have the greatest burden of high-volume, low-complexity work. The scientists undertook the training alongside their existing clinical, scientific, and managerial roles within the laboratory and, after they had

“Assigning new duties to healthcare scientists has been identified as a way to improve pathology services across the board.”

completed at least one year of training, took a competency exam. If they passed this initial test, the scientists' training continued for at least another two years before they were permitted to attempt an exam – at an equivalent level to FRCPath part II – in their focus area. Successful candidates then entered the final stage of training, akin to that undertaken by medical pathologists, which developed independent practice at consultant level. This stage lasted around



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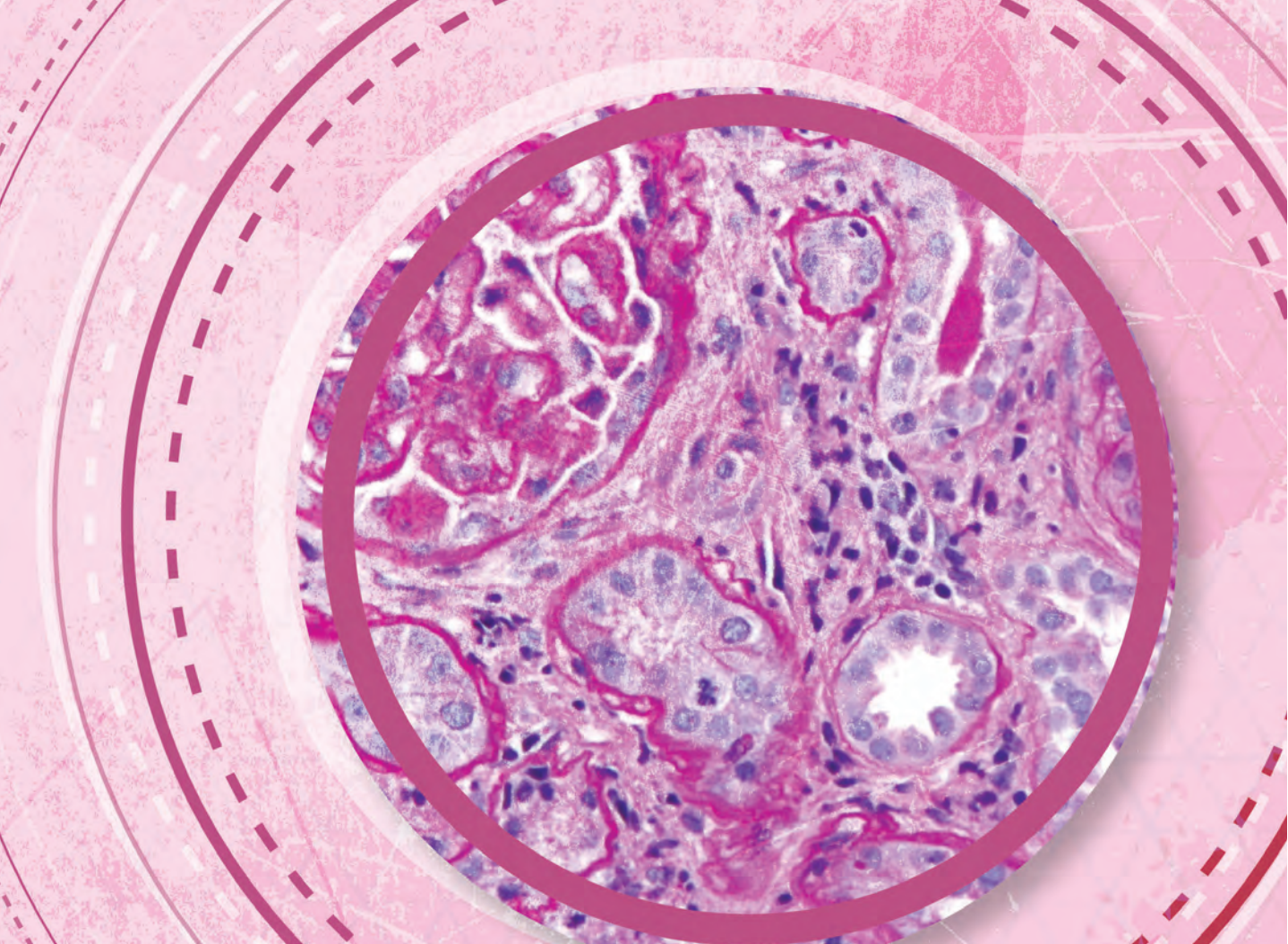
a year and preceded the Certificate of Completion of Training, which then provided a route into formal posts.

By 2017, the first two healthcare scientists had started practicing independently at consultant level alongside medical consultants within specialty histopathology teams. The success of the pilot scheme saw it transformed into a formal training program and, with the addition of dermatopathology as an option, more and more healthcare scientists began training. Today, there are many fully qualified and substantive Consultant Healthcare Scientists in England, all of whom dissect and report a wide range of specimens alongside medical pathologists as part of the clinical histopathology workforce. Although their roles are, in many ways, similar to those of their consultant medical pathologist colleagues, these scientists practice within specialist areas and do not perform post-mortem examinations, interpret frozen sections, or report diagnostic cytology specimens.

Bolstering the workforce
The benefits of increasing the pool of staff

able to provide a clinical histopathology service are clear. Most importantly, it enables continued provision of a safe, effective, and high-quality histopathology service to the patient. It also has the potential to maintain or decrease turnaround times in the face of increasing demand (1–3), which can no longer be satisfied purely by training more medical pathologists. Medics are in short supply globally – and the situation is only predicted to worsen. Changing the skill mix is of huge benefit to departments and is in line with UK policies, such as the National Health Service Long Term Plan (2) and Pathology Networking in England: State of the Nation (3), which recommend new ways of working to meet demand, improve services, and make financial savings.

For healthcare scientists, there is also the opportunity to develop another full clinical role in the histopathology laboratory. Historically, the only senior career development available was management – and, for many scientists seeking work that took full advantage of their scientific expertise and extensive education and training, this was not the most desirable



pathway. When those working at junior levels can visualize a clear clinical career pathway to consultant-level practice for the first time, team morale hits a record high. And so the recruitment and retention of healthcare scientists is set to improve as a result.

Expanding roles and opportunities for healthcare scientists also widens the experience of the team providing the clinical service. Medics may excel via their clinical knowledge, whereas scientists can bring strong laboratory and management expertise to the table. Individuals can educate and advise each other according to their strengths, further enriching the dynamic and expertise of the team.

Healthcare scientists who undertake training in reporting experience a fundamental change in their roles and responsibilities, with increased clinical responsibility for cases and the ability

to provide leadership for histopathology within the multidisciplinary team (MDT). They increasingly represent histopathology at local and regional MDT meetings – and this is beneficial because it helps to develop relationships between clinical and pathology teams, gives greater job satisfaction for scientists, and releases time for medical pathologists to focus on more complex work.

New opportunities

There are many benefits for the department and organization when reviewing the skill mix of staff providing the clinical histopathology service. Fundamentally, healthcare scientists cost less than their medically qualified counterparts, whether working at Advanced Clinical Practice or Consultant level. In the UK, histopathology dissection and reporting training is overseen by the College and

IBMS and is of a high standard, with structured training and assessments set at appropriate levels for the qualifications being undertaken. The use of healthcare scientists in reporting provides a way for histopathology departments to manage increasing workloads while maintaining or even decreasing turnaround times. If the workload can be managed successfully, cases will no longer require outsourcing – an expensive option that can lead to reporting delays. As pathology networks continue to develop in the UK, the presence of reporting healthcare scientists can even provide flexibility by reporting cases for any departments in the network with a backlog, keeping the task within the geographical network and reducing costs.

Since the publication of the Royal College of Pathologists' workforce census in 2018 (1), there has been greater interest in addressing issues around the

delivery of histopathology services. A national working party has been established to scrutinize wider training for healthcare scientists from the start of their career up to consultant-level practice. The working party will review all existing qualifications and pathways, including the histopathology curricula established in 2012 by the National School of Healthcare Science as part of the Scientist Training Program.

Until now, histopathology reporting training for healthcare scientists has not been nationally funded, leaving many cohorts of interested and engaged staff to complete the training alongside their existing laboratory duties – not the optimal way for any new qualification to be successful. As a result, there are still only small numbers of healthcare scientists in training; even fewer

have completed the training to gain the ability to work at consultant level. Recently, for the first time, Health Education England offered the opportunity for two healthcare scientists within each English pathology network to embark on funded dissection or reporting training within histopathology. And though it is a positive step forward – to meet existing and future demand for histopathology services, it is important that more extensive, fully funded clinical training opportunities are available for healthcare scientists across the UK. Only then will there be sustainability within the workforce, safe and timely delivery of the workload across the entire UK, and improved pathways and outcomes for our patients.

Jo Horne is a Consultant Healthcare Scientist in histopathological dissection and reporting

at the cellular pathology department, University Hospital Southampton NHS Foundation Trust, Southampton, UK.

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44-45

Teaching the PAs of the Future
The pathologists' assistant program at Tulane University School of Medicine is designed to offer students both essential training and flexibility. Sarah Garner describes how she established the program – and why it's a necessity for the evolving laboratory.

46-48

Compatible Careers: A Laboratorian's Journey
A grounding in laboratory science offers a unique insight into pathology and can give medical students a head start. Laboratory experience can also encourage those without previous exposure to pathology to consider it as a discipline.

Teaching the PAs of the Future

How – and why – the PA program at Tulane University came into being

By Sarah Garner

If pathology is an oft-overlooked field of medicine, then the role of the pathologists' assistant (PA) is even more obscure. Many healthcare professionals, even those who regularly interact with the laboratory, are unaware of our existence – or, even if they know our names, may not be aware of our role in the lab. This lack of visibility presents a problem – not just for our ability to work alongside other medical professionals, but also for our ability to attract new students to our profession. Add to that the dearth of PA programs available to students and it becomes clear why I felt the need to establish a brand-new pathologists' assistant program at Tulane University School of Medicine. I wanted to give aspiring PAs in the southern United States the same opportunities as those elsewhere. The program grants students a Master of Science in Anatomic Pathology and sets them up with the training they need to become successful PAs.

The program

The PA program at Tulane is designed to have a unique, flexible curriculum so that each of our students can get the education they need to pursue their individual career goals.

The mandatory component of the program has all the standard classes: anatomy, histology, embryology, physiology, general and systemic pathology, surgical pathology, and autopsy pathology. During the first year of the program, students not only take these classes, but also start clinical rotations in both surgical and autopsy

pathology. Our first-year students are only about six months into the program, but have already had the opportunity to be in the surgical pathology lab and gross real cases such as limb amputations, placentas, and appendixes. The transition from a fully didactic first year to a fully clinical second year can be a challenge for some students, so our goal is to facilitate a smoother transition and simultaneously put less of a burden on our clinical preceptors at the various rotation sites.

In their first year, students don't just learn the basic science coursework. They also begin learning how to identify various disease processes and tumors by their gross features, what specimen types to expect for each pathology, and how to gross them. We have a surgical pathology lab course series where the students practice each of these dissections on either fixed cadaveric organs or fresh organs from animals. Then we reinforce this knowledge during their clinical rotations in first and second year.

The flexible part of the didactic curriculum includes additional elective courses on any topic of interest to the student, the option to participate in basic and translational science or educational research, and – my personal favorite – the teaching practicum. Through the practicum, students can participate in both clinical and didactic teaching activities to gain teaching experience, allowing them to develop a teaching portfolio that they can use when applying for jobs after graduation. I've heard from a lot of PAs who are interested in teaching, but cannot get hired or find opportunities to get involved; one of the problems is that institutions are hesitant to hire someone without teaching experience. By providing that experience and portfolio, we ensure that students have the background they need to apply for educational positions. In my opinion, teaching is an important skill for every PA, whether in an academic position or not, but unfortunately many of us did not receive any formal training. The practicum is our way of addressing that gap – but it's optional

so that students who don't want to teach in the future don't have to participate.

Not all of our program's highlights are purely educational, though. We are located in a city filled with culture and fun! New Orleans is a wonderful place to live and the Tulane community is a unique place to learn. Our students can take courses with students and faculty of all levels and backgrounds, as well as learn with – and even help teach – our pathology residents.

The inspiration

My goal in creating the program was to promote pathology and the pathologists' assistant profession in the South. When I was in PA school, I found it really discouraging that there were minimal clinical rotation sites in the region. I went to Tulane for my undergraduate and graduate education before attending PA school, so I contacted them about starting a clinical rotation site for PA students. They had never even heard of a pathologists' assistant – something I quickly learned was common in the South! I knew that this had to change, so I completed my clinical rotations there while also teaching a gross anatomy class in the evenings. The faculty that taught me at Tulane during my clinical rotations were so wonderful and passionate that I wanted other students to experience their enthusiasm. I immediately started developing the curriculum for a PA program and planning ways to increase my teaching skills so that I could eventually start the program I had in mind.

As I've worked on developing the PA program, I've realized that our profession is often misunderstood and underutilized. PAs have a unique skill set – one that I feel isn't being used to its full potential. I want to provide unique opportunities for PA students and other PAs so that they have the educational background, confidence, and mentorship to be able to grow with the ever-expanding scope of our work.

The number of applicants we had for our first class was impressive. I wasn't sure what



to expect because we are not yet accredited, so I was pleasantly surprised to see so many fantastic applicants. Interestingly, the vast majority of our applicants reported hearing about the program through social media – and I think it’s clear that the role of social media in advocacy and education will only grow more important. It’s exciting to see an increasing number of people becoming interested in pathology; our second application cycle recently opened and we already have a lot of applicants. We have also heard from various institutions seeking to hire our students after graduation. The goal for our program at Tulane is to advocate for the profession in the South, to increase the number of labs and institutions hiring American Society for Clinical Pathology-certified PAs, and to provide educational opportunities to students in the South. Even though we have only just started, I am already seeing a positive impact in Louisiana and other states, which is very encouraging.

From a personal perspective, I have never experienced anything more rewarding than teaching (not even getting the ampullary section on a Whipple!). If you had told me 10 years ago that I’d be teaching now, I would probably have laughed – but now, with my passion for teaching, pathology, and anatomy, I can’t imagine doing anything else.

Top tips

My advice for students interested in becoming PAs is – shadow! Because pathology, and especially the PA profession, is typically misunderstood (not only by the community and the media, but also by other medical professionals),

it’s important to experience it firsthand. I know PAs who went to school believing that PAs and pathologists only performed autopsies – and thinking that was going to be their lifelong job. Luckily, those people ended up loving surgical pathology as well.

It is a wonderful field, but you want to make sure it’s right for you. The best way to do that is by getting experience, ideally hands-on (whether paid or by job-shadowing), but at the very least by talking to people in the field. If you’re having a hard time finding contacts in pathology, reach out to any PA or program director. The pathology world is pretty small, so even if I can’t help someone directly, it’s easy for me to reach out to other PAs who can. In fact, I’ve had students reach out from across the country trying to find someone to shadow. Of course, coming to New Orleans was impractical for most of them – but when I asked the PA community if anyone was willing to help, I found an eager volunteer in most cases. There are many ways to find information or get involved – you just need to ask; you’ll find that most people in pathology are more than happy to help!

When I was first learning about the profession, there were very few resources, which is why I now try to promote the profession on social media. There are plenty of other PAs and pathologists who are actively engaged in social media, so the information is freely available. The American Association of Pathologists’ Assistants also does a wonderful job of providing information to those interested in the profession, so there are a variety of avenues to pursue for those who want to learn more.

Not just grossing

Pathologists’ assistants are willing and able to do a lot more than gross specimens – and, as I mentioned earlier, I believe our knowledge and skill sets are vastly underutilized. Furthermore, most PAs are dedicated, passionate people. Even though we work behind the scenes, we care about our patients. I can’t even count the number of PAs I know who constantly go the extra mile because they know that what they do directly affects patients.

People may assume that those of us who work in pathology chose the field because we don’t like interacting with others. For the PAs I know, this could not be further from the truth. Rather, people choose the PA profession because they care immensely about patients; many prefer to work behind the scenes so they can help in a less emotional way. (In fact, that’s one of the reasons I chose it.) In addition, those of us who work in pathology actually talk to a lot of people throughout the day. Pathologists, PAs, and other laboratory professionals are constantly in contact with not only each other, but also other medical professionals.

There’s so much potential in the laboratory – and every prospective student should know that. It’s my hope that future PAs, other pathologists, and even medical professionals in other fields will learn what PAs do, what’s involved on the road to joining the profession, and how vital our role is in the care of patients.

Sarah Garner is a Pathologists’ Assistant and Director of the Pathologists’ Assistant Program at Tulane University, New Orleans, Louisiana, USA.

Compatible Careers: A Laboratorian's Journey

How a background in laboratory science led me to a career in pathology

By Constantine Kanakis

If you're reading this, you're almost certain to have a vested interest in the field of pathology and laboratory medicine. Maybe you're a pathologist yourself – or perhaps an educator, student, or clinical technologist? Each of these roles plays a critical part in our profession – trust me, I've been through most of them! My personal and professional experience is somewhat unusual, although I do know of others who have followed a similar path to pathology. I'm definitely not the only one who graduated from the bench to the bedside, but I do think having done so gives one a unique perspective.

Fresh from the 2019 ASCP Annual Meeting, and having read Austin McHenry and Kamran Mirza's piece "The Case for a Universal Clerkship" (1) in a recent issue of *The Pathologist*, I sense a culture shift that is drawing the spotlight onto the amazing opportunities that exist within our field. However, without my history as a medical laboratory scientist, this information would have floated right past me – unnoticed! Medical students are often advised to join professional societies or interest groups in the specialty areas that catch their attention. They tend to agglutinate around surgery, family medicine, pediatrics, emergency... the usual suspects. These fields are great – and critical to the practice of clinical medicine – but pathology often falls by the wayside in lieu of other, more dynamic, and more visible specialties.



I had the distinct privilege of gaining exposure to laboratory medicine during my undergraduate education at Loyola University Chicago and since then have encountered innumerable examples that reaffirmed my passion for pathology.

From lab work to lab-at-work During university, I studied several subjects that culminated in a bachelor's degree in biology with a molecular emphasis (and minors in bioethics and political science – I had varied interests!). About halfway through my studies, I got a job in the Rush University Medical Center blood bank as an expediter – a fancy title for the lab technician who receives and enters specimens, takes phone calls, and

dispenses blood and blood products under appropriate quality guidelines. I remember the interview; my first time walking through a clinical lab was intimidating, but also exciting. Most blood bankers reading this will know that such a lab can move quickly, and it did. I became a professional in FDA reportable guidelines, quality assurance and monitoring, and standard operating procedures. Every day I went to work, I learned something new about clinical care and about laboratory medicine at large. Like the majority of biology degree holders, I had wanted to apply to medical school even before my laboratory job – but now, something else was starting to shine through.

The more I learned, the more professions



in the allied health category came out from behind the scenes. There was a donor center attached to my blood bank at the time, so I met various specialists – respiratory therapists, occupational therapists, and more – each teaching me that the “physician” was part of a large array of devoted clinicians who all held crucial roles in patient care. I learned more about the people I worked with each shift: medical technologists (now called medical laboratory scientists) with certifications, degrees, licenses, and endless experience. How that would fit into my medical

aspirations I didn’t yet quite understand.

From grad to grad school

After I graduated from university, I made the decision to go to graduate school at Rush – the place where my laboratory learning began. I obtained a Master of Science in Clinical Laboratory Medicine and sat for my Medical Laboratory Science certificate exam shortly thereafter. Graduate school was truly an enlightening experience; I got to learn what my technologist colleagues knew and dive deep into the subspecialized knowledge involved

in each laboratory test. The research and teaching I encountered during this course of study also demonstrated pathology’s broad reach in applied translational medicine and in educating our colleagues and peers. I learned a slew of new concepts and skills I hadn’t even heard of during my job in the blood bank. I was getting closer! I knew more about what test results meant, what systems were in place to manage test utilization, how tests impacted clinical decisions, and just how much medicine relies on accurate results!

In the end, I obtained a graduate degree, did some formative research that set up my future interests, became a board-certified medical laboratory scientist, and found two jobs to work after graduating... but something was still missing. My knowledge of clinical practices was

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growing, but I found myself further from becoming a physician. It seemed I was at a crossroads: jump right back on the academic path toward medical school or stay in the professional world to learn more and climb a bit higher to get a clearer view. Ultimately, I chose to work for a few years before revisiting thoughts of medical school. Why? I was motivated by a strong passion for what I was already doing, and I hoped that a few years of the work I loved would help me find the right niche to move forward in my career pursuits.

Finding a profession as a professional
After grad school, I worked as a medical laboratory scientist generalist at Swedish Covenant Hospital and in the blood bank at Northwestern Memorial. The former was a small community institution; the latter a large Level I Trauma center in downtown Chicago. Both jobs taught me that there's something to be said about book knowledge versus practical experience – my education prepared me well, but my experiences on the bench at both of those hospitals taught me a great deal in a much shorter time frame. That steep learning curve translated to some great stories and experiences that I'll never forget and, with each measure of time spent there, I acquired more and more responsibilities. At Swedish, I contributed to an overhaul and update of their hematology section for an inspection (in fact, I was on the list of various inspection contacts in charge of each department!). At Northwestern, I was given the responsibility of teaching new nurses and clinicians proper blood bank ordering and massive transfusion protocols, as well as managing smaller projects like turnaround time improvement and new employee training. These steps seemed small back then, but they were moves toward graduated responsibility and accountability. They reaffirmed that there was one more challenge I still sought.

I remember a day when a few resident physicians came to look at some peripheral



smears in hematology one day when I was working. They came to preview the slide first, asking questions and talking to me about their patients' cases; later, they were joined by their attending hematology/oncology physician, who came alongside a hematopathologist to continue treatment decision-making. I knew immediately that this was it. This was what I wanted to do!

Laboratory medicine is home
Since then, one experience after another has bolstered my path to pathology. In a whirlwind of events, a colleague nominated me for an American Society for Clinical Pathology (ASCP) award, which I won in the same year as I was named my hospital's "Lab Scientist of the Year." I got to attend my first professional society meeting and speak to amazing folks who continue to mentor, shape, and inform my future.

Shortly thereafter, I started medical school, where I used my experiences in leadership to spearhead a public health project aimed at Zika in the Caribbean. I asked one of my mentors how I could share my projects and insights with others, and he connected me with the ASCP's blog; I've now been writing there for nearly three years! My school recognized my contributions with their own awards, as did ASCP, and I even made it to the ASCP's Top 40 Under Forty list in 2017. Since pursuing medicine, specifically pathology, I have been met with overwhelming support, and I couldn't be more appreciative.

There are very few medical students who start on day one knowing what specialty they want to pursue – and, of those, I bet even fewer have chosen pathology. Because I had already learned about what tests mean and how results inform decisions, I had a

leg up on the first day of medical school. By the time the other students saw their first histology slide, I was already well-equipped to interpret them. I knew how to speak the language of diagnostics: immunology, microbiology, hematology, histology, and more! When it came to understanding how values obtained from patient testing lead to a diagnosis, I was ready – I had already been on the other side of the process. I ran chemistry panels on patients with hepatitis, dispensed HLA-matched platelets to patients with refractory thrombocytopenia, looked at peripheral smears for patients who were suspected to have malaria, and made sure troponin QC was in so the next suspected myocardial infarct was diagnosed on time... all before my first class!

What a unique point of view laboratorians have when changing gears to a career in medicine! I spent nearly a decade working in clinical laboratories; I've now spent four years learning how to diagnose and treat; and I am now looking forward to the next few years of dedicated pathology training. Every tube of blood, every biopsy specimen, and every glass slide is a patient – a living, breathing patient waiting for their doctor to talk to them about their results. For those of us who spent time getting those results, it's an honor to be part of the team that turns critical values into hope.

Constantine Kanakis is an incoming resident physician/trainee in Pathology and Laboratory Medicine at Loyola University Medical Center, Chicago, Illinois, USA.

Reference

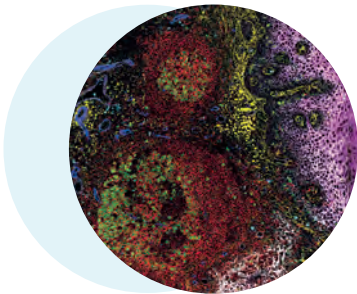
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A close-up portrait of George J. Netto, a middle-aged man with short, thinning brown hair, smiling slightly. He is wearing a dark suit jacket, a light blue patterned shirt, and a blue patterned tie. The background is a dark blue gradient with diagonal grey lines.

A Leading Light

Sitting Down With... George J. Netto, Endowed Chair, Department of Pathology, The University of Alabama at Birmingham, Alabama, USA

As Chair, you oversee the three main functions of your department: teaching, research and service. How do you manage all that and still remain active in research and elsewhere?

Managing these responsibilities is not unique to the role of Chair – but, as an academic pathologist, you learn to multitask and to organize your time and efforts in these three areas. As Chair, you have a heightened responsibility and become more of a facilitator, building a team to help fulfill the missions for your department. When you surround yourself with talent, it positions you and your organization for success.

As Chair, you are forced to downsize your participation in clinical service and research to allow more time for your many additional administrative responsibilities. Having said that, it is important for me to maintain a certain degree of activity in research and service for my own sense of fulfillment. It also helps me understand how to best serve my faculty and stay in touch with the challenges they face within the institution on a day-to-day basis.

Do you have a five- or 10-year plan for your department?

I do. Such planning is very important for the success of any large department like ours. We are four years into our initial five-year plan, which included major objectives, such as i) recruiting a team of talented clinical and research faculty; ii) building an infrastructure that is supportive of faculty growth – in terms of not only physical space and equipment, but also protected time for scholarly and academic growth; iii) transitioning into a subspecialized model of anatomic pathology service, which is crucial to delivering the highest quality of care and enhancing translational research output; and iv) revamping the training program in this competitive environment of pathology residency recruitment and building subspecialty fellowships to train the next generation of pathologists.

Does molecular biology rank highly on your list for near-future development?

Yes – and the five-year plan includes building a genomic diagnostic center that will support our comprehensive cancer center and the precision medicine initiative at UAB. Not only have we been able to attract faculty with the molecular expertise we need, but we have also invested heavily in capital equipment and our bioinformatics infrastructure. All of these efforts have brought great dividends that will soon materialize in our molecular offerings, including a wide array of next-generation gene panels for a variety of solid and hematologic malignancies, fusion gene panels, and pharmacogenomics.

Do you have enough funds to accomplish your goals?

At UAB, we are known for our successful track record in basic science and National Institutes of Health funding. Our federal funding resources are further enhanced by grants from the Veterans' Administration and the Department of Defense, which our investigators have been successful in securing. An important part of our mission is to maintain this success by providing mentoring and a supportive research infrastructure to current researchers, as well as by exploring other areas of investigation to allow for future growth. We are building on our synergy with other departments in the institution to attract funded investigators in neurodegenerative and cardiovascular diseases.

Have you encountered any challenges in recruiting new scientists?

Quite the contrary; we have been fortunate to attract 30 talented anatomic and clinical pathologists, physician-scientists, and clinical translational faculty to our institution since I became Chair. Our recruiting success is due in part to robust support from the School of Medicine in providing internal funds and mentoring infrastructure. In addition, the generous donations of our former faculty and community have allowed us to set up endowments for recruitment

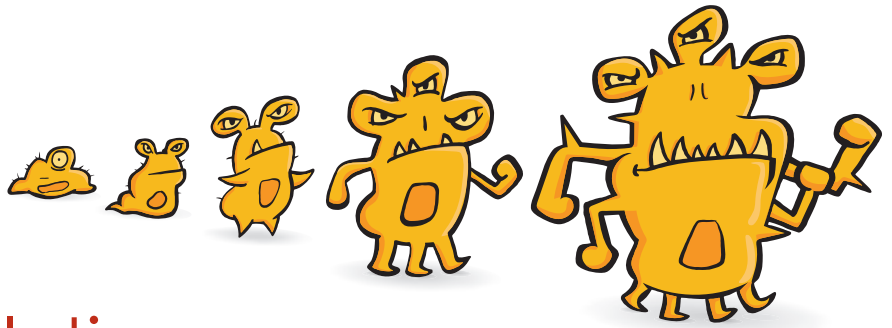
and retention. The ongoing revitalization of Birmingham and the region, in combination with our institution's outstanding reputation, continues to attract new talent to the area.

In January 2020, you became Editor-in-Chief of *Modern Pathology*. What are your plans for the journal?

I am thrilled to have been chosen as Editor-in-Chief for the premier journal in our field. It is a big responsibility to follow the great success John Eble achieved in his impressive 20-year tenure. Together with a talented team of 13 subspecialty-based editors and a revamped editorial board, we are working hard to further expand the scope of the journal. My plan is to continue to provide our readers with the latest discoveries in genomics and biomarkers for immune therapy and, at the same time, to expand into other areas. Right now, I am particularly interested in the impact of machine learning and artificial intelligence on digital pathology, applied informatics, genomics, and precision diagnostics.

Modern Pathology is already highly ranked among pathology journals. How do you plan to build on that success?

We are excited about the challenge of maintaining – and hopefully even raising – the high impact factor the journal has achieved. We are introducing processes to improve review turnaround times. We are reaching out to authors in the areas where we would like to expand our scope, such as immunogenomics and computational pathology. We have plans to expand the journal's web and social media presence – perhaps by offering podcasts and other educational media tools. And, of course, we will continue to offer thematic issues, including the supplement based on the United States and Canadian Academy of Pathology's long course. I am excited and optimistic about the future of our journal – and of our field in general.



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