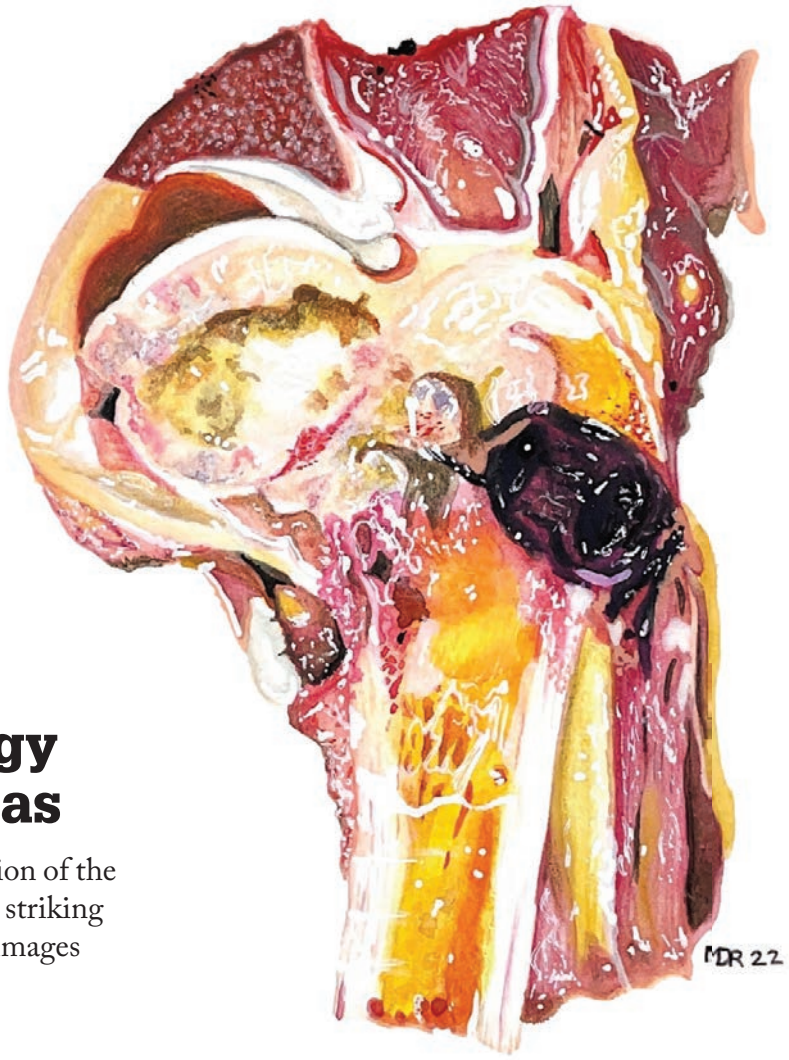
MARCH/APRIL 2023 # 89

the Pathologist®

Official society partner of The Pathologist



Pathology on Canvas

A curated collection of the laboratory's most striking illustrations and images

LEADING LABORATORIES

ASCP | The Joint Commission

RECOGNIZING EXCELLENCE IN THE LABORATORY

leadinglaboratories.org

The Leading Laboratories designation supports a positive, patient-centric mission, increasing visibility to the vital role laboratories play in a patient's healthcare journey. Developed in collaboration between ASCP and The Joint Commission, this designation sets the gold standard for laboratory excellence, providing:

- Public recognition of a laboratory's meaningful achievements in improving patient outcomes
- Evidence of a laboratory's commitment to the necessary ongoing professional development of its team that is critical to the continued delivery of effective, high-quality care
- Proof of a laboratory's trusted leadership

A LEADING LABORATORY DEMONSTRATES EXCELLENCE IN FOUR KEY WAYS:

- ELEVATING QUALITY OUTCOMES
- SUPPORTING PROFESSIONAL DEVELOPMENT
- CULTIVATING TRUSTED LEADERSHIP
- PROMOTING LABORATORY VISIBILITY

Celebrating Your Many Talents

The Pathologist art issue – a reminder that your skill and creativity do not end in the laboratory

It is always fun to conceptualize, plan, and then work hard to make an issue a reality, but our March/April issue is extra special. Firstly and evidently, it is a feast for the eyes – a celebration of the beauty of pathology, which is hard not to love. Secondly, as an added bonus, this particular issue grants us the opportunity to collaborate and communicate closely with many readers from all over the world. We asked for your best artwork and you sure did deliver! You are a very talented bunch.

Turn to page 14 for magical histology, works of watercolor, creative craftiness, including embroidery and crochet. There's even cake. Our special art of pathology issue – now in its eighth iteration – is dedicated to the most beautiful, interesting, quirky, and sometimes surprising imagery from the field of pathology – and we sincerely hope you enjoy it. Please let us know which one is your favorite.

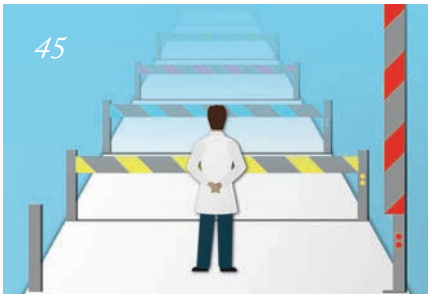
Speaking of communicating with many readers, we headed over to USCAP 2023 in New Orleans and it was refreshing to meet some of you in the flesh! The conference was well attended and vibrant – and "Facing the Unknown" was a great theme. But my highlight was the 2023 Maude Abbott Legacy Lecture by Elizabeth Montgomery from the University of Miami Miller School of Medicine. As part of her lecture, Montgomery paid tribute to Abbott – and I was inspired by the latter woman's resilience and perseverance. Abbott was, in the late 1800s, rejected by McGill University Medical School, but, by the 1930s, she was regarded by the medical community as "the leading authority on congenital cardiac disease."

While we're paying tribute to strong women, I was recently reminded of the words of Mary Lasker, a pioneer of medical research advocacy and philanthropist, who was credited with playing a major role in significantly expanding the budget of the US' National Institutes: "If you think research is expensive, try disease." Her blunt but effective call to action is still very much true today; the current NIH budget of $47.5 billion is nowhere near the close to $4 trillion that is spent annually on healthcare in the US for people suffering from chronic diseases.

As we celebrate World Health Day on April 7, it is important to remember that much work is yet to be done to guarantee "Health for All" – the theme for this year's commemoration.

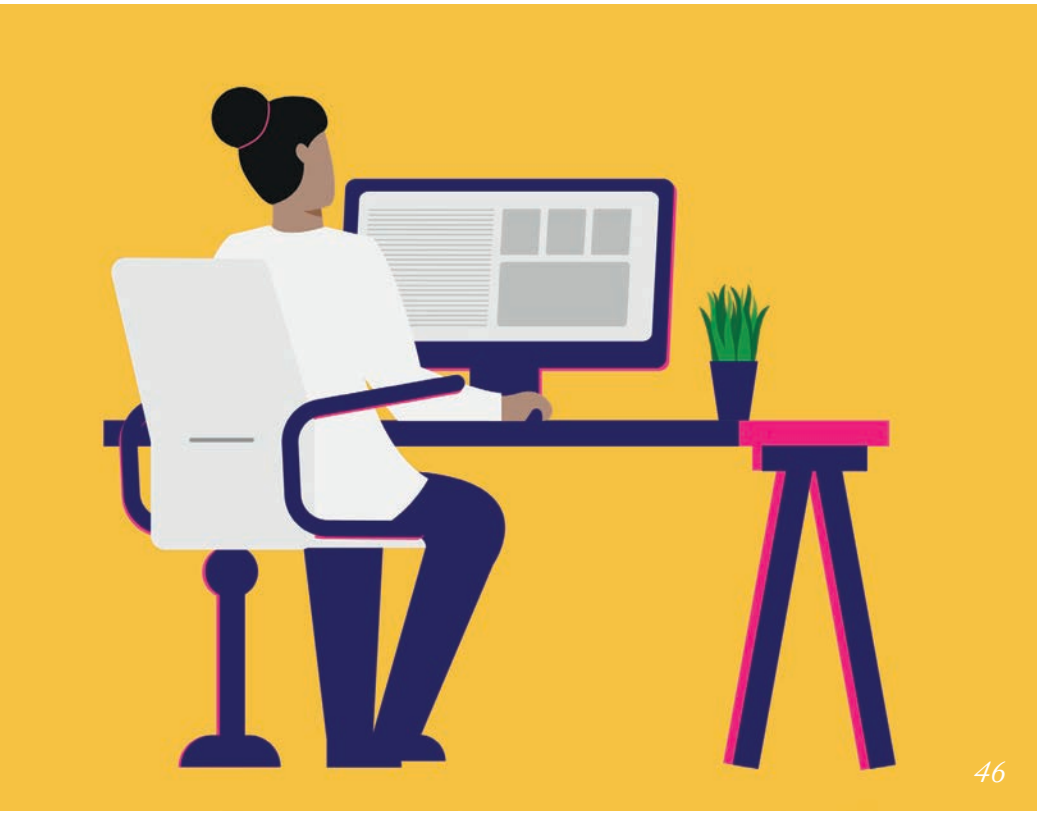
Bibiana Campos Seijo
Senior Editor

Contents



On The Cover

"Giant Cell Tumor of Bone," by Mariana Duarte Riberio.
See page 14 for more.



the Pathologist

ISSUE 89 - MARCH/APRIL 2023

Feel free to contact any one of us: first.lastname@texerepublishing.com

Content Team
Bibiana Campos Seijo (Senior Editor)
George Francis Lee (Associate Editor)
Georgia Hulme (Associate Editor)

Commercial Team
Publisher - Sally Loftus
Nick Ransom (Business Development Executive Americas)
William Whittaker (Business Development Executive)

Design Team
Charlotte Brittain (Senior Designer)
Hannah Ennis (Senior Designer - Commercial)
Téa Hewitt (Designer)

Digital Team
Head of Digital Operations – Brice Agamemnon
Digital Team Lead - David Roberts
Jody Fryett (Salesforce & Audience Sytems Manager)
Peter Bartley (Senior Digital Producer)
Jamie Hall (Audience Insights Analyst)
Shea Hennessey (Digital Producer)
Oliver Norbury (Digital Producer)
Seamus Stafford (Digital Producer)

CRM & Compliance
CRM & Compliance Manager - Tracey Nicholls

Commercial Services
Commercial Service and Social Media Manager - Matt Everett
Lindsey Vickers (Sales Support Manager)
Hayley Atiz (Sales Support Coordinator)
Julie Wheeler (Sales Support Coordinator)
Emily Scragg (Sales Support Coordinator)
Anna Harbottle (Video Producer)
Sophie Hall (Social Media Executive)
Emma Kaberry (Project Coordinator)

Marketing Team
Marketing Manager - Katy Pearson
Lauren Williams (Marketing Executive)
Charlotte Shaw (Brand Marketing Executive)

Accounts Team
Kerri Benson (Assistant Accountant)
Vera Welch (Junior Accounts Assistant)

Human Resources
Human Resource Manager – Tara Higby

Management Team
Chief Executive Officer - Andy Davies
Chief Operating Officer - Tracey Peers
Senior Vice President (North America) - Fedra Pavlou
Financial Director - Phil Dale
Commercial Director - Richard Hodson
Content Director - Rich Whitworth
Creative Director - Marc Bird

Change of address info@thepathologist.com
Tracey Nicholls, The Pathologist, Texere Publishing Limited, Booths Park 1, Chelford Road, Knutsford, Cheshire, WA16 8GS, UK

General enquiries
www.texerepublishing.com | info@thepathologist.com
+44 (0) 1565 745 200 | sales@thepathologist.com

Distribution: The Pathologist (ISSN 2055-8228), is published bi-monthly by Texere Publishing Limited, Booths Park 1, Chelford Road, Knutsford, Cheshire, WA16 8GS, UK. Single copy sales £15 (plus postage, cost available on request info@thepathologist.com). Non-qualified annual subscription cost is available on request.

Reprints & Permissions – tracey.nicholls@texerepublishing.com
The copyright in the materials contained in this publication and the typographical arrangement of this publication belongs to Texere Publishing Limited. No person may copy, modify, transmit, distribute, display, reproduce, publish, licence or create works from any part of this material or typographical arrangement, or otherwise use it, for any public or commercial use without the prior written consent of Texere Publishing Limited. The names, publication titles, logos, images and presentation style appearing in this publication which identify Texere Publishing Limited and/or its products and services, including but without limitation Texere and The Pathologist are proprietary marks of Texere Publishing Limited. Nothing contained in this publication shall be deemed to confer on any person any licence or right on the part of Texere Publishing Limited with respect to any such name, title, logo, image or style.

FSC MIX Paper from responsible sources FSC® C008161
texere publishing
Available on the App Store

Measuring the Storm

How a molybdenum disulfide diode-based biosensor detects elevated levels of TNF-alpha – a biomarker of cytokine storm risk

Overproduction of cytokines can lead to a "cytokine storm" – an extreme inflammatory reaction triggered by numerous health conditions, including COVID-19, cardiovascular disease, rheumatoid arthritis, and Alzheimer's disease. Detection of cytokine biomarkers at low concentrations can help diagnostic professionals to identify the risk earlier. And although existing methods – such as ELISA and mass spectroscopy – are extremely sensitive, they are expensive and time consuming. And that's why a group of Canadian researchers developed a rapid, label-free, molybdenum disulfide (MoS2) diode-based biosensor that detects one particular cytokine: TNF-alpha (1).

"The sensor we are developing is simple to use and portable so it could potentially be used in a doctor's office or in more remote areas where access to laboratories is limited," says Michael Adachi, the project's lead investigator. "The advantage of the diode sensor is its simple electrical readout and fabrication process," he continues.

The geometric asymmetry makes the sensor highly sensitive to any changes that occur at the surface. Next, the sensor is functionalized with TNF-alpha binding aptamers. So, when a small volume of solution containing TNF-alpha comes into contact with the sensor, it interacts with the aptamers, causing an observable change in the electrical properties of the biosensor crystal. By measuring the electrical signal output, the concentration of the biomarker protein can be assessed. "These biomarkers are indicators that can help determine if a person may have or be at risk of developing a disease," says Adachi.

There may be potential for this method to be applied in the detection of other biomarker proteins, and in other diseases, such as Alzheimer's. For now, the team is working to overcome the challenges of targeting one specific protein in a sea of interfering substances, including hormones and salts. Indeed the next phase of the current study will assess sensor performance using blood samples – which may demonstrate its potential for scalability in the future.

Reference

1. *T De Silva et al., Nat Commun, 13 (2022). PMID: 36535944.*

INFOGRAPHIC

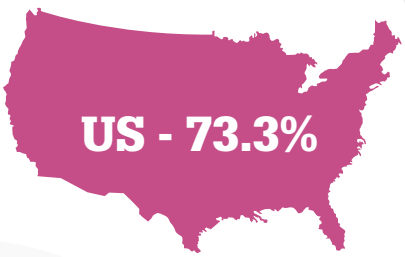
The Road to Inclusion

A breakdown of diversity in the US human genetics and genomics workforce

Reference

1. *The American Society of Human Genetics (2022).*

Most common country of citizenship:



Gender identity:

Women **74.7%**

Men **23.3%**

Non-binary or transgender **0.5%**

Missing responses **1.5%**

RESEARCH ROUNDUP

The latest breakthroughs in pathology and laboratory medicine – in a succinct summary

Sharing is caring

A genome-wide association study has conducted cross-trait meta-analysis to explore pleiotropic single nucleotide polymorphisms, genes, and biological pathways that could be shared by 12 psychiatric disorders (1). Although genetic overlap was observed, it was seen among pairs of psychiatric disorders – rather than shared by all disorders. Further, only annotations related to evolutionarily conserved genomic regions were significant for nine out of 12 psychiatric disorders.

Same, but different

Clonal hematopoiesis is characterized by the over-representation of mutated hematopoietic stem cells. In a recent study, researchers collated exome sequence data on 628,388 individuals to identify 40,208 carriers of clonal hematopoiesis of indeterminate potential (CHIP). Germline genetic variation influenced predisposition at 24 loci. Overall, the researchers concluded that CHIP has a complex set of heterogeneous phenotypes with joint and unique germline genetic causes (2).

Credit: NIAID

Super sensor

A novel, point-of-care, transistor-based biosensor successfully detected CIP2A – a protein that is highly pronounced in oral cancer (3). The biosensor proved to be highly sensitive, and detected 1 × 10-15 g/m of pure CIP2A protein at dilution. Next, the biosensor will be applied to in vivo samples of CIP2A in oral, and non-oral cancer patients.

Better together

In a recent study, plasmonically enhanced lateral flow assays (p-LFAs) outperformed laboratory gold-standard LFAs, returning results in 20 minutes with improved sensitivity (4). The p-LFAs accurately detected and quantified protein concentration in a standard-free manner – allowing laboratory professionals to detect bacterial and viral infections.

Bigger fish to fry

A group of international researchers have developed a new technique – radial symmetry-fluorescent in-situ hybridization (RS-FISH) – to overcome the slow processing restrictions of regular FISH-based methods (5). RS-FISH is rapid, accurate, and uses interactive software for spot detection in 2D and 3D images, where high detection accuracy can be achieved across a variety of signal-to-noise ratios.

See references online at: tp.txp.to/0423/roundup

Credit: National Cancer Institute

Under Interrogation

How efficient are community diagnostic centers?

Public Health Wales has conducted a rapid review that analyzed existing studies on the effectiveness of community diagnostic centers. Using 20 studies published between 1998 and 2021, they examined 12 individual centers.

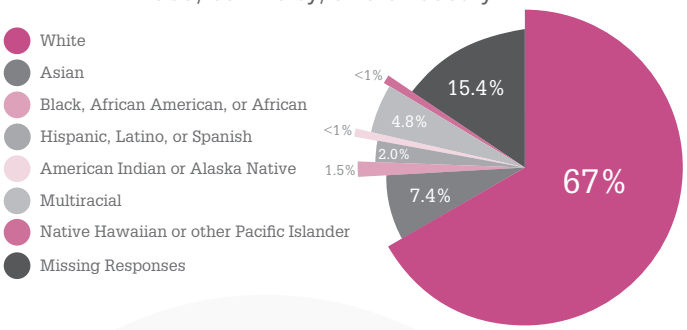
The results suggested that certain waiting times like time to surgical consultation and time from cancer suspicion to treatment were reduced. Other waiting times – namely, diagnostic examination and time to diagnosis – were mixed. Evidence suggested that the number of visits required to receive a diagnosis and stable patients being referred for hospitalization overtime were reduced. Evidence suggests they are more cost effective than traditional care, but appear to rely on running at full capacity.

The data were taken from studies outside of the UK and from different healthcare systems, so more research is needed before drawing a firm conclusion.

Reference

1. *A Wale et al., [Preprint] (2022).*

Race, ethnicity, and ancestry:



42.9 YEARS = mean age

Survey respondents' age ranged from under 25 to over 80 years old (45.1% were between 25 and 40 years old).

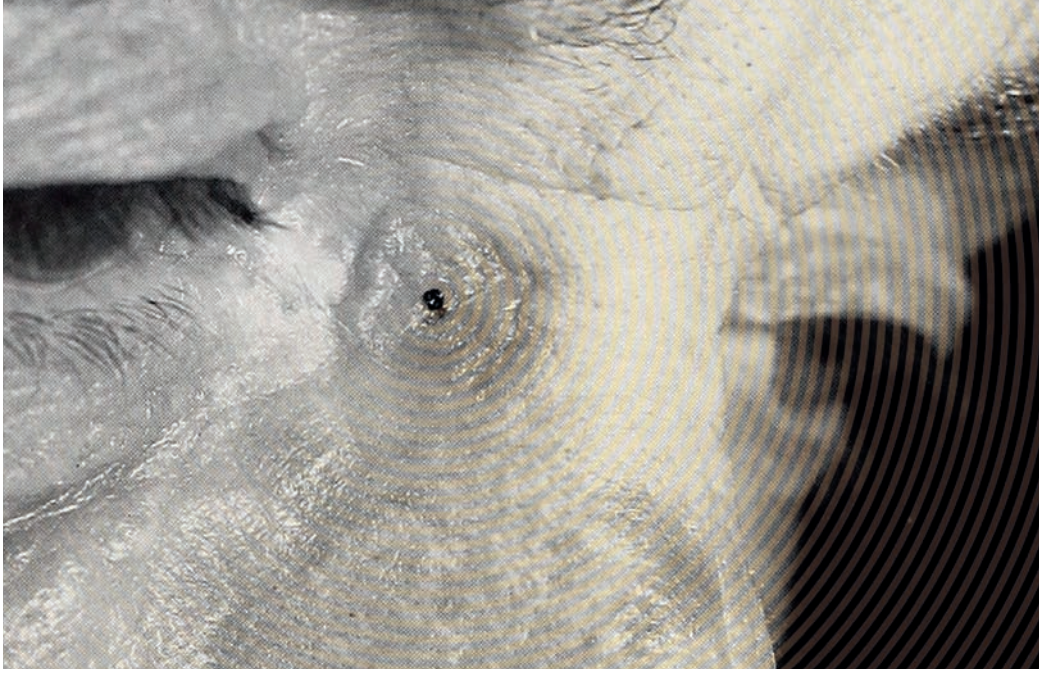
Of the 3,319 respondents studying, training, or employed in the US:

113 (3.4%) reported a disability, with

69 (61.1%) using accessibility aids.

Cutaneous Melanoma Diagnosis Down Under

Why new biomarkers are needed in the fight against Australia's world-leading rates of skin cancer



Credit : Internet Archive Book Images / flickr.com

In countries with historically large settler populations from Europe, skin cancers – particularly melanoma – are among some of the most significant health risks, as exemplified by Australia, which has the highest rates of skin cancer in the world (1). Cutaneous melanoma is also common among Australians – and both under- and overdiagnosis have serious, potentially deadly, implications for patients throughout the Australian healthcare system.

"Melanoma research is a significant issue for clinical service provision and the Australian public," says Jessica Logan, Research Fellow from the University of South Australia, one of several researchers trying to throw the complexities of correct diagnosis (2). "Cancer treatment is always at the forefront of the news and academia, but we wanted to highlight [that] melanoma diagnosis can also present significant difficulties."

One root cause of the problem is the high level of heterogeneity. The authors explain how routine histology – combined with supporting tests such as immunohistochemistry (IHC) – are used as a standard in melanoma diagnosis. But note that, though IHC can help distinguish melanocytic from non-melanocytic tumors, current markers gleaned through IHC cannot consistently differentiate melanomas from benign melanocytic lesions. To improve the diagnostic accuracy and patient outcomes, the authors state, pathologists must have melanoma-specific markers that can reveal useful information about the state of disease.

To identify reliable markers, a change in thinking and approach is needed, they say. Any marker candidates must be analyzed and eventually shortlisted into a group with the greatest potential. Only the best candidate should be chosen for further development and their ability to identify unique pathological features. And, of course, the authors note, these candidates must be cross-validated through larger cohorts and highly-annotated biobanks.

The paper has garnered significant media attention, according to Logan, so it looks like their mission to raise awareness of inaccurate melanoma diagnosis can be considered a success.

See references online at: tp.txp.to/0423/down-under

Tackling TKI Troubles

Does the tumor microenvironment hold the key to predicting therapy response?

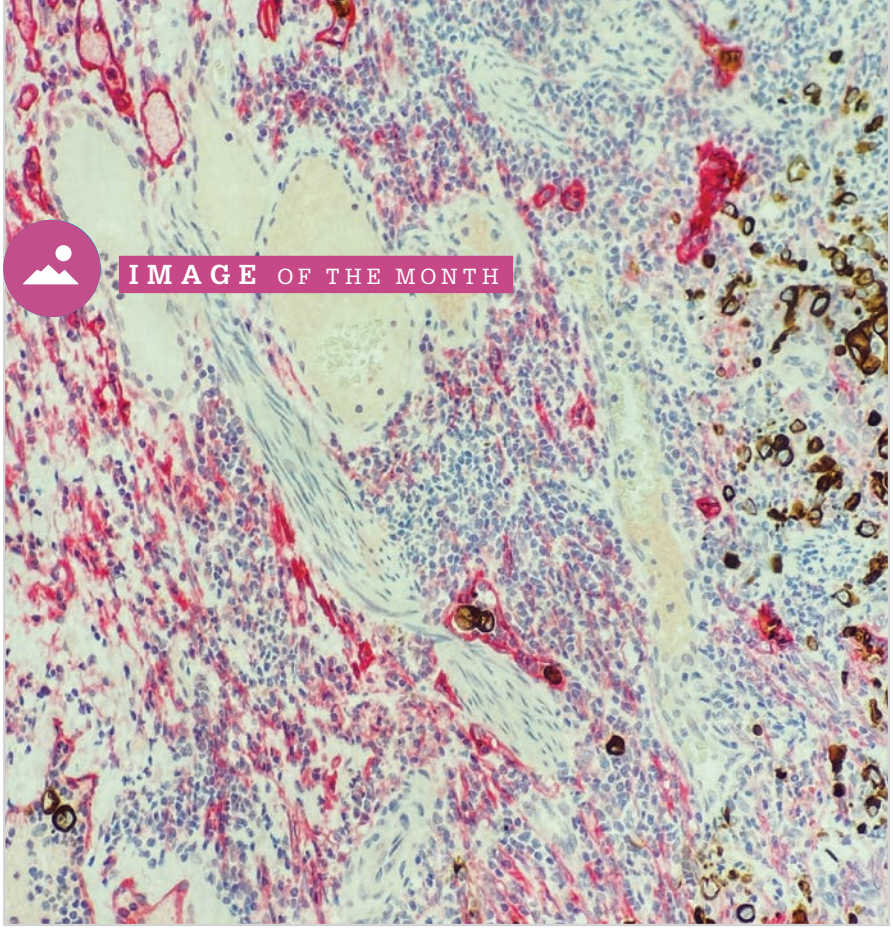
Despite their success, tyrosine kinase inhibitors (TKIs) that target epidermal growth factor receptors (EGFR) do not display the same efficacy across all lung cancer patients – even in those who have EGFR-sensitizing mutations.

A team of researchers have tackled this TKI trouble by using the patterns found in features of the tumor-microenvironment to predict the EGFR-mutant metastatic lung cancer patients' therapy response. They found that higher tumor–tumor interactions were linked with a greater overall benefit to patients, whereas more tumor–stroma interactions showed less benefit, suggesting that this latter interplay is involved in people's resistance to targeted therapies.

Although the authors state that the methodology sample size was limited and only offers insights on intertumor – rather than intratumor – heterogeneity, their findings could have implications for treatment plans and treatment development.

See references online at: tp.txp.to/0423/tki-trouble

Credit: Joseph Szulczewski, David Inman, Kevin Eliceiri, and Patricia Keely, Carbone Cancer Center at the Univ. of Wisconsin, National Cancer Institute, National Institutes of Health



Lymphovascular invasion in colon adenocarcinoma

This slide shows a keratin/D2-40 dual stain performed on a colon resection for tumor. The image demonstrates lymphovascular invasion by the tumor; the red highlights lymphovascular spaces, whereas the brown chromogen indicates keratin-positive carcinoma cells.

Credit: Alan A. George, private practice gastrointestinal pathologist in Florida, USA.

Do you have a photo suitable for Image of the Month?
Send it to edit@thepathologist.com

QUOTE of the month

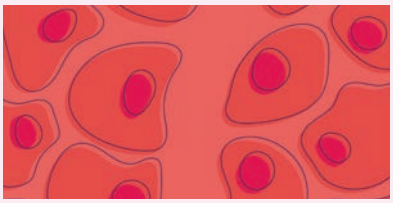
"I basically don't see any legitimate use for ChatGPT in science, and this likely applies to its future successors as well.
Don't use it for writing, and definitely don't use it for research.
It is the exact opposite of what we want in scientific info sources: it is centralized, black-box, citation-less, for-profit, proprietary, and methodological unlinked to empirical thinking."

Alexander Crits-Christoph is a Senior Scientist at Cultivarium.org

Dermal (ISF) Diagnostics

Exploring the diagnostic potential and utility of dermal interstitial fluid

The average body has three times as much dermal interstitial fluid (ISF) as blood, but much of its diagnostic power is lost due to disruptions caused by its extraction (1). But are we ignoring a powerful diagnostic tool? A new perspective examines just what differentiates the diagnostic power of blood and seeks to settle the question (2).



But rapid technological advancements have renewed the question of ISF's diagnostic value. "Investments are ramping up rapidly in trying to measure interstitial fluid… without fully understanding the fundamentals of the physiology and its diagnostic limits," says study author Jason Heikenfeld.

Ultimately, the authors found that dermal ISF does not currently match blood's diagnostic utility. However, there could be benefits in using assays or sensors to continuously monitor small-molecule analytes in dermal ISF – especially in monitoring therapeutics and immune response. Further research to improve sensitivity, performance, and functionality may yet allow dermal ISF to play a key role in molecular diagnostics.

See references online at:
tp.txp.to/0423/isf-diag

CASE OF THE MONTH

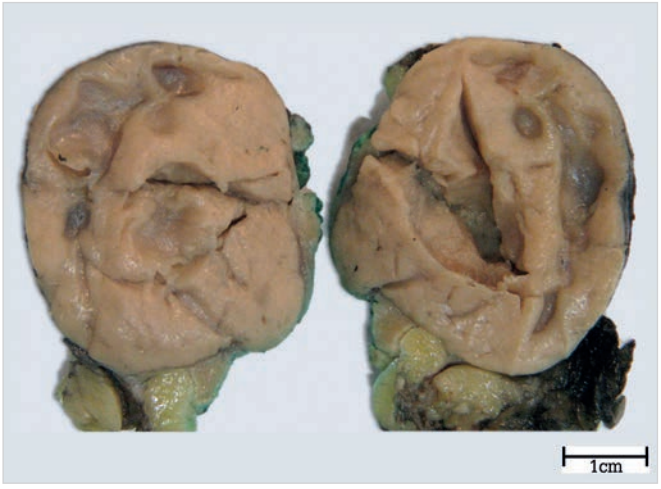


Figure 1. Gross photograph of the formalin-fixed specimen.

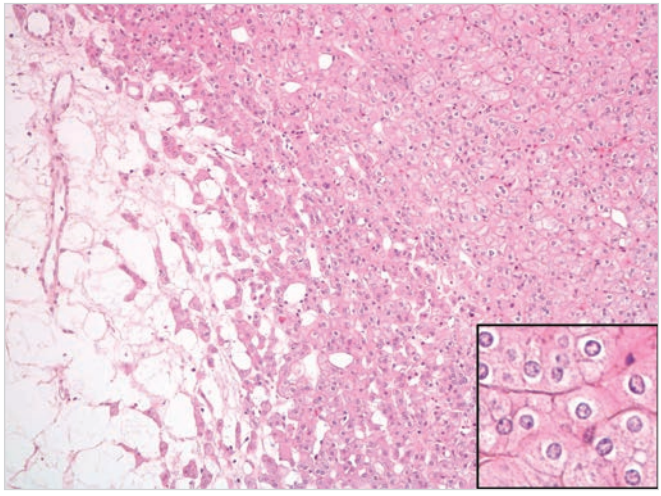


Figure 2. H&E; 20x magnification. Inset: cytomorphological detail.

A 69 year-old woman presented with an incidental 36x35x30 mm right kidney tumor on a CT scan, centered on the cortex and exophytic. The tumor was grossly circumscribed, mostly solid and tan, with cysts filled with translucent liquid (Figure 1). Microscopically, it showed a compact nested to trabecular pattern, interspersed with areas of sharp edema (Figure 1), and was entirely composed of oncocytic cells with smooth round nuclei with perinuclear halos (Figure 2, inset). It was diffusely and strongly immunoreactive for cytokeratin 7 and negative for CD117 (c-kit).

What is the diagnosis?

a) Hybrid oncocytic tumor
b) Eosinophilic solid cystic renal cell carcinoma
c) Chromophobe renal cell carcinoma, eosinophilic subtype
d) Low-grade oncocytic tumor

Answer to last issue's Case of the Month…

c) Plexiform schwannoma

The biopsy reveals a plexiform architecture with nuclear palisading and Verocay bodies. The tumor is predominantly composed of dense, hypercellular Antoni type A areas. The proliferating spindle cells form interconnecting fascicles and well-encapsulated nodules with extensive involvement of the dermis and subcutaneous tissue. However, proliferation remains within the confines of the capsule. The morphologic findings are consistent with the diagnosis of plexiform schwannoma. Immunohistochemically, schwannomas stain strongly for S100 protein, SOX-10, and type IV collagen in the Antoni type A areas. They account for 4.3 percent of all schwannomas and have a predilection for the head and neck region (1). Malignant transformation is extremely rare. Plexiform schwanomma has been rarely reported in association with neurofibromatosis type 2 and schwanommatosis.

Submitted by Muhammad Ahsan, Chughtai Institute of Pathology, Lahore, Pakistan, and Sehar Altaf, Nawaz Sharif Medical College, Lahore, Pakistan.

Reference

1. *JC Berg et al., Hum Pathol, 39, 633 (2007). PMID: 18439936.*

To register your guess, please go to http://tp.txp.to/0423/case-of-the-month
We will reveal the answer in next month's issue!

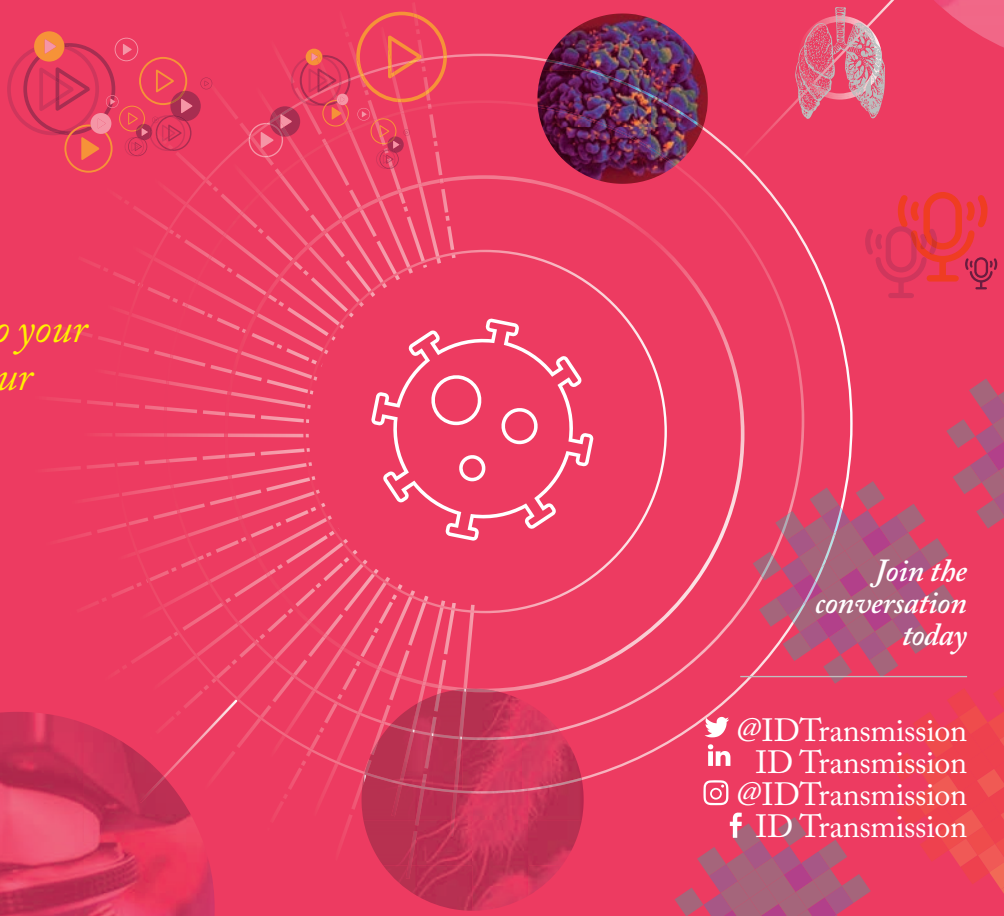
Case of the Month is curated by Anamarija M. Perry, University of Michigan, USA.

ID Transmission

Covering the front lines of the fight against infectious diseases for researchers, clinicians, and policymakers

ID Transmission brings you the latest research and innovations in the field, whilst also tackling hard-hitting and thorny topics that many others shy away from. We keep you informed, start conversations, and connect all disciplines and specialities within the field of infectious diseases.

Visit our website now to find out more
idtransmission.com



Receive updates direct to your inbox by signing up to our weekly newsletter

Join the conversation today

@IDTransmission
ID Transmission
@IDTransmission
ID Transmission

In My View

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

Rethinking the Value Construct in Pathology

A broken value equation based heavily on cost, revenue and reimbursement is weighing down pathologists – isn't it about time we freed ourselves?

By S.M. Hacking, Pathologist at Toronto General Hospital, Toronto, Ontario, Canada.

"A cynic is a man who knows the price of everything, and the value of nothing." - Oscar Wilde

I've learned a lot about value-based healthcare over the years – but not always in ways I expected. The term value is thrown around a lot, but what does it really mean? Value is defined as a cognitive construct, distinctive to an individual or group, with assigned importance (1). Views on value have changed throughout the years. Today, I think we may not fully understand what value truly encompasses inside the laboratory – and we perhaps have an outdated perception of the value pathologists provide in modern and ever-evolving healthcare ecosystems.

It is important to note that the lab has significant financial value; alongside surgical/outpatient services and imaging, the lab represents one of three major "revenue centers" for many health systems. The term "value" in the lab is often synonymous with costs, associated reimbursement, and, ultimately, revenues. In the current value construct, lower costs, less financial compensation for laboratory professionals, and higher overall reimbursement are often equated with more value. This could help explain why we have become the "invisible doctors." Patients cannot always understand or appreciate the value pathologists provide to them, possibly because value is too strongly associated with cost and potential savings.

Recently, hospital-based clinical labs in the United States and worldwide have begun to adopt more methods of commercialization and other enterprise activities. Meanwhile, outsourcing of hospital-based clinical laboratory services is increasing (2). It is unknown how this will affect pathologists and laboratory services in general. Pathologists in certain geographic areas, along with those in academic settings, are consistently underpaid relative to their peers, suggesting that this may be a zero-sum game for some (3).

In a recent paper regarding an academic department – "10-Year Outcomes After Deciding to Keep the Lab" – the authors discuss the benefits to patients and the financial performance of the parent health system. They show growing laboratory volumes and revenues, with annualized rates of 4.5 and 16 percent, respectively (4). However, comments were raised regarding whether patients were able to recognize the value provided by their lab.

In an editorial response, one commenter mentioned that "pathologists' greatest threat today is our inability to clearly explain the value equation, to administrators, payors, legislators, and patients and their families" (5), further describing pathology as a "black box" in which we cannot articulate the quality care we provide to patients. Decisions and benefits regarding pathologists and laboratories often trickle down from the heights of corporate offices – but do the people in those offices truly understand and value our role? Or is too much emphasis given to cost, revenue, and reimbursement – with the quality of laboratory diagnostics seen as essentially the same thing?

My question to the readers is: how could we better define the value construct in pathology and laboratory medicine? And, even more fundamentally, what should we value? I am not sure that true value in pathology can be derived from costs, relative value units, revenue, or further commercialization or outsourcing of academic pathology laboratories and services. Perhaps it is time for a new formula?

We as pathologists could refocus the value equation on delivering excellence in patient care, empowering other laboratory professionals, creating an inspiring, incipient vision of the future, and better communicating the importance and findings of our work. Leadership that fully prioritizes and represents the needs and goals of our practitioners and our profession could also be part of a new equation. This will be critical in fostering our medical specialty and driving real value gains in precision medicine.

See references online at: tp.txp.to/0423/value-construct

Driving Technology for Better Patient Care

Technology might drive innovation, but pathologists have patients' best interests at heart…

By E. Blair Holladay

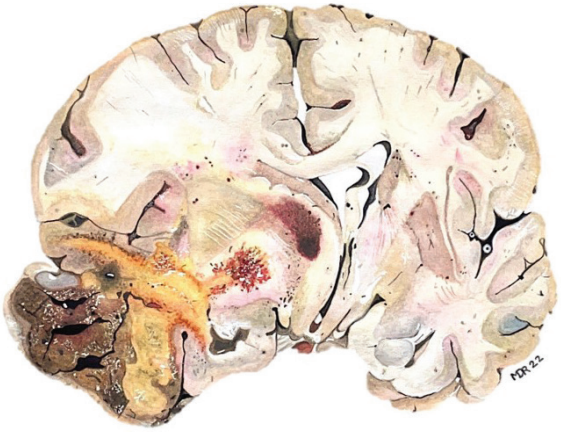
Navigating the ever-changing landscape of the medical laboratory is not an easy task. It takes patience and skill, as well as faith that every advancement is a step forward that will benefit our patients in one way or another. In the past few years, we've seen innovation in the laboratory take incredible steps forward – from the advent of leapfrog technology that enables rapid diagnostics in underserved areas to laboratory-developed tests that helped stem the onslaught and spread of COVID-19.

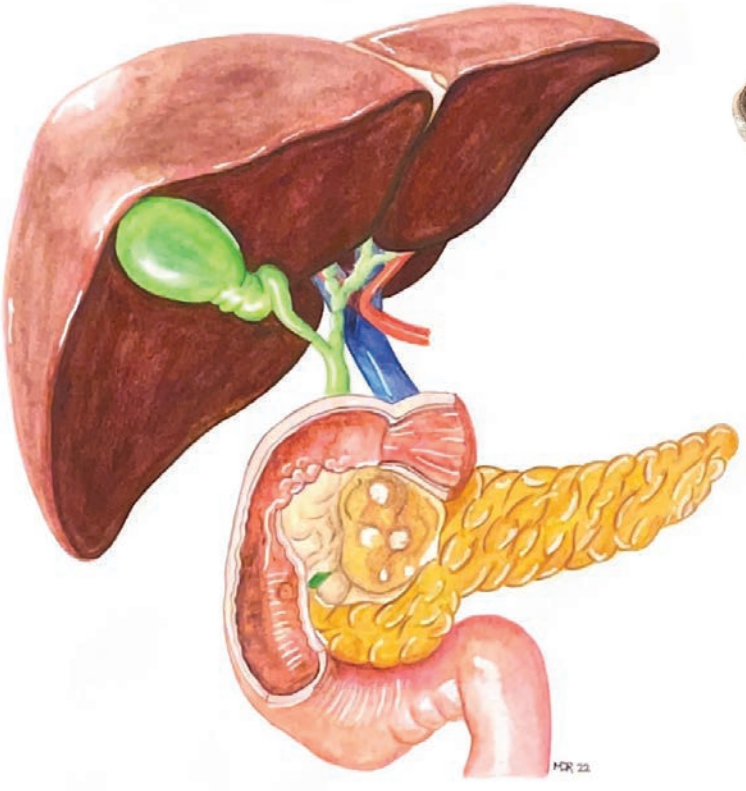
In today's laboratory environment, we find ourselves balancing on the edge of another technology that is becoming increasingly prevalent in the laboratory: Artificial intelligence (AI). Though machine learning is already in place in some aspects of the laboratory – think molecular pathology or output increases in testing – there are still plenty of cutting-edge ways that AI can be used in the laboratory. The innovation of the laboratory knows no bounds.

Though these technological developments and advancements will, and do, help the laboratory better provide high-quality care, the critical element behind all of it is the human component. Pathologists and medical laboratory scientists are the heart of the laboratory, and all the technology in the world cannot replace that. People caring for people – that is what the laboratory is about. When physicians from other departments or healthcare personnel across an organization collaborate with the lab, they're not fostering relationships with a machine or a test result. The technologies that help the laboratory provide the right test for the right patient at the right time are nothing without pathologists and medical laboratory scientists to give them meaning and context. These relationships have proven time and again that the value of the laboratory cannot be underscored enough.

To disregard the advances in lab technology would be an obvious disservice to those who practice laboratory medicine and the patients they care for. To overlook the role that people play would be even more egregious, as patients do not survive on technology alone. As pathologists and medical laboratory scientists, it's our responsibility to encourage and inspire the momentum that keeps technology moving forward, while simultaneously ensuring that its benefits are being applied properly to deliver the care patients need. Healthcare and technology will never stop changing, growing, and learning – and neither will we.

PATHOLOGY *on* CANVAS



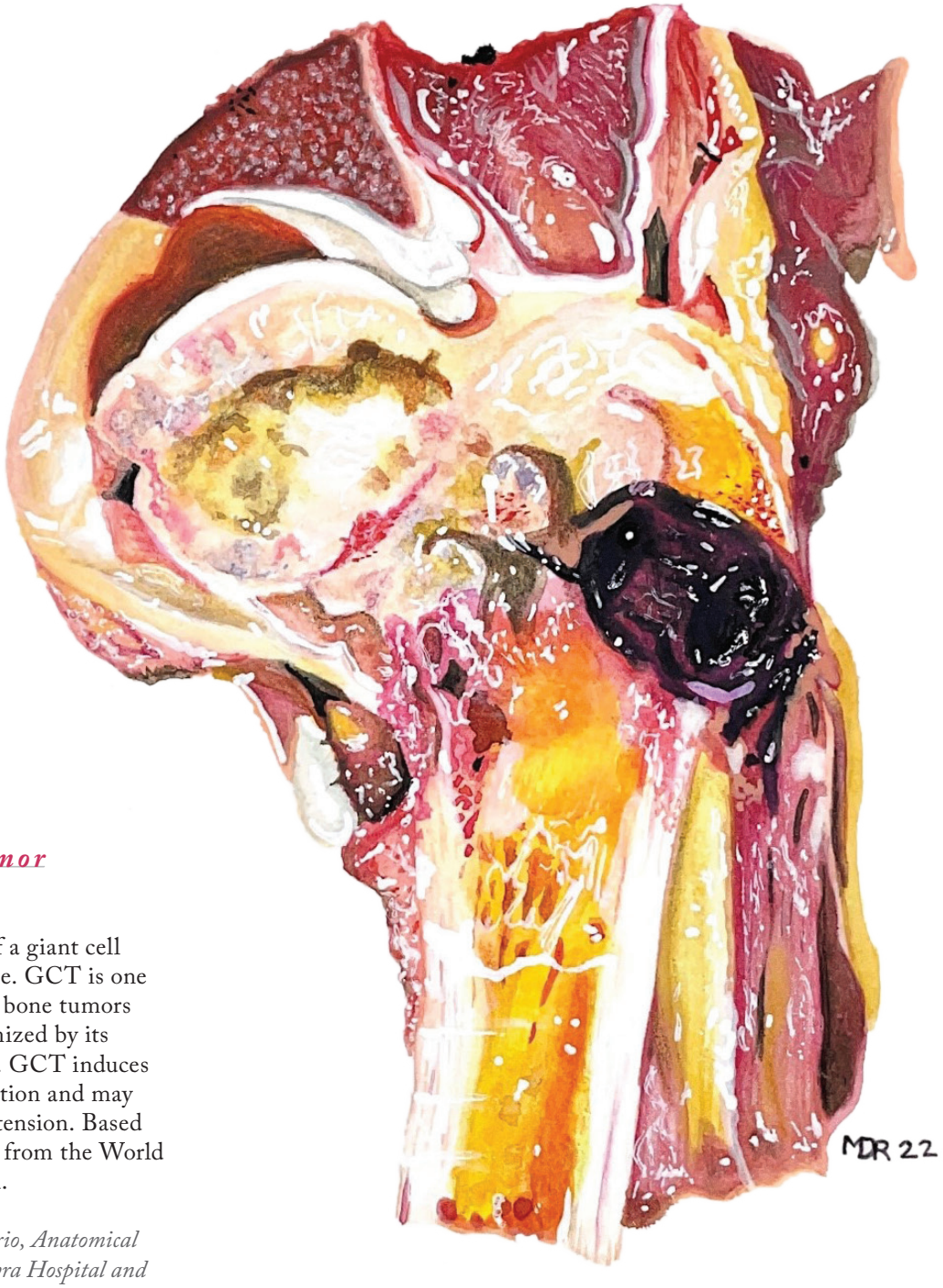


Glioblastoma

Right: Concept art of a glioblastoma. Based on an original image from Pathorama (pathorama.ch).

Pancreatic Tumor

Left: Concept art of a pancreatic tumor, located at the head of the pancreas with D2 compression. Knowledge of the anatomic relations is fundamental for understanding clinical symptoms as well as gross examination and sampling.



Giant Cell Tumor of Bone

Right: Concept art of a giant cell tumor (GCT) of bone. GCT is one of the most common bone tumors and it is easily recognized by its spatial heterogeneity. GCT induces marked bone destruction and may exhibit soft tissue extension. Based on an original image from the World Health Organization.

Mariana Duarte Riberio, Anatomical Pathology Unit, Coimbra Hospital and University Centre, Portugal

Pathology on Canvas

In this art piece, H&E stain colors were used as the primary theme.

Regina Zavodovskaya, Associate Veterinary Anatomic Pathologist, VDx, Davis, California, USA

Breathe

Top Left: Abstract watercolor on cotton paper. Recreation of a piece by Katharine Asher.

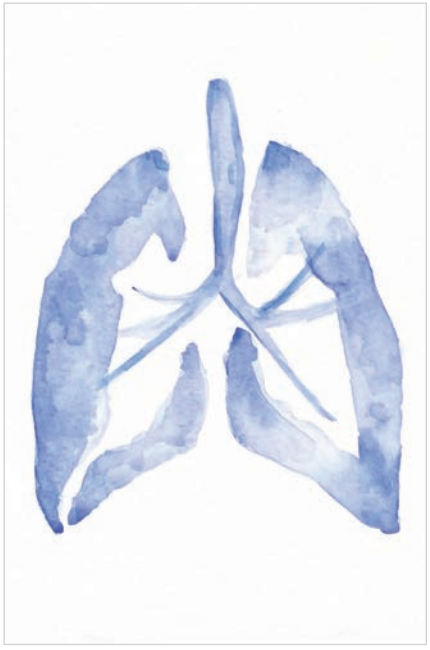
Thyroid and Trachea

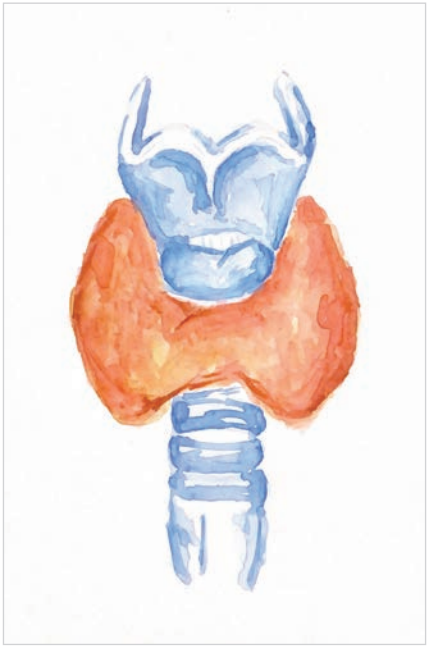
Top Right: Watercolor on cotton paper. Recreation of a piece by an unknown artist.

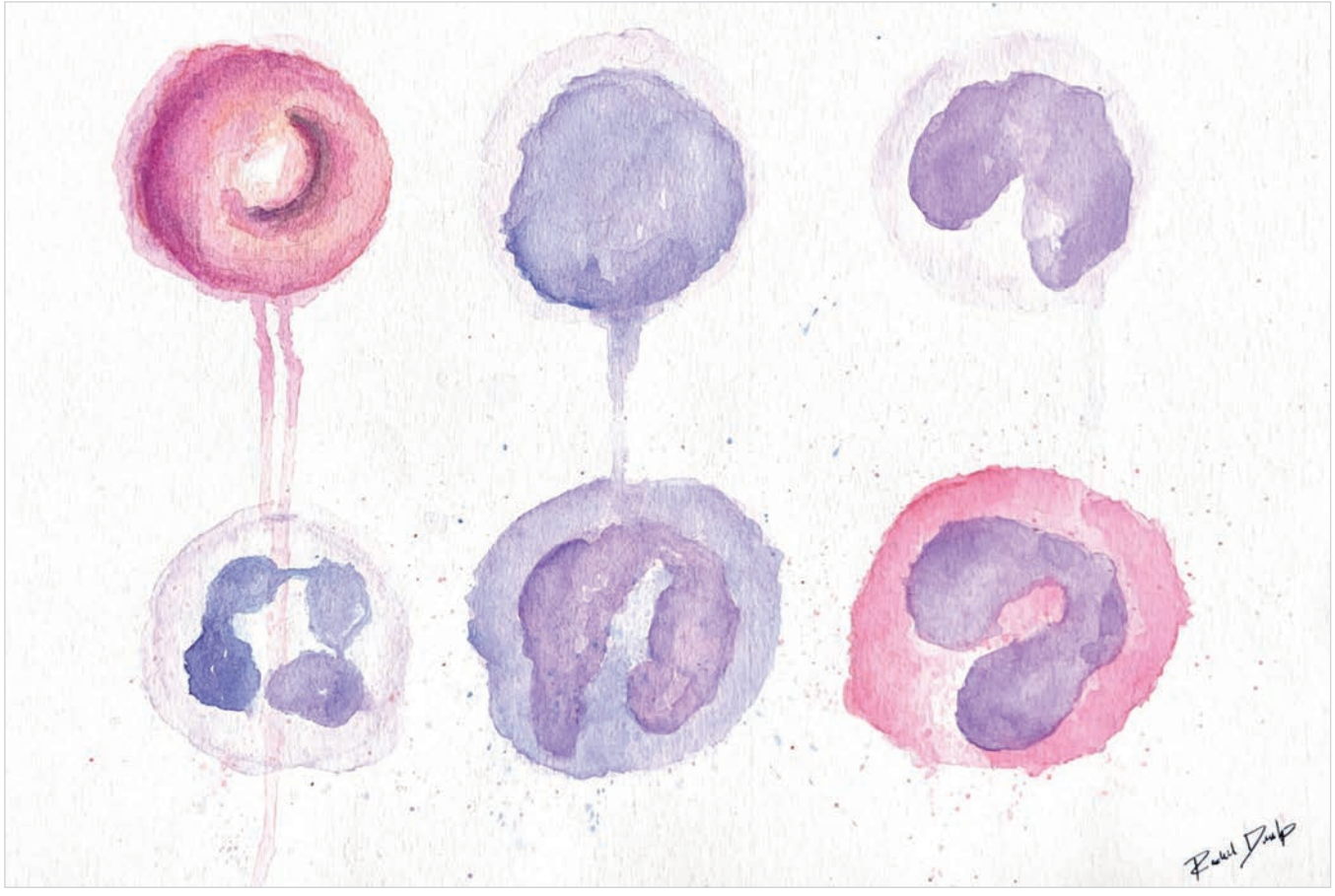
Blood Cells

Bottom: Watercolor on cotton paper. Recreation of a piece by LyonRoadArt.

Rachel Dunlap, Pathologists' Assistant, Chicago Area Autopsy Service, Chicago, Illinois, USA







Blood Cells

Top Left: Acrylic paintings.

Shabnam Seydafkan, Resident Physician, PGY-4, Department of Pathology, SUNY Downstate Health, Brooklyn, New York, USA

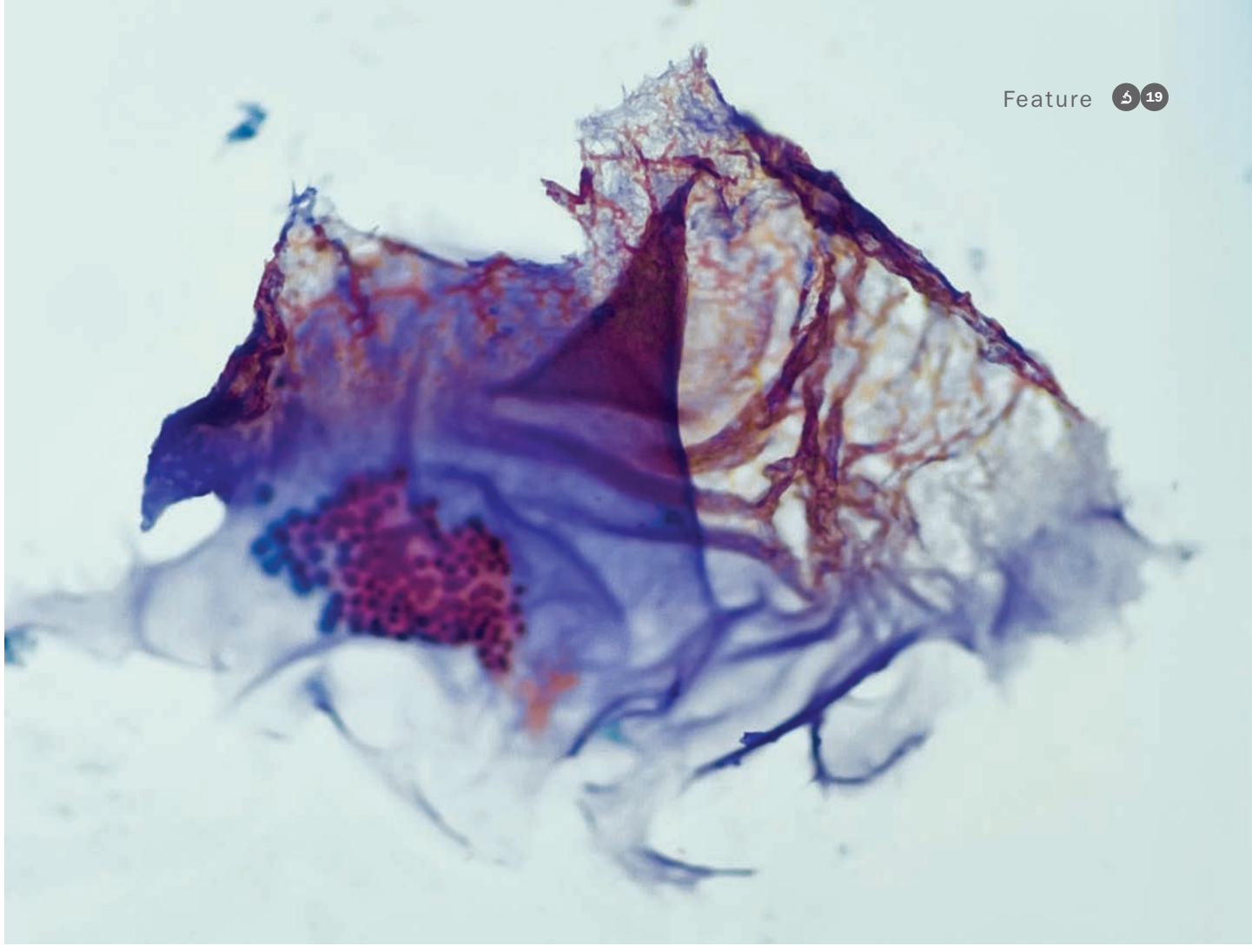
The Wall

Bottom Left: Acrylic abstract painting on a 10x10 in. canvas.

Adipose Stems

Bottom Right: Acrylic abstract painting on a 12x12 in. canvas.

Aswathy Miriam Cheriyan, Anatomic & Clinical Pathology, Allegheny General Hospital, Pittsburgh, Pennsylvania, USA



A Benign Abstract

Top: I was previewing a Pap stain of a benign thyroid nodule when its beautiful colors caught my attention.

Perched on a Tree

Bottom: Cervical Pap smear resembles a bird.

Apeksha Agarwal, Cytopathology Fellow, UT Health San Antonio, Texas, USA

A Pathologist's Universe is in the Microscope

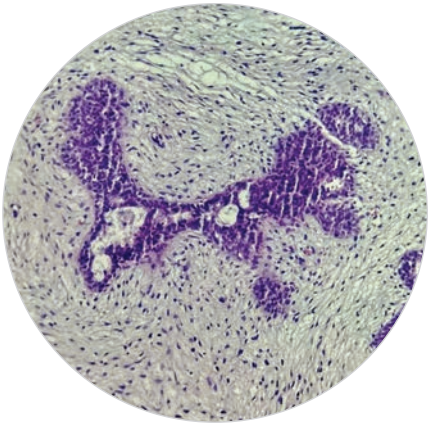
In a universe of innumerable pathological conditions, the pathologist's tool, the microscope, is like a telescope – a powerful tool to explore a different universe of its own kind.

Vasudev Prabhu, Consultant Pathologist, Tejasvini Hospital, Mangaluru, India

The Patient Behind the Lens

Michele Mitchell is a breast cancer survivor. Since retirement, she has devoted her time to patient advocacy. Michele takes the advocacy role seriously: "It is a great honor to educate and empower patients, move the needle on important issues, and make a real difference in healthcare policy, quality, and safety."

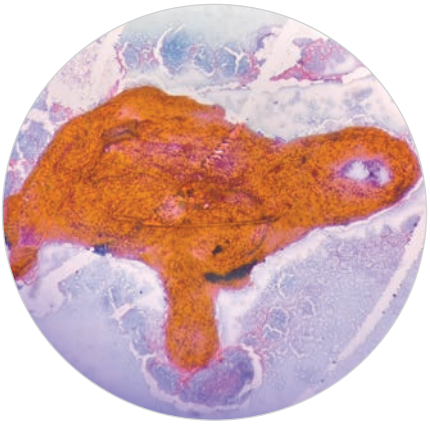
Michele Mitchell, Co-Chair of the University of Michigan Dept of Pathology Patient and Family Advisory Council



My Fur Baby

A canine friend in histology.

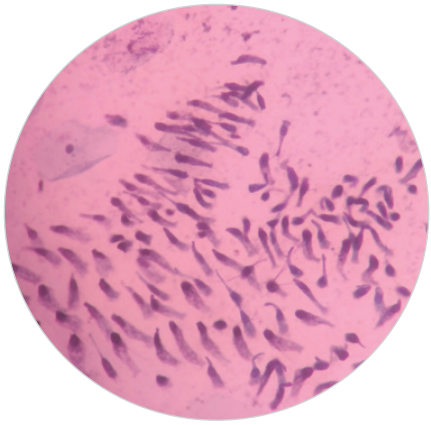
Rico P. Lasaca, Department of Pathology, Divine Word Hospital, Tacloban, Philippines



Speed Doesn't Matter

An orange turtle discovered under the microscope.

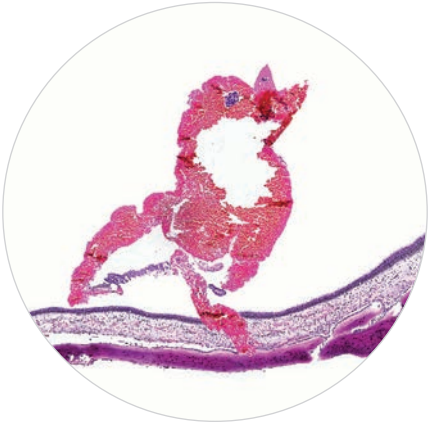
Rico P. Lasaca, Department of Pathology, Divine Word Hospital, Tacloban, Philippines



Endocervical School of Fish

A zoological safari through tissue specimens.

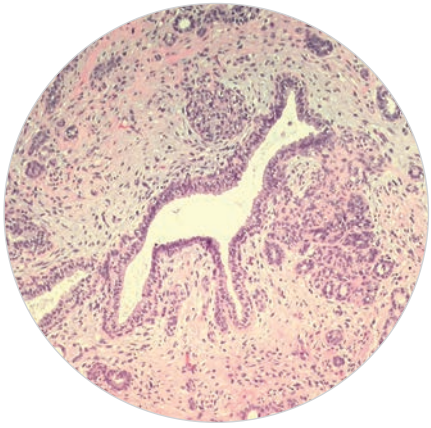
Anoosha Murthy, Consultant Pathologist and Quality Manager, Celara Diagnostics, Bangalore, India



Chirp, Chirp

This image shows H&E staining with a group of red blood cells aggregated in the shape of a bird.

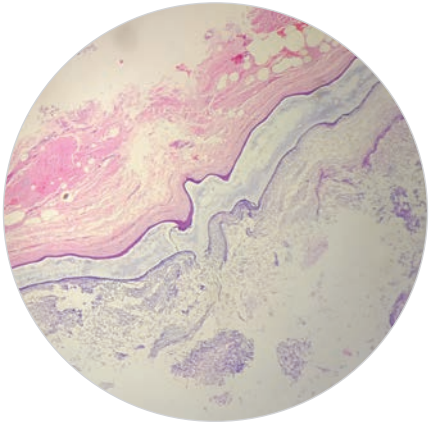
Linlin Gao, Department of Pathology and Laboratory Medicine, University of Kansas Medical Center, Kansas City, Kansas, USA



Fibroadenoma Fox

Ductal elements create a curious fox in this section from a fibroadenoma resection. Hematoxylin and eosin at 40x magnification.

Lynn Messersmith, Pathologist, Martin Army Community Hospital, Ft. Benning, Georgia, USA



The Brook in the Epidermal Cyst

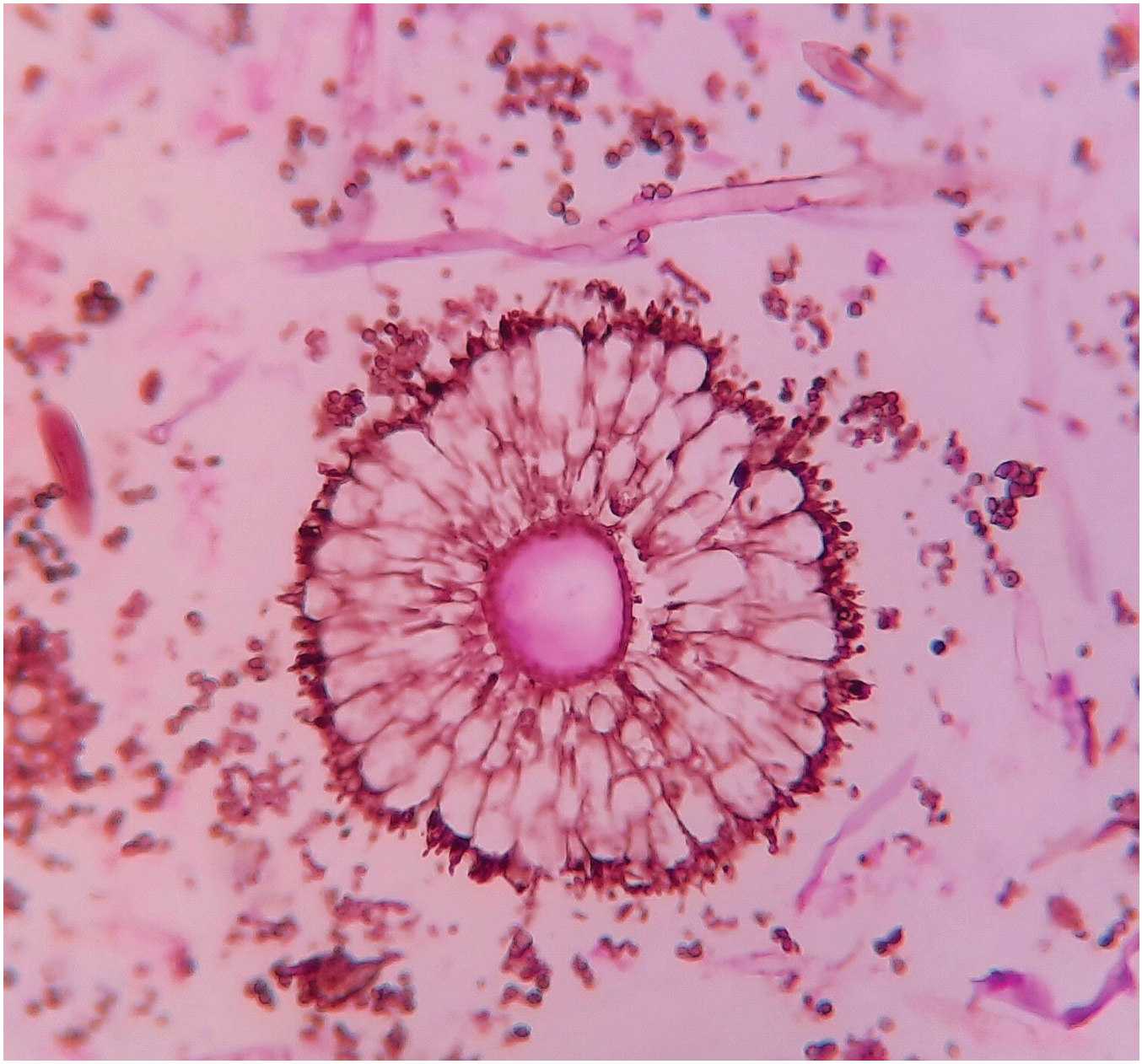
Photomicrograph of an epidermal cyst. Cyst content retracted from the wall gives the appearance of a brook.

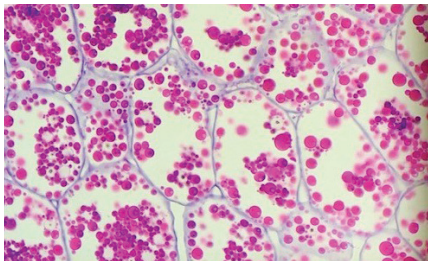
Syed Salahuddin Ahmed, Senior Consultant in Pathology, Delta Hospital, Dhaka, Bangladesh

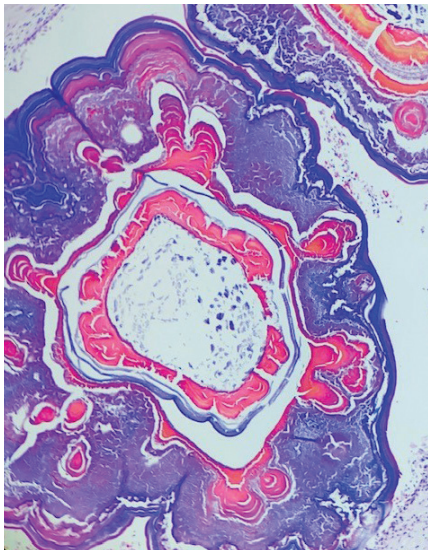
Perfect Flower

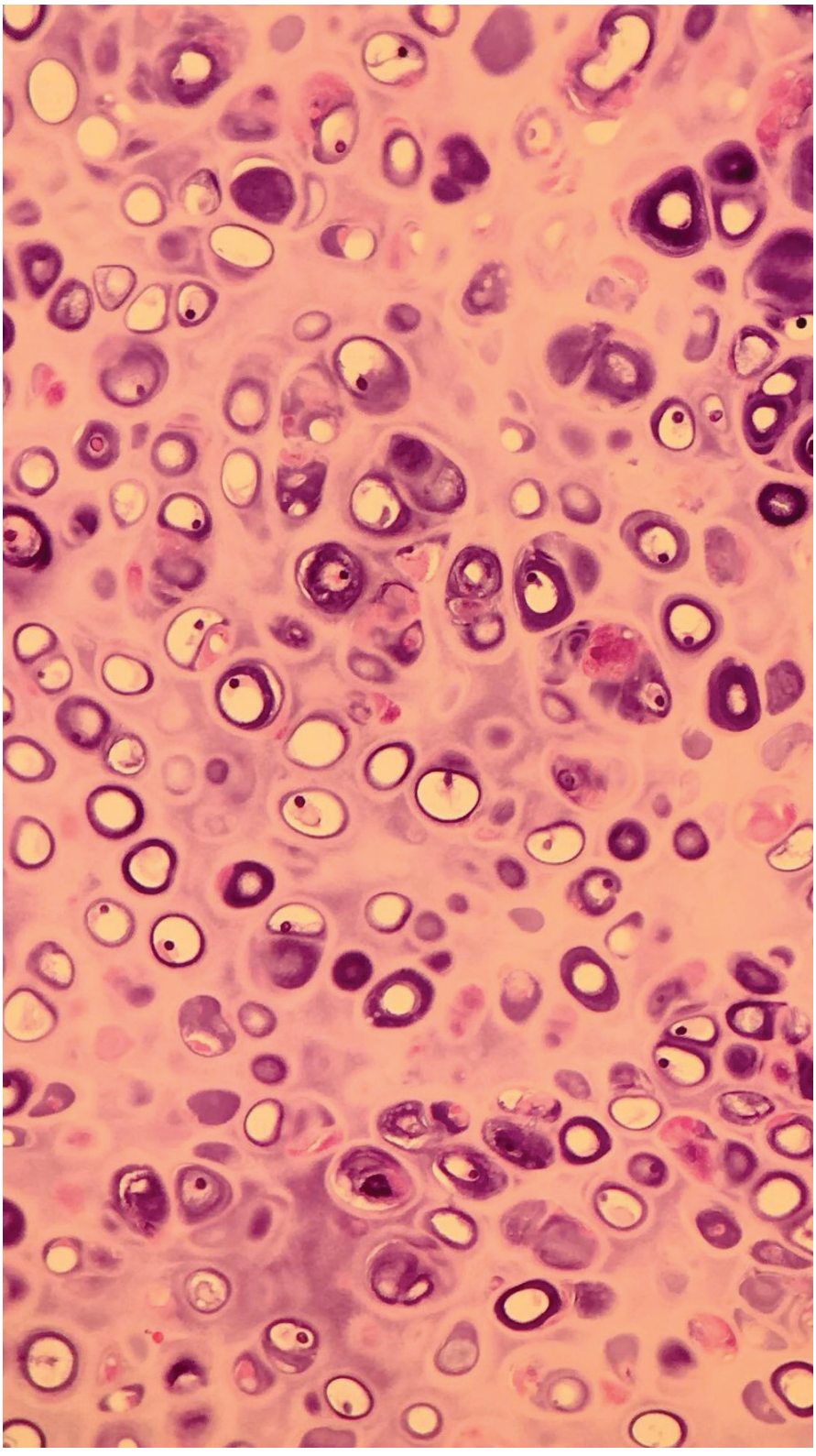
Fruiting body of *Aspergillus* fungus identified in the maxillary sinus tissue of a post COVID-19 patient.

Chitturi Ramya, Associate Professor, NRI Medical College, Chinakakani, India









Balloons and Vegetables

Top Left: Vegetable material, 40x magnification.

Flowers of Prostate

Bottom Left: Corpora amylacea, 20x magnification.

Sea of Cartilage

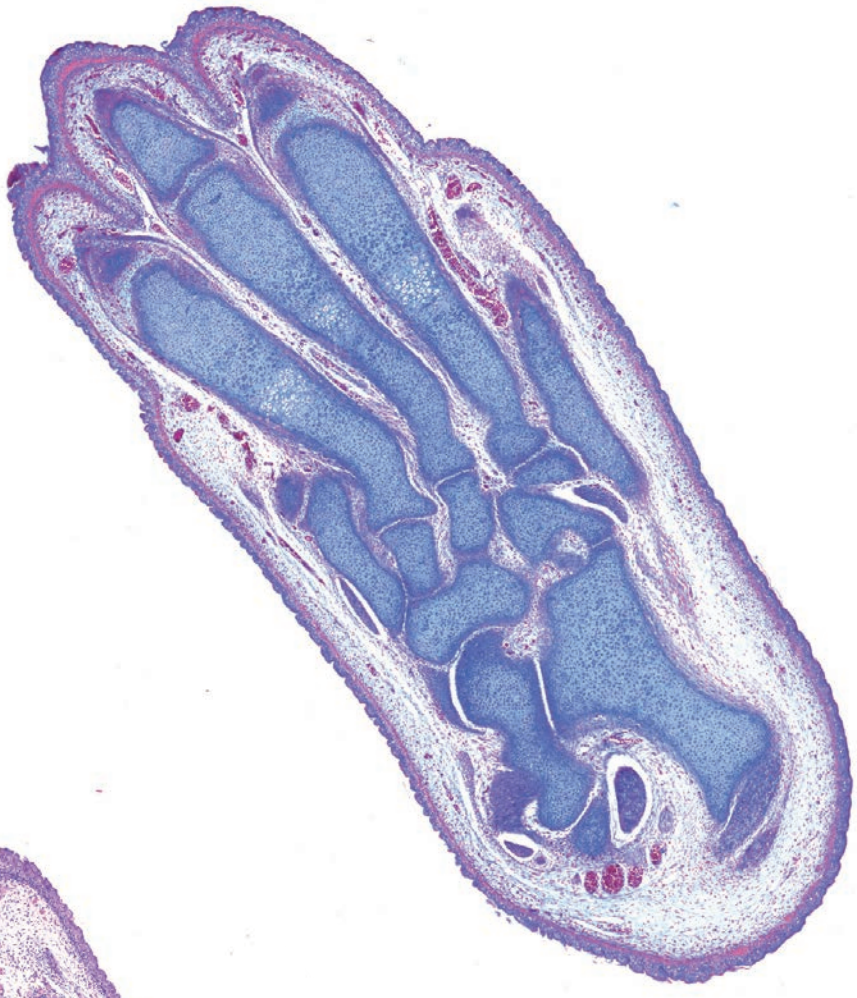
Right: Cartilage, 40x magnification.

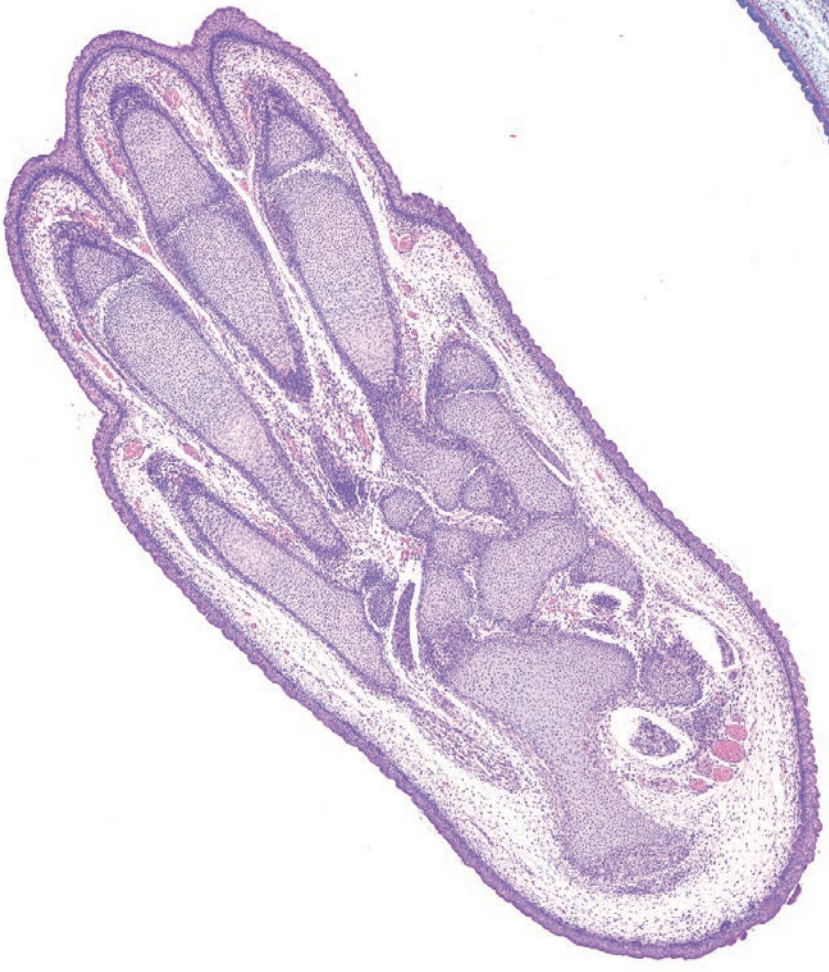
Evanthia Omoscharka, Pathology Residency Program Director and Associate Professor of Pathology, University of Missouri-Kansas City School of Medicine; Cytopathology and Point of Care Director, University Health, Kansas City, Missouri, USA

Stepping Stains to Histology

Mouse embryo paws stained with H&E and Alcian blue/Masson's trichrome.

Frazer Bell, Histopathology Technician, Histology Research Service/ Veterinary Diagnostics Services, College of Medical, Veterinary and Life Sciences, University of Glasgow, UK





Lymphoma Flowers

Top: The flowers are high grade lymphoma in a pleural fluid.

Faye Smith-Chakmakova, Pathologist, Barton Memorial Hospital, South Lake Tahoe, California, USA

Pap Rose Painting

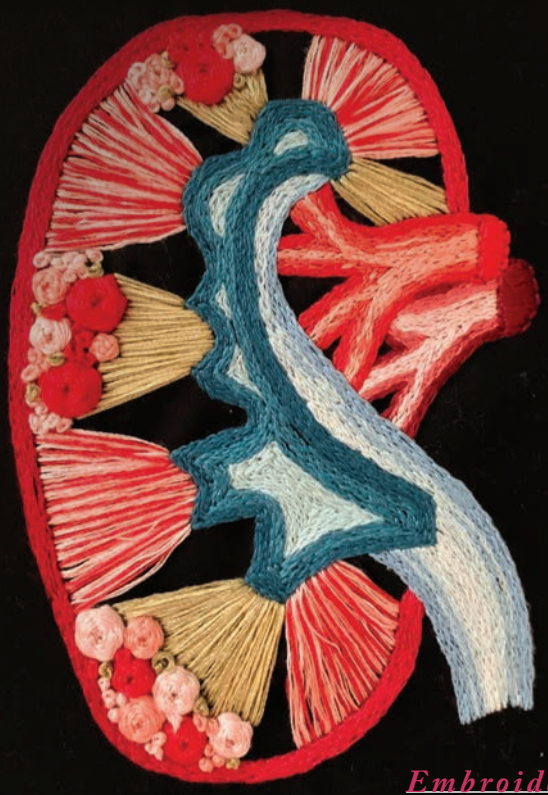
Bottom: I painted this picture after a cytology-GYN rotation because the squamous cells reminded me of petals.

Andrea Shields, PGY-2, Loma Linda University, Loma Linda, California, USA

Searching for a Cure

This image was rendered in Daz Studio software using empiric assets with a laboratory setting. A touch-up for additional lighting was performed in Adobe Photoshop.

Jaye H. Paulman, Laboratory Manager at Southview Medical Group, Birmingham, AL, USA



Embroidered Kidney

A fiber art creation to showcase this wonderful organ.

Meagan Chambers, Resident, Department of Pathology and Laboratory Medicine, University of Washington, Seattle, Washington, USA

Inside a Cell

Top Right: I made a cake depicting a B-cell's structure with organelles, antibodies, and major histocompatibility complex (MHC) class II proteins. It shows the nucleus containing chromatin, which spirals into a DNA helix with histones and shows individual bases. Most of the decorations are made of modeling chocolate; the cell membrane is buttercream.

Alivea Smith-Andrews, Medical Laboratory Scientist, LabPLUS, Auckland City Hospital, Auckland, New Zealand

Crochet Microscope

Bottom Left: What do you give the lab professional who has everything?

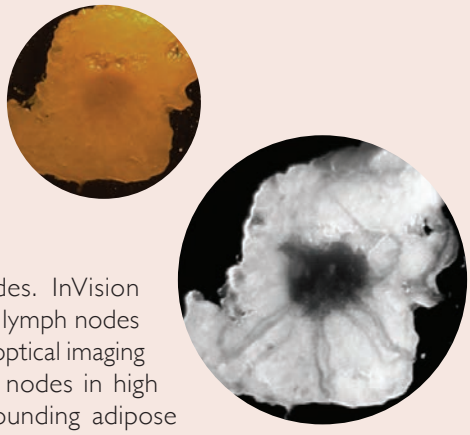
Renee Fraser, Cytotechnologist, Northwestern Medicine-West Region, Winfield, Illinois, USA

WEAPONS OF REASON

Technology should solve problems, not make more of them. It should marry the cutting edge of research and engineering to create devices that can transform lives. These positive disruptors, these Weapons of Reason, are symbolic of our march forward for better patient care. The following are just a handful of our powerful technological arsenal.

CisionVision

reddot winner 2023
medical devices and technology design



INVISION: A CLEAR VIEW

Increasing the yield of lymph nodes to save time, money, and lives

Locating and identifying lymph nodes within surgical specimens is a challenging, but vital part of pathology. A laboratory professional's ability to correctly spot lymph nodes directly affects accurate cancer staging. Therefore, any innovation has tremendous implications on patient care. Unfortunately, in many cases, lymph node yield minimums established by the National Comprehensive Cancer Network (NCCN) are left unmet. This most commonly occurs in colorectal resections, specifically those treated with neoadjuvant therapy. When lymph node yield is compromised, patient care suffers. Studies have demonstrated that retrieval of higher numbers of lymph nodes is correlated with better patient outcomes. Therefore, there is great potential for yield improvement and, consequently, impact on patient care.

A new revolutionary tool that's leading the change for innovation is InVision – an optical imaging device that provides enhanced imaging contrast and assists laboratory professionals in finding lymph nodes. InVision allows clinicians to see lymph nodes like never before. This optical imaging device depicts lymph nodes in high contrast against surrounding adipose tissue – all in real time. There's no need for injected dyes, fluorescent tags, or radiation.

InVision uses military-grade technology previously unavailable for public use that leverages the difference in water content between lymph nodes and adipose tissue. Infrared light sensing technology helps to enhance visual contrast, and boosts lymph node yield. InVision can be seamlessly integrated into existing anatomic pathology workflows thereby improving the efficiency and accuracy of cancer staging.

InVision is a winner of the 2023 Red Dot Design Awards in the medical device and technology category. The success of this technology can be attributed to the pathologists, pathologists' assistants, and other laboratory professionals who have been at the forefront of its development. The product was built following more than 800 clinician interviews, ten iterations of prototype testing, and valuable input from numerous leaders and innovators throughout the pathology community. This has resulted in a device that is well-tailored for the needs of pathologists and pathologists' assistants. Not only does InVision provide time-saving and potentially life-saving benefits, but by reducing the need for excess adipose tissue submission, labs can significantly reduce costs.

DELL Technologies

SOLVING THE STORAGE CONUNDRUM

Dell's PowerScale technology offers a flexible and scalable solution to digital data storage

Digital pathology offers incredible advantages when compared to traditional microscopy. However, one of the consequences of the increasing adoption of digitization is that the amount of data grows exponentially as more and more slides become digitized. The need for scalable, reliable, and secure infrastructure is imperative to combat this data influx. With the right IT infrastructure in place, institutions can make accessing, analyzing, and archiving these images simple and easy to manage.

Dell PowerScale is a leading scale-out (network attached storage) NAS platform. Based on years of successful deployments in medical image management, PowerScale is relied upon by pathology departments and their IT teams in healthcare and life sciences organizations. Pathologists generate near a petabyte of data annually in a fully digitized department, and PowerScale's architecture, which includes the Dell PowerScale OneFS operating system, ensures the required levels of performance, scalability, reliability, and security are always achieved. Pathologists can eliminate storage silos, consolidate all unstructured data, store petabytes of file data and analyse it.

The storage conundrum

Storage infrastructure is an essential part of a digital pathology deployment. PowerScale, when incorporated into the solution design, ensures slide images are efficiently stored, protected and always available while remaining easy to manage at any scale.

"Although our digital pathology image capacity grows by leaps and bounds, we no longer worry about running out of space on PowerScale," says Nikolas Stathonikos, Principal Investigator, AI Development and Implementation at UMC Utrecht. "Now that we have a scalable, flexible infrastructure, we no longer need daily or weekly conversations with IT about our storage requests. PowerScale allows us to focus on patient care and gives us peace of mind."

The power of the many

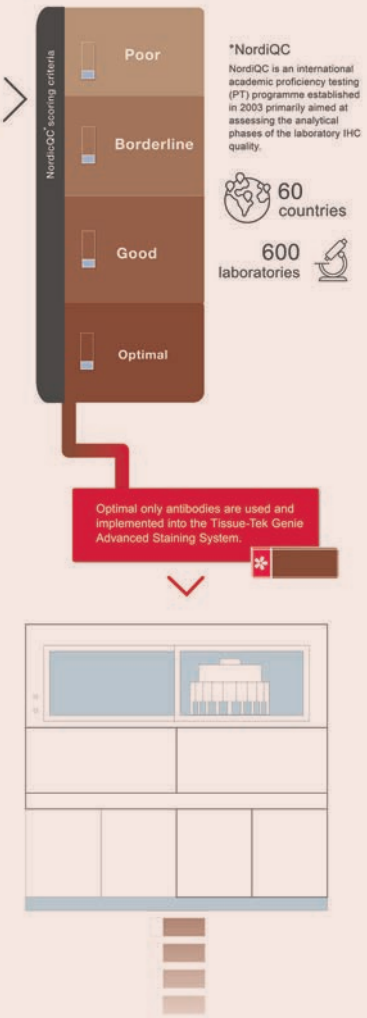
Dell Technologies' Chairman and CEO Michael Dell has stated that "By 2030, we believe we'll be able to transform the lives of a billion people. And healthcare is one of the most important areas where technology can have an enormous impact."

Dell Technologies values the ability to be a strategic partner and help customers around the globe deliver better patient care. Pathologists trust PowerScale to securely store patient data and to make it available when needed.

Seamless Standardization

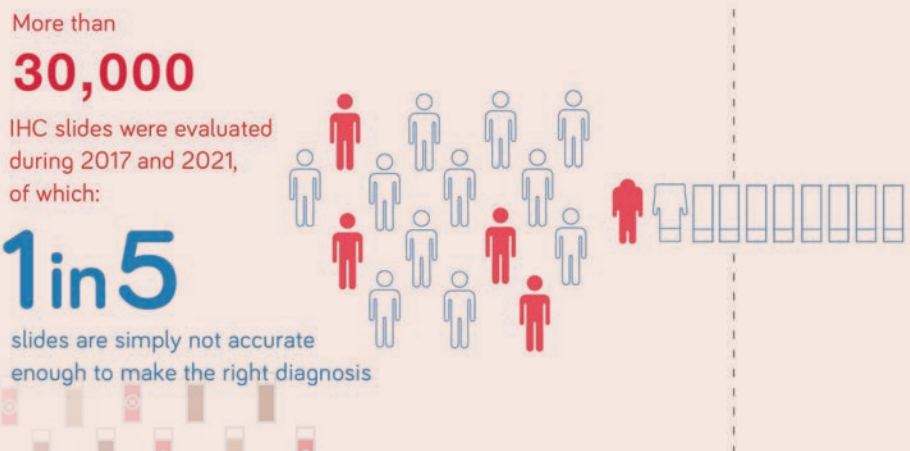
The fully automated, IVDR-compliant Tissue-Tek Genie® allows advanced tissue staining to meet standardization

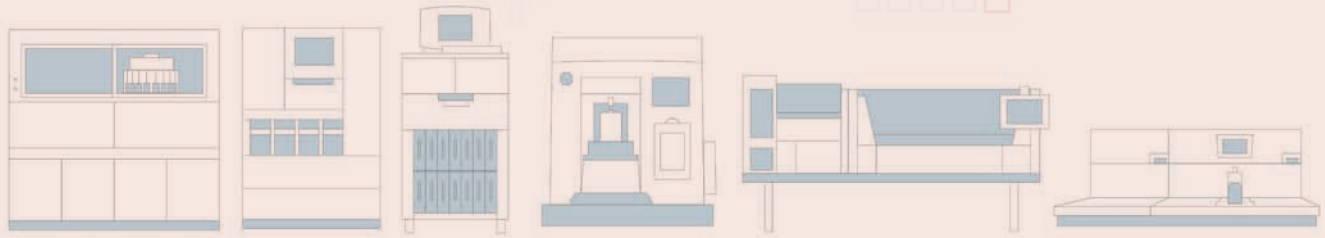
It is crucial that labs can rely on their slides for a seamless – and accurate – diagnosis. With many more commercial instruments focusing on flexibility and choice, these qualities are difficult to separate from subjectivity and complexity. To prepare for the future, we not only need standardization to reduce the chance of error and inaccuracy, but also for successful digital pathology practices and future AI developments. Sakura Finetek Europe has developed a new, advanced staining system – The Tissue-Tek Genie® – that allows laboratories to easily achieve standardization. Their novel system uses solely optimal scoring antibodies, enabling labs to produce optimal scoring slides with quicker, more streamlined results. This technology underlines their mission to advance cancer diagnostics by providing integrated solutions for anatomic pathologists and patients through their best-in-class innovation, quality, and customer care.



Five years ago, NordiQC concluded that, although 67 percent of immunohistochemistry (IHC) slides were accurate enough to make a diagnosis, one out of three slides (33 percent) were, and are still, insufficient (1). The study – which analyzed more than 30,000 IHC slides between 2003-2015 – found that 30 percent of the staining results in the general module, and 20 percent in the breast cancer IHC module, were inadequate for diagnostic use. Some reasons for this insufficiency included underdeveloped antibodies, poorly calibrated ready-to-use products, erroneous epitope retrieval – and, most importantly – delayed standardization. Closer analysis revealed that most laboratories faced challenges with calibrating and validating IHC assays for optimal performance. In 2022, this performance was reflected on. Today, only one in five slides is insufficient for diagnosis (2). This jump may be attributed to factors such as access to sophisticated instrumentation for IHC, or publications that provide all

"Fast, very fine, precise, and homogeneous staining. Precision immunochemistry inseparable from precision oncology."
- Eric Bonte, Pathologist Le Centre Médical De Pathologie De Compiègne





stakeholders with guidelines on how to optimize IHC methods.

Regardless of the improvement, it was concluded that further IHC test accuracy and precision were required. Standardization is the key to perfection, and is the driving factor behind the Sakura Tissue-Tek Genie® – a fully automatic and non-flexible system that allows laboratories to achieve reproducibility and optimal only results. Standardization with the Genie also supports IVDR compliance and prepares for future developments in digital pathology and artificial intelligence. The technology is a huge step towards Sakura's goal of being the first company to fully automate anatomic pathology.

Sakura strives to connect all pathologists in the lab to their technique, and with their excellent implementation consultancy service – Bridge – they've done precisely that. Sakura Bridge supports utilization of technology, and will guide you through the stages of preparation, implementation, and sustainment – regardless of your preferred solution. Their service will not only optimize workflow, but also help you achieve your own personalized goals. To further optimize partnership, Sakura Finetek Europe has created GenieOnline, a replenishment service that automatically reorders any consumables your Genie needs, eliminating worry about stock management.

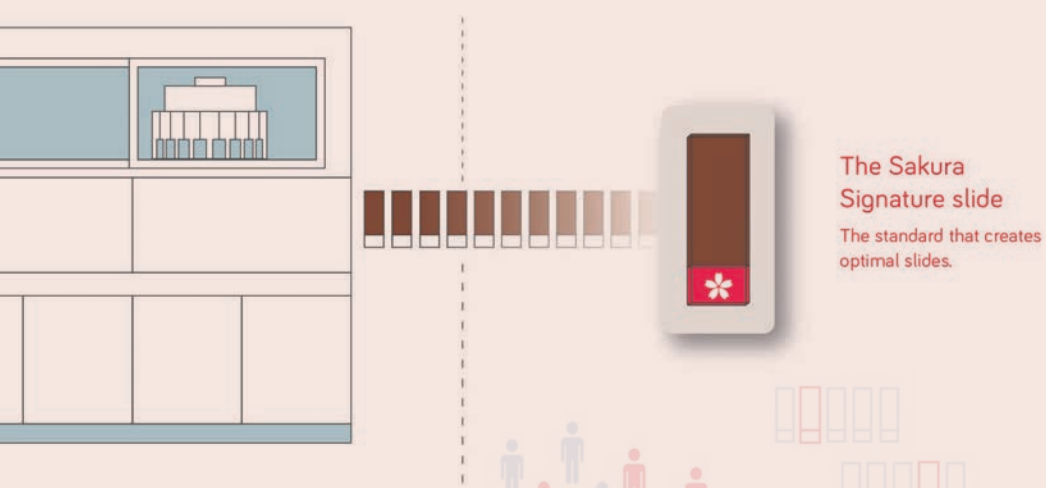
With The Tissue-Tek Genie®, Sakura Finetek Europe has set a new standard for tissue diagnostics – enabling laboratories to achieve consistent, optimal, and standardized results every time. The dream of standardization is now a reality.

References

1. *M Vyberg, S Nielson, Virchows Arch, 468, 19 (2016). PMID: PMC4751198.*
2. *S Nielson et al., Appl Immunohistochem Mol Morphol, [Online ahead of print] (2022). PMID: 36194495.*

What are the practical applications of your technology in the lab?

- Tissue-Tek Genie enables standardization of advanced staining of human, and formalin-fixed paraffin-embedded tissue
- Advanced capillary gap technology for whole slide coverage
- Pay-per-slide and transparent cost management
- 2hr 45 min predictable turnaround time for all biomarkers to support an efficient workflow
- Partnership with GenieOnline powers auto-replenishment for worry-free stock maintenance
- Optimal, ready-to-use reagents for standardized results that are prepared for future developments
- Closed system limits the exposure to chemicals, caters for a safer working environment, and allows easier IVDR compliance
- 30 fully independent stations allow maximum flexibility with limited downtime, and nullify splitting and sorting of cases



BIOCARE MEDICAL

IT'S PRO TIME

RAPID IHC, ISH & FISH AUTOMATION

ONCORE™ PRO

SCHEDULE YOUR FREE DEMO TODAY

www.biocare.net/oncore-pro

Free demonstration is for a maximum 30 days, terms and conditions apply as determined by your assigned Biocare Medical representative.

BIOCARE MEDICAL

Biocare Medical is a global leader in solutions for cancer research and diagnostics. We provide world-class reagents and a comprehensive suite of advanced instrumentation for IHC, molecular and histology testing. Our advanced platforms of semi and fully-automated instrumentation are designed to meet every need from high throughput clinical diagnostics to flexible research requirements.

Complete line of IHC, Molecular, Fully Automated Instrumentation & Histology Products

www.biocare.net · Order Online 24/7 · 800 · 799 · 9499

Cancer Classification Clarification

How do we prevent cancer taxonomy from becoming a jumbled mix of different systems, phrases, and diagnoses?

Establishing what determines one cancer class from another is a tricky and ever-shifting science. So, what are the most recent updates in terms of diagnostic criteria? Here, we present two research stories that cover the complexities of cancer classification!

Twenty-twenty-WHO

Until somewhat recently, all classification of myeloid malignancies were based on the fourth edition of the World Health Organization's *Classification of Haematolymphoid Tumours*, published in 2017. But with a fifth edition freshly unveiled in 2022 (1), and so many genetic advancements taking place between editions, how will these new guidelines affect diagnostic criteria?

One of the more salient changes between editions is that the blast cut-off between myelodysplastic syndromes (MDS) and acute myeloid leukemia (AML) with defining genetic abnormalities (DGA) is for the most part gone. For comparison, the International Consensus Classification (ICC) sets the blast cut-off for AML-DGA to 10 percent, while cases with 10-19 percent blasts without DGA are assigned as a new category: MDS/AML (2).

A study presented at the recent American Society of Hematology (ASH) Annual Meeting in 2022 sought to establish how the new guidelines would affect cases of myelodysplastic syndromes and acute myeloid leukemia (3). A total of 1451 cases related to MDS and AML as per the 2017 classification were examined, and, of those, 746 were diagnosed with against the 2022 criteria. The AML-DGA group remained similar to the WHO 2017 but changed in composition. The largest genetic contributors to this group were AML with *KMT2A-r*, AML with *MECOM-r*, as well as two newly defined categories – AML with *NUP98-r*, and AML with other DGA.

More broadly, the study found that the 2022 classifications places a greater emphasis on genetic definitions rather than pure morphology. These new guidelines, the authors state, make comprehensive genetic analysis of AML and MDS mandatory. Further to this, much of the classification criteria between WHO 2022 and ICC is similar, yet a small number of patients will be affected by differences in exact phrasing. Ultimately, the authors predict that, in their current state, these classifications could lead to diagnostic confusion among physicians and patients.

A diffused diagNOSis

Diffuse large B-cell lymphoma not otherwise specified (DLBCL, NOS) continues to be a diagnosis with a multitude of complex implications for patients – and it is still the most common form of the DLBCL malignancy worldwide. DLBCL can be divided into a number of subgroups based on molecular characteristics, and there are equally as many approaches for classification.

Although these systems are in some ways similar, none have yet to be implemented on a wide scale due to issues with consistent classification across patients. Another paper that was presented at the recent ASH Annual Meeting set out to establish a more consistent and efficient system working off the foundation laid by pre-existing classification algorithms (4).

The researchers used whole genome sequencing (WGS) data from 900 tumors from DLBCL, Burkitt, follicular, and other mature B-cell neoplasms. These data were then clustered with non-negative matrix factorization, which revealed seven distinct subgroups based on genetic characteristics. The authors note that a number of these are similar to groups defined as existing classification systems – though they vary in their scope and refinement, and, in some cases, exist as a merger of two previously separate groups.

By refining the genetic subgroups of established classification systems, the authors believe they have created an improved method that will allow for greater understanding of the most complex aspects of DLBCL, NOS?

See references online at:
tp.txp.to/0423/classification-clarification

Oncology Overhaul

What do advances in sequencing technology mean for research in cancer genomics?

By Neil Ward

We've known for a long time that cancer is a disease of the genome. We've also known that applying insights from genomic sequencing to cancer studies can unlock its highly complex and variable pathology. The knowledge gained from sequencing data enables oncologists to dive deeper into the complicated biology of tumors and tumorigenesis and gives researchers a deeper understanding of cancer at the genomic and transcriptomic level. Yet historically, embedding genomics widely into cancer research has been challenging because of limitations in sequencing technology. But now, a wave of innovations looks set to fuel new breakthroughs in cancer research, diagnostics, and treatment.

Where are we today?

Each of the two main approaches to genomic sequencing employed today – long- and short-read – have their own applications for different cancer scenarios. High-throughput short-read sequencing is used for applications where the depth and length of long-read is not necessary, such as single-nucleotide polymorphism (SNP) calling or sequencing short microRNAs. This short-read data is useful for tracking residual disease, ongoing cancer screening, and, in some cases, early detection of cancer. In contrast, long-reads are typically kilobases long, which allows them to cover challenging variant types, such as large structural variants and tandem repeats. The accuracy and completeness of long-reads affords a deeper understanding of individual cancers and enables a precision oncology approach.

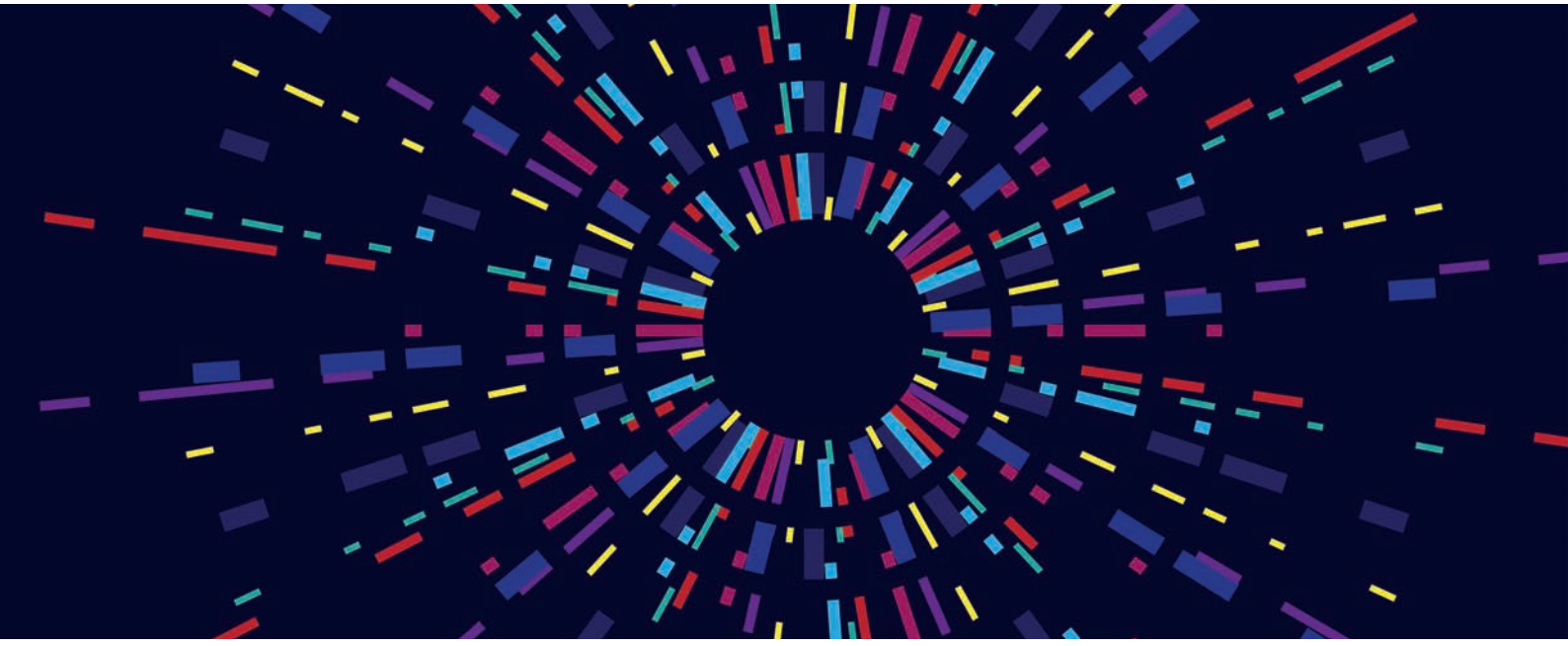
To date, long-read sequencing has had lower throughput, making it more challenging to incorporate in large-scale cancer studies. Yet, without the ability to gather whole genome sequences from significant numbers of study participants, researchers are unable to identify trends in genetic change and discover new biomarkers associated with risk of cancer. For example, structural variants (genomic differences ≥50 base pairs), are a main driver of cancer but are too large to be reliably discovered with short-read sequencing – and that is true of both germline variants inherited from parents and somatic variants triggered by environmental factors, such as damaging UV rays.

Multiomics at scale

The good news? Developments in long-read sequencing have made the technology increasingly accessible. Overall, the cost of long-read sequencing has come down and throughput has increased. A single whole genome sequencing machine can now deliver more than 1,300 human genomes per year, with reduced sample sizes, far fewer consumables, and exceptional accuracy. As a result, there is less need to batch samples, which improves time-to-result – so labs will no longer need to choose between cost and turnaround speed. In short, we've unlocked the possibility of the US$1,000 genome with a 24-hour turnaround for patients.

Integrating long-read sequencing into large cancer studies is also now feasible. We've already seen the benefits of such innovation in breast cancer; one study that employed long-read data revealed 3,059 breast tumor-specific splicing events, including 35 that are significantly associated with patient survival (1).

Another significant evolution in long-read is the ability to gain insights into the epigenome in a single experiment. Previously, multiple tests have been required to evaluate epigenomic changes, such as methylation, but it is now possible to capture both genetic and epigenetic variation together. This ability has



noteworthy implications for oncology research because many genetic changes related to cancer show in the methylation layer first (2). Understanding subtle patterns in this rich source of information will uncover new opportunities for diagnosing specific cancers before solid tumors begin to grow.

Short-read sequencing still as a seat at the table

In addition to long-read innovation, progress in the sensitivity and specificity of short-read sequencing is enabling further oncology use cases. Highly accurate modern short-read systems produce results with far fewer errors in read data, reducing the number of false positives while increasing biological insight. Improved short-read sensitivity also decreases detection limits, allowing for lower frequency of allele detection in samples. This increased sensitivity is particularly important in scaling the use of liquid biopsy in cancer – a far less invasive sampling method than the commonly used Formalin-Fixed Paraffin-Embedded (FFPE) technique. Such innovations will accelerate the development of diagnostic tools to improve therapy selection, recurrence monitoring, and early detection.

Finally, contemporary sequencing machines, both short- and long-read, are increasingly backed by massive computing power and use advanced AI and deep learning techniques. Combining AI methods with genomics technology improves both the accuracy and yield of a single experiment, resulting in more precise identification of genetic variants. This enables deeper analysis of large data sets, helping unlock patterns that will give us greater insight into the pathology of cancer and its progression at a molecular level.

A sequencing step change

The pace of oncology research is about to go through another step change thanks to rapid innovation in sequencing technology. Promising new applications that will benefit patients are coming closer to fruition. We know that health outcomes when cancer reaches stage 3 or 4 are inferior; here, a deeper understanding of biomarkers and genetic changes associated with specific cancers will edge us closer to the goal of diagnosing at the earliest possible stage and informing precision oncology treatment decisions.

The powerful combination of highly accurate short- and long-read sequencing will unlock the pathology of this variable and complex disease, empowering researchers to work towards better outcomes for patients.

"...we've unlocked the possibility of the US$1,000 genome with a 24-hour turnaround for patients."

Neil Ward is the General Manager EMEA at PacBio, based in Reading, UK.

References

1. *DFT Veiga et al., "A comprehensive long-read isoform analysis platform and sequencing resource for breast cancer," Sci Adv, 8 (2022). PMID: 35044822.*
2. *A Nishiyama, M Nakanishi, "Navigating the DNA methylation landscape of cancer," Trends Genet, 37, 1012 (2021). PMID: 34120771.*

21-25 May

WORLDLAB · EUROMEDLAB
ROMA 2023

25th International Congress of Clinical Chemistry and Laboratory Medicine
25th european Congress of Clinical Chemistry and Laboratory Medicine
55th Congress of the Italian Society of clinical biochemistry and clinical molecular biology

March 31st, 2023
Deadline for
reduced registration fees

MZ EVENTS

ORGANISING SECRETARIAT
Via Carlo Farini 81 - 20159 Milano (Italy)
Phone: +39 02 66802323
E-mail: info@2023roma.org

On the brain. US researchers have conducted autopsies on patients that have died from COVID-19 to quantify the distribution and cell-type specificity of SARS-CoV-2 infection outside of the respiratory tract (1). The study found that virus replication was persistent not only in respiratory tissues but also non-respiratory tissues of the human body – including the brain – in early infection and up to 230 days after symptoms began.

Urgent testing. Global testing rates in low and middle income countries have decreased after the onslaught of COVID-19 – reducing the effectiveness of SARS-CoV-2 genomic surveillance. New evidence reveals that low testing rates and spatiotemporal biases significantly delay the detection of new variants by months. To increase the productivity of genomic surveillance programs in these low to middle income countries, the mean test rate must increase to 100 tests per 100,000 persons per day (2).

Robotic revolution. Automation platforms greatly increase the productivity of global testing rates. A new technology that uses millimeter-sized magnets as mobile robotic agents – or ferrobots – allows the precise and accurate handling of magnetized sample droplets based on nucleic acid amplification. The method overcomes the limitations of pooled testing by enabling accessible, adaptable, and distributable automated viral testing (3).

Hook, line, and sinker. In a recent study, researchers have successfully leveraged DNA "nanobait" to detect nucleic acids from multiple respiratory viruses simultaneously (4). The sensing technology can be easily reprogrammed to discriminate between viral variants, rapidly identifying the presence of SARS-CoV-2 RNA variants in patient swabs with high specificity. In the future, researchers hope it can be implemented into point of care settings to allow amplification-free RNA identification.

References

1. *S R Stein et al., Nature, 612, 758 (2022). PMID: 36517603.*
2. *A X Han et al., medRxiv, [Preprint]. PMID: 35664998.*
3. *H Lin et al., Nature, 611, 570 (2022). PMID: 36352231.*
4. *F Bošković et al., Nat Nanotechnol, 18, 290 (2023). PMID: 36646828.*
5. *B Zhu et al., Analyst, 147, 4971 (2022). PMID: 36205380.*
6. *P Chitale et al., Nat Commun, 13 (2022). PMID: 36400796.*
7. *J J Kovarik et al., iScience, 26 (2022). PMID: 36507225.*
8. *A Johannessen et al., Nat Commun, 14 (2023). PMID: 36596805.*

IN OTHER NEWS

Ray of light.
Quenchbody fluorescent immunosensors prove to be sensitive tools to rapidly diagnose COVID-19 – offering potential for high-throughput analysis of swab samples in large-scale monitoring of infectious diseases (5).

Building a blueprint.
A genome assembly tool successfully sequenced the complete genome of the tuberculosis strain, H37Rv, using consensus building (6).

Culprit of long COVID-19?
Exploratory study assessing the proteome, lipidome, and metabolome in patients with long COVID-19 syndrome finds that an exaggerated anti-inflammatory response may be responsible (7).

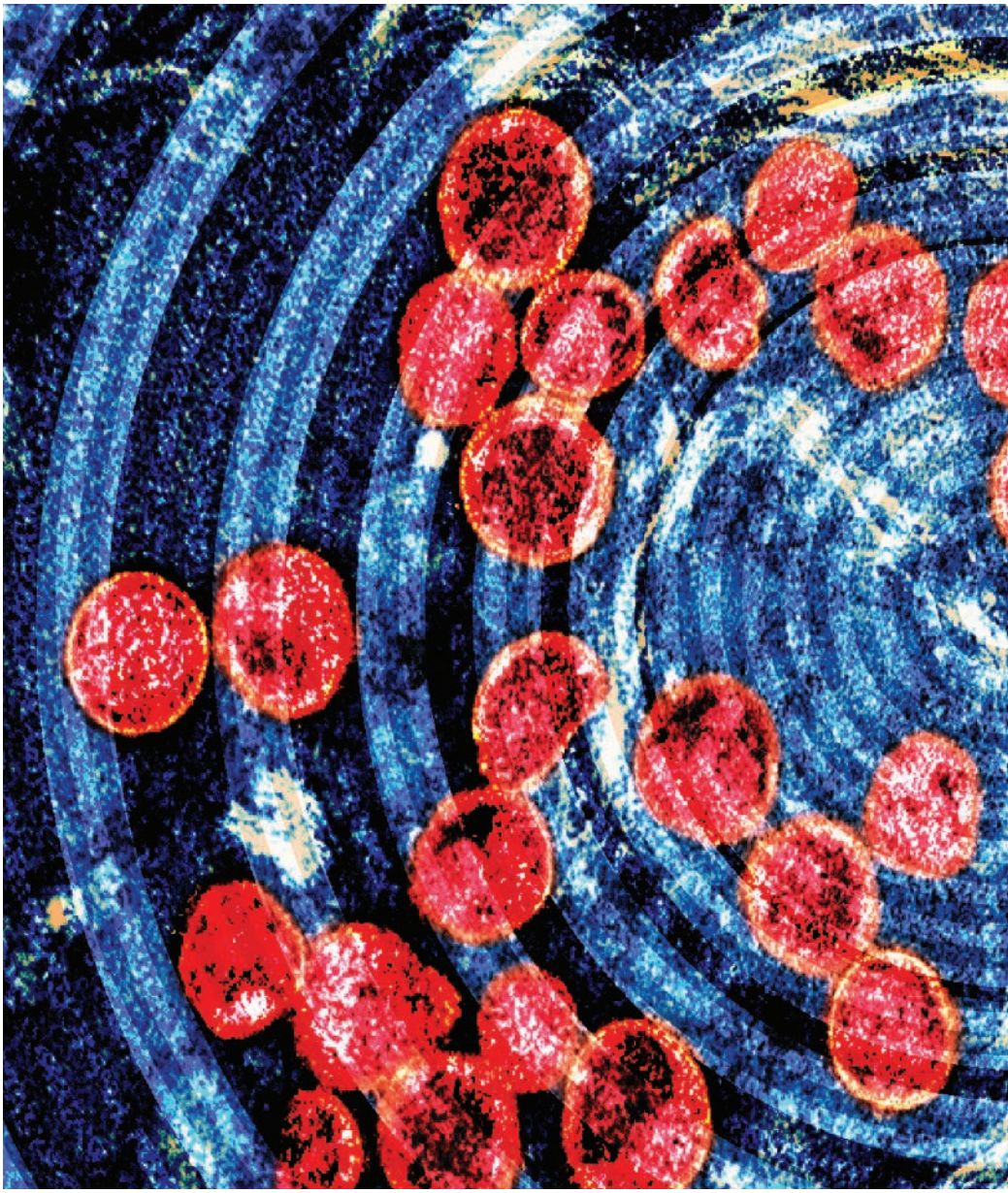
Scaling up.
WHO guidelines suggest that simple biomarkers of liver fibrosis are not sensitive enough for hepatitis B diagnosis in sub-Saharan Africa. Researchers call for improved rule-in and rule-out thresholds to optimize treatment (8).

Three Mpox Challenges

Mpox testing has certainly improved, but there are still significant barriers to address and lessons to learn

By Erica Frew

Credit : NIAID / flickr.com



Since May 2022, countries around the world have been dealing with the first mpox outbreak to spread broadly beyond Africa. By November, there were nearly 80,000 confirmed cases in more than 100 countries (1).

But those numbers actually belie the tremendous challenges we have experienced in detecting mpox in this outbreak. For most of 2022, testing has been a significant bottleneck in addressing this public health threat. In New York City, for example, which has a population of nearly 8.5 million and quickly became the epicenter of the outbreak in the US, testing was so constrained that, until July 2022, only 10 people could be tested each day (2).

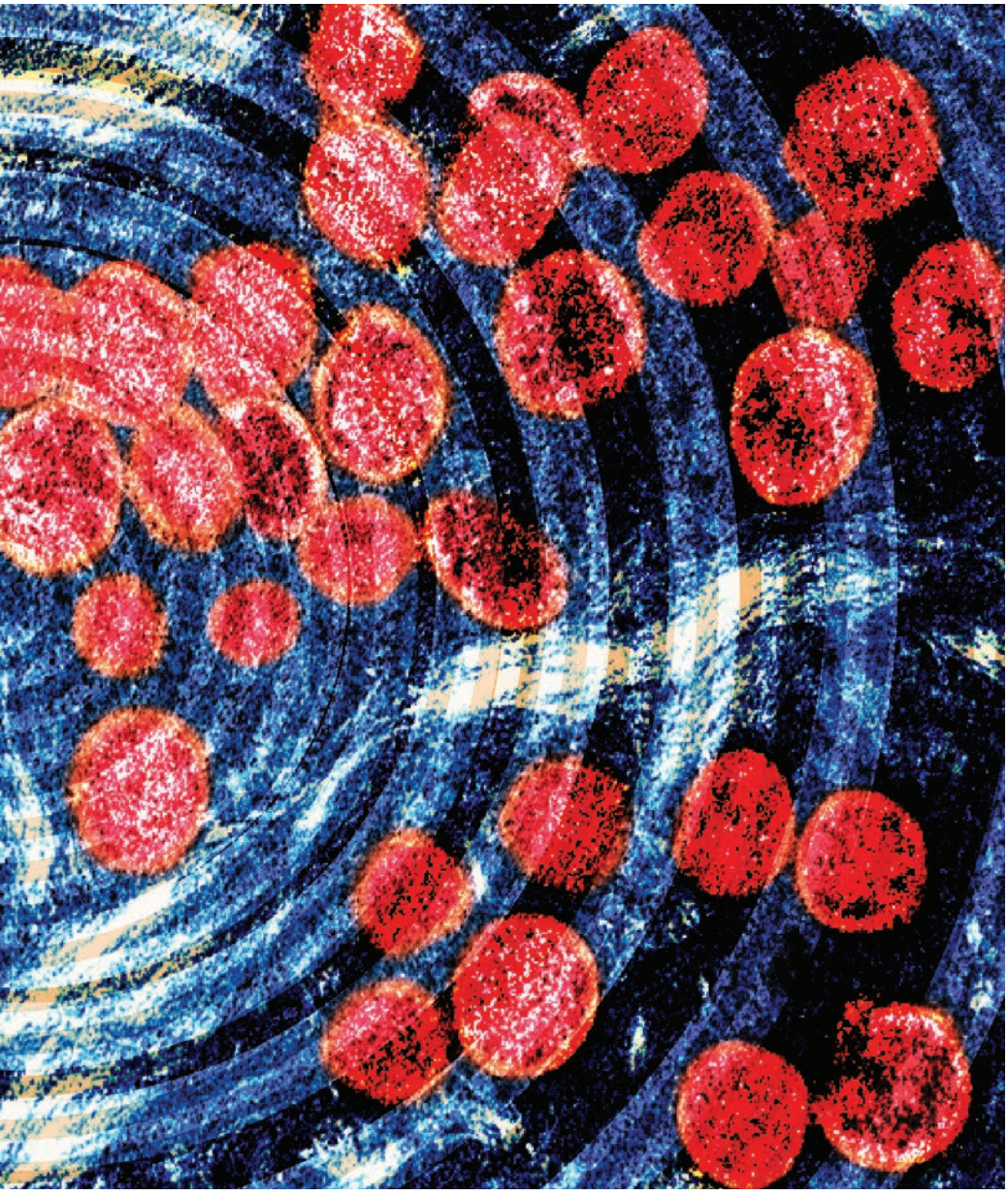
The US Food & Drug Administration's ability to grant emergency use authorization for new mpox tests – a development that occurred in September 2022 – should help alleviate testing issues in the coming months. Still, the clinical laboratory community has a number of hurdles to clear before it can roll out accessible, reliable testing for mpox. Many of these challenges can be addressed with better collaboration between industry and clinical labs.

Mpox-specific sequences and testing protocols

So far, the sequences and testing protocols approved for mpox testing are not actually mpox-specific — they are for the broader category of non-variola Orthopoxvirus DNA viruses (3, 4). It is acceptable to use this now because mpox is the only widely circulating member of this group – but ultimately labs will need methods that are specific to mpox. This challenge is likely to be addressed as test manufacturers bring new assays to the FDA for emergency use authorization.

Early access to reliable controls and reference materials

One key message we learned from COVID-19 is that companies need to do more to get reliable testing materials into the hands of test developers – both for clinical labs and for commercial test manufacturers. The severe testing constraints that occurred in the first few months of the mpox outbreak were largely caused by limited access to controls and reference materials needed to build, verify, and routinely run new assays. Since then,



we have begun to see companies releasing synthetic mpox controls, which has helped labs better respond to unmet testing needs.

Better collaborations between test developers and clinical labs

For much of the outbreak in the US, just a handful of labs had partnered with the CDC to get mpox testing up and running. It wasn't enough. Industry should do a better job of partnering with clinical labs to help ramp up testing capacity. If these relationships are established ahead of time as part of a nimble infrastructure, it will be easier to develop new tests and materials rapidly when new outbreaks emerge. In addition, collaborations can be used to expand and enhance testing strategies, such as enabling send-out testing or a variety of sample specimen types.

"It is more important than ever to plan ahead with new strategies..."

Looking ahead, infectious disease experts predict that the frequency of zoonotic pathogens spilling over into the human population will continue to increase due to climate change and human encroachment on animals' natural habitats. It is more important than ever to plan ahead with new strategies for the rapid development of tests and controls. We must also establish stronger relationships between clinical laboratories and the developers of tests and controls so that we can respond quickly to new threats in the future.

Erica Frew is a product manager at Asuragen, a Bio-Techne brand, where she specializes in molecular controls for clinical tests. She is based in the Boston area, Massachusetts, USA.

References

1. *WHO, "2022 Mpox (Monkeypox) Outbreak: Global Trends" (2023). Available at: https://bit.ly/3YA9XWy.*
2. *S Otterman, The New York Times, "Monkeypox Vaccine Rollout Is Marred by Glitches in New York" (2022). Available at: https://nyti.ms/3xa1pdk.*
3. *US FDA, "Monkeypox (mpox) Emergency Use Authorizations for Medical Devices" (2022). Available at: https://bit.ly/3RLM8cg.*
4. *US CDC, "2022 Outbreak Cases and Data" (2023). Available at: https://bit.ly/3YkTQN3.*

WEBINAR

illumina®

Parse BIOSCIENCES

Using Single-Cell Sequencing to Investigate Murine COVID-19 Mortality

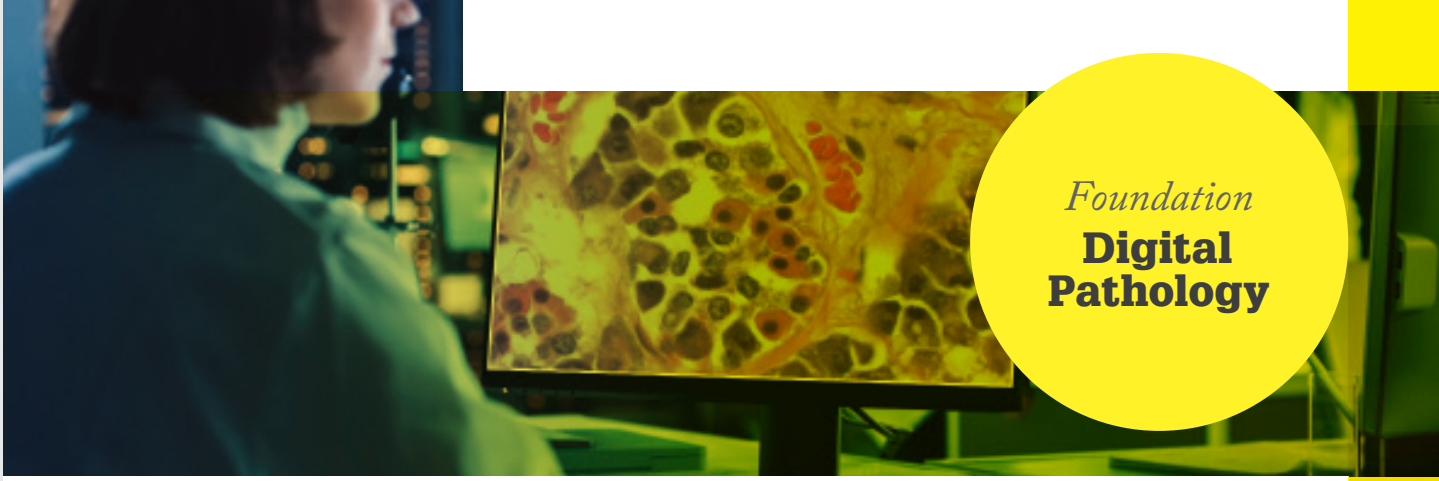
With flexible and scalable solutions available, learn why single-cell sequencing studies are no longer out of reach. Join Illumina and Parse Biosciences for a webinar where our invited speaker, Dr. Benjamin Ostendorf, Charité-Universitätsmedizin, Berlin, will present results of his recent single-cell study, published Sep 2022 in the Journal Nature, on the role of APOE in Murine COVID-19 mortality.

Webinar Learning Objectives:

- Learn about the role of APOE in Murine COVID-19 mortality.
- Understand how accessible and scalable single-cell experiments can be using the Parse Biosciences Evercode platform with Illumina next-generation sequencing readout.
- Get more information on single-cell workflows from single-cell sample prep through sequencing and data analysis.

NOW AVAILABLE ON DEMAND:

www.shorturl.at/botx5



Foundation
Digital Pathology

What Exactly Is an AI-Enabled Digital Pathology Platform?

Providing some much-needed clarification on a critical component of computational pathology adoption

By Nathan Buchbinder

It's time to break through the noise surrounding the AI-enabled digital pathology platform. As the case for AI adoption strengthens, thanks to growing evidence and regulatory clearances, more laboratories are beginning to deploy computational pathology. The AI-enabled platform has – quite rightfully – been posited as a future-proof means of bringing these applications into the workflow. It's hardly surprising that we're seeing a tranche of perspectives on what it is and what it should do. But how should laboratories make sense of these differing views to chart their path to success? Let's unpack the key considerations.

An AI-enabled platform sits at the center of your digital pathology operations

Whether it's in the form of detection and prognostic solutions, or in applications that automate and eliminate routine tasks such as quality control, computational pathology can only add value when it is integrated into day-to-day operations. An AI-enabled platform must deliver the robust functionality and compelling user experience needed to power your routine practice. Only then can it meaningfully introduce computational applications into the workflow.

An AI-enabled platform powers computational pathology across the end-to-end workflow

Integrating AI into routine operations is a three-step process, which spans the end-to-end workflow and should be driven fully by the platform to empower the pathologist. This means that the AI-enabled platform must first ensure that a computational application runs at the appropriate times. Keep in mind that many applications are not only subspeciality-specific, but also only intended for use on certain patient cases. A true AI-enabled platform helps to manage this mapping, saving time for everyone in the lab.

Next, the platform should execute the AI solution, giving the pathologist the option to run it automatically or manually. The pathologist may want to automatically execute a triaging solution on all relevant cases. However, they will likely want to manually run an application that evaluates a region of interest after they've made the necessary annotation. Finally, once the application has been executed, the platform must seamlessly display AI results where and when the pathologist needs them so that they can make a more informed decision. And that is where the rubber meets the road – or, put another way, where the pathologist can realize the promise of the AI.

An AI-enabled platform supports a broad portfolio of applications

It's inevitable that the modern laboratory will leverage a variety of computational solutions given that many of these applications are disease and use case-specific. Though the makeup of this portfolio will differ for each laboratory, some solutions will almost certainly come from a mix of AI companies, while others may be home grown.

The AI-enabled platform must offer native support for all of these applications, or it will fail to meaningfully incorporate computational pathology into the routine workflow. An open platform that integrates any AI solution will also continue to meet your needs as they evolve, and as new applications emerge.

Though many laboratories will understandably want to take small steps at the beginning of their computational pathology journey, it's important that you think big to set yourself up for long-term success. A true AI-enabled platform will scale with your laboratory, giving the professionals within the opportunity to realize the full promise of digital and computational pathology today and in the future.

Nathan Buchbinder is Chief Product Officer at Proscia Inc., Philadelphia, Pennsylvania, USA.

Filling a Global Gap

How technology can alleviate the impact of the global pathologist shortage

By Gerardo Fernandez

Disease detection, diagnosis, and treatment decision-making rely on information and insights from pathology, laboratory medicine, and radiology. All three are crucial contributors to patient management – but it's pathology that currently faces the greatest obstacles. Although most life-threatening illnesses, such as cancer, require the expertise of qualified pathologists, there remains a significant shortage of experts to provide essential diagnostic services.

A recent workforce audit uncovered global deficits in the number of pathologists worldwide (1). Although the audit identified over 100,000 pathologists practicing in over 130 countries, it also highlighted the fact that two-thirds of the world's pathologists are located in just 10 countries. In North America, there are an estimated 50 to 65 pathologists to every one million people. Other countries have only a few laboratory medicine professionals to serve millions of patients' healthcare needs – and still others have none at all.

The scarcity of pathologists coupled with a growing incidence of disease begs the question: how does this shortage impact patient care and what can we do about it?

The answer likely lies in technology – specifically the intersection of digital pathology, artificial intelligence (AI), and access to the Internet.

AI to the rescue?

In light of the severe and growing workforce issues, the healthcare industry has begun to investigate technological innovations that may be able to help. In fact, recent publications in pathology report on a wide array of applications to improve detection, increase diagnostic accuracy, and alleviate the workflow constraints inherent in the traditional manual reading of pathology slides (2).

One such solution is the development of slide scanning systems capable of creating a digital version of an entire pathology slide for subsequent analysis. Instead of needing to prepare a physical slide and mail it to a qualified pathologist for review, labs can now share digital images of samples with experts anywhere in the world. With little more than a stable Internet connection, pathologists from different laboratories or institutions can seamlessly evaluate slides and provide their diagnoses remotely. This distributed capability using digitized images allows patients in even the remotest regions to access high-quality pathology services that may not exist within thousands of miles of their location – just as they can already routinely access teleradiology.

New computational methods can also analyze pathology slides for abnormal histology characteristic of disease. This approach has been used both to triage slides prior to pathologist evaluation and to screen previously evaluated cases for potentially missed entities. This ability to combine digital pathology with computational analysis opens up the possibility of a "second look" – a quality control review of the slide – either locally or through a distributed network of collaborating laboratories. As a result, providers can improve the screening and diagnostic detection of disease, ultimately making the diagnostic process more accurate – and more consistent.

Finally, pairing digital pathology with evolving computational methods may allow us to standardize aspects of pathology that have historically been plagued by the inherent subjectivity of human interpretation, such as the grading of malignancies and chronic diseases. By mathematically characterizing histologic morphology, computational pathology promises to bring robustness and reproducibility to all established grading systems – and opens the door to expanding those systems' features, which have thus far been limited by subjectivity. This will perhaps be one of the technology's greatest impacts – affecting guidelines and democratizing treatment decisions across the globe.

Embracing the future

As new technologies continue to advance and demonstrate clinical validity, it is apparent that they can help address the shortage of pathologists and simultaneously improve pathology standardization globally. Embracing digital processes in the lab will yield more complete reports with a higher degree of standardization – regardless of location – and, ultimately, support better patient outcomes.

Like other industries and even other areas of healthcare that have adopted new technologies, pathology too has the opportunity to evolve. Our goal is to give every patient the most accurate diagnosis, the most appropriate treatment, and the most reliable monitoring possible. Data and AI will power continued personalization and keep the spotlight firmly focused on improved healthcare for all – no matter where in the world they may be.

Gerardo Fernandez is Co-Founder and Chief Scientific Officer at PreciseDx, New York City, New York, USA.

References

1. *A Bychkov, M Schubert, "Constant Demand, Patchy Supply," The Pathologist (2023). Available at: [TBC].*
2. *S Cohen et al., "Artificial intelligence in pathology," Am J Pathol, 191, 1670 (2021). PMID: 34391718.*

Scan Times and Hidden Costs

The challenges of using digital pathology in a lab environment

By Prasanth Perugupalli

Scanning is a vital part of the digital pathology pipeline. But what are the hidden pitfalls that stymie its success? And what are the cost implications? Find out in part two of our six-part "Barriers to Adopting Digital Pathology" series.

As pathology labs evaluate their options for adopting digital workflows, the most critical decision comes down to the total cost of this new adventure.

The workflow efficiencies that digital pathology can bring to planning, scheduling, and physician engagement are indisputably attractive. There is increasing chatter about AI-driven digital labs of the future, and labs want to deploy digital pathology – albeit at a small scale – so that they can "talk the talk" and plan their strategies for the future.

The science of making images is fundamental to digital transformation. Glass slides are converted into digital whole slide images, which can be stored, uploaded, and transported over the internet. A tremendous focus falls on the time and effort to make this digital data – and rightly so. One metric that is most misrepresented in the industry is scanning time. Vendor specs may not include the pre-analytics and prep time for the slides before they are loaded into the scanners, including checking for a misplaced coverslip or a label – or the time it takes to load the slide baskets – laborious tasks technicians silently dread.

Indeed, significant resources can go into making decisions on how to scan a particular specimen for first-pass success. Manual quality checks add at least one to two minutes per slide and will result in a call for a rescan if errors are found. Each of these steps add costs, mostly in the form of trained manpower. At what point does the total cost of digital adoption become prohibitive? Put another way, a great digitization solution is one that mitigates the need for pre- and post-scan intervention.

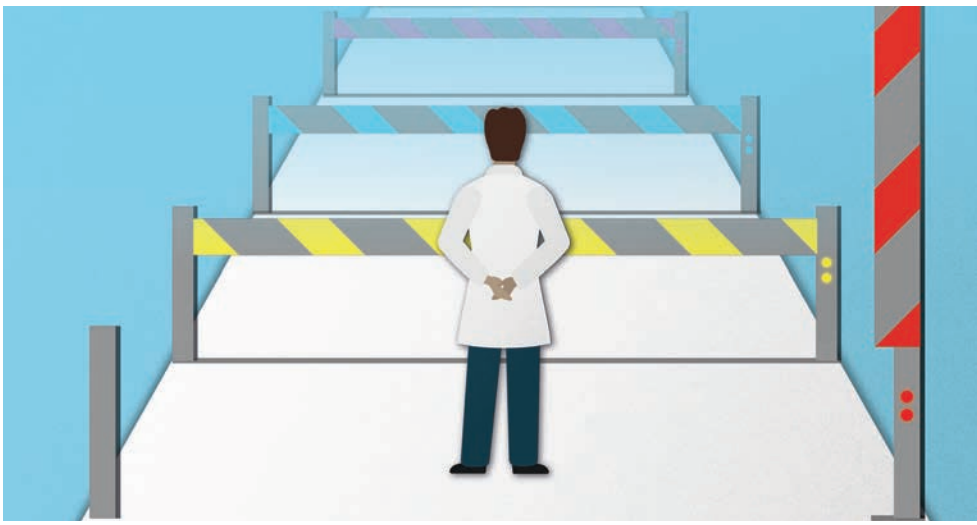
Scanning issues are exacerbated when images are fed into an AI pipeline. Labs may need to invest in additional QA tools as a precursor to the AI because algorithms have yet to achieve the low-level general intelligence to overlook certain bad patches on images.

Lab managers should model total cost of operation, hiring needs, material flow, and overall ability to go digital in their daily practice. Several early adopters have deployed excess capacity through the addition of more scanners, which does not seem sustainable.

A "Digital Pathology as a Service" business model is an option that puts the onus on the solution providers to help the lab managers achieve the optimal deployment plan. An analogy exists in the mobile phone industry, which realized at the onset of 3G services two decades ago that data-driven paradigms are complex. It was only when capacity planning and operation were left to the system providers, that maximum efficiencies in operation costs were achieved.

Prasanth Perugupalli is Chief Product Officer at Pramana, Cambridge, Massachusetts, USA.

"Lab managers should model total cost of operation, hiring needs, material flow, and overall ability to go digital in their daily practice."



Profession

Your career
Your business
Your life

From Reaction to Revolution: How One Pathologist Flourished with Remote Work

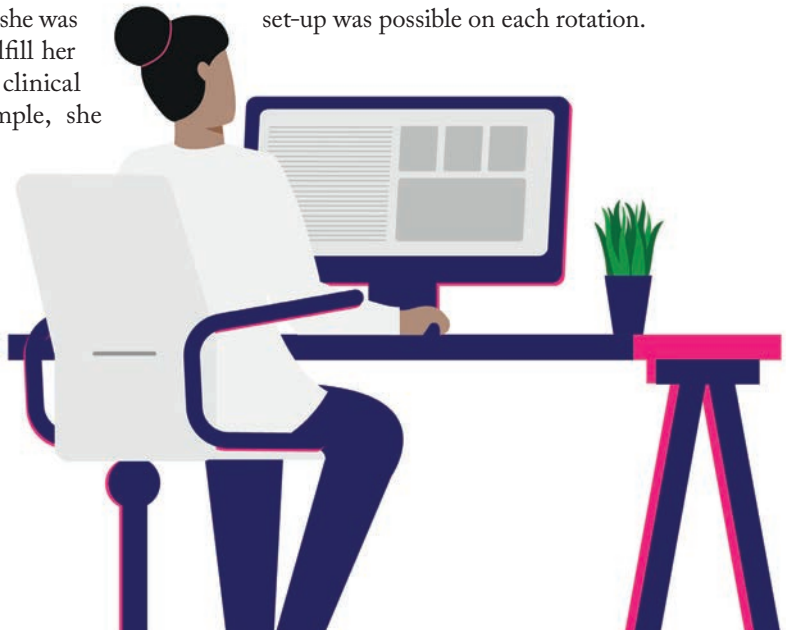
It all began with an allergy in the lab…

By Caitlin Raymond, Alexandra Rapp, Christopher Zahner

During her first year of pathology training, Alexandra Rapp had severe allergic reactions to numerous chemicals – including many used within the laboratory and hospital – such as formalin and xylene. This eventually led to a diagnosis of mast cell activation syndrome (MCAS), a condition characterized by inappropriate mast cell degranulation in response to various chemical stimuli. By winter 2020, during her second year of residency, she was no longer able to work onsite in the presence of most laboratory chemicals without experiencing debilitating reactions requiring intermittent treatment with prednisone. Coinciding with this, a new virus – SARS-CoV-2 – was emerging, leading to a national stay-at-home order and provisions from the American Board of Pathology that allowed remote training in certain circumstances, including those with certain chronic medical conditions. Suddenly, a vast portion of the population was working from home – including Rapp. On the forefront of the remote work revolution, Rapp blazed a new trail in medical training that could ultimately serve as a blueprint for the future of laboratory medicine.

At the beginning of the COVID-19 pandemic, Rapp was tasked with fulfilling all her pathology training requirements while working virtually from home. She worked closely with the administration of the University of Texas Medical Branch (UTMB) Pathology Residency Program and her supervising attendings to develop avenues in which she could complete all training program requirements. Using multiple tools, she was more than able to fulfill her residency duties. In clinical chemistry, for example, she was able to complete toxicology reports via the electronic medical record and participated in chemistry rounds via Skype for Business. On the coagulation service, she used electronic medical records to complete Diagnostic Management Team (DMT) assessments of patients with complex coagulopathies. Even on more challenging services, such as hematopathology, she was still able to fully participate and meaningfully contribute through the use of virtual tools, such as microscope cameras, as well as a platform that can capture static images of peripheral blood smears named Cell-a-Vision.

With creativity and open communication, she found a remote work set-up was possible on each rotation.



As she continued to work remotely, the benefits to her own wellbeing and the work of her institution became increasingly clear. With her chemical exposure symptoms now lifted, she found herself being more productive, resulting in numerous publications, virtual presentations, and virtual teaching experiences alongside her clinical work. The absence of a commute allowed her to devote previously lost hours to her work, and with no social distractions to take her attention, she remained focused throughout the day. With the relief of both stress and symptoms, her productivity flourished – to the point where she was actually covering multiple services at a time. Amazingly, Rapp – while still in training as a resident on other rotations – was involved in the creation and dissemination of patient-specific interpretive comments for COVID-19 test results for UTMB's COVID-19 DMT service. This experience more than adequately prepared her for her subsequent role as an attending, in which she would again juggle the competing demands of multiple services simultaneously, including the COVID-19 DMT service.

From an institutional standpoint, Rapp's increase in productivity was just one benefit. Creating a remote work option allowed UTMB to begin recruiting from a wider geographic talent pool. In fact, UTMB was able to recruit the best and brightest in pathology without the added burden of relocation. In the current laboratory workforce shortage, this helps UTMB retain staff as the institution can offer the bonus of location flexibility. A career in academic laboratory medicine often means relocation every 1–2 years – but UTMB is forging a new work model, relieving the burden of location, while obtaining the highest productivity from staff.

Of course, there can be some challenges to remote work. Without open communication, the structure of remote work can fall apart. Closing off channels can quickly lead to discrepancies regarding work performance expectations. Lack of communication can also be difficult emotionally for those who receive the bulk of their social support from their work environment. While working from a household with multiple family members or small children may be less isolating, this too can also have its own set of obstacles, notably through potential distractions that introduce difficulty in concentration and focus.

Rapp has faced all these challenges and more. But because there was open and consistent communication from the start of her remote work endeavors, she was able to complete all clinical responsibilities successfully and maintain strong relationships with her supervisors, co-workers, and mentees. She frequently communicates with her colleagues through email, chat, text, and video conferencing software. She has even developed her own methods of breaking the ice for new residents who are not used to engaging in remote sessions, often introducing her cat, Gracie (assuming Gracie does not introduce herself first!).

Rapp completed her residency training at UTMB in the summer of 2021, after which she immediately began her full-time position as a faculty member of UTMB's pathology department. Because she had garnered glowing reviews for her remote work as a resident, she was able to continue this arrangement as an attending clinical pathologist. She continues her work with the COVID-19 DMT service, signing out the majority of the interpretation reports and has also revitalized ANA test reporting at UTMB. To directly oversee technologists' antinuclear antibodies (ANA) testing and reporting work, Rapp uses SharePoint files.

Additionally, she leads education conferences via Microsoft Teams for the technologists to improve their recognition of rare and dual ANA patterns. Rapp also provides individualized interpretation reports of ANA and autoimmune serology testing for patients, maximizing her time to also educate pathology residents on the nuances of these types of tests.

"With creativity and open communication, she found a remote work set-up was possible on each rotation."

Her work on the COVID-19 DMT and ANA/Autoimmune DMT services has generated an approximately 328.5-fold increase in work relative value units to what was expected. All of these impressive achievements were made possible by enabling remote work capabilities for someone who would have otherwise been excluded from the lab – a point that highlights another profound benefit of remote work: enabling qualified persons with disabilities or physical limitations to meaningfully contribute to their fields when they might have otherwise have been prevented. This benefit has been widely reported, but to simply summarize – creating flexibility by introducing remote work allows for truly talented people to participate and contribute to the workforce, which can only benefit a growing institution such as UTMB.

Rapp remains a trailblazer for the pathology department. In the past two years, UTMB pathology has supported several other remote faculty members, which has helped further increase the diversity of its faculty. We hope Rapp's story – and her enormous success – can act as a blueprint for remote work for the field of laboratory medicine as a whole.

Skin Deep: The Stigma of Rare Skin Disease

We spoke to Christine Ko about the psychosocial effects on patients with rare skin conditions

By Georgia Hulme

Rare skin diseases affect over 6.8 million patients worldwide (1). Though all dermatological patients have to deal with managing physical symptoms, those with visible conditions face other harmful challenges, especially in an online world where social media judgment is rife.

In late 2022, Nancy Morel – a popular influencer with an undiagnosed, rare skin disease – was openly criticized by Azadeh Shirazi, a dermatologist with 1.9 million followers on TikTok. Shirazi, who called Morel's condition into question, labeled the 19-year-old as a "very talented makeup artist," and went on to say that her condition didn't seem "natural." The since-deleted video received thousands of views, and invited a great deal of discussion and debate, particularly around the topic of "medical gaslighting."

"This is a hot button issue for me. I hate it when I see medical professionals – many in my field – giving unsolicited opinions and advice about other people's bodies – bodies which they have not examined. We have the potential to really damage someone – especially if we're wrong," said Kelly Killeen, Plastic Surgeon at Cedars-Sinai Medical Center, Los Angeles, US (2).

In light of Rare Disease Day, we spoke to Christine Ko, Professor of Dermatology and Pathology at Yale School of Medicine, about the stigma of living with rare skin diseases, the struggles of misdiagnosis, and the toxic effects of social media.

What challenges are faced by patients with rare diseases?

One major challenge for patients with rare diseases is that there can be diagnostic delay or misdiagnosis. The rarer a disease is, the less likely the patient's physician will be familiar with it. Doctors think the same way as everyone else; there are cognitive biases that influence us all – and these are particularly relevant to rare diseases. Availability bias often means that a physician will consider more common diagnoses because they come to mind more easily. Premature closure occurs when a diagnosis is made without the consideration of other potential

MarginMarker™ Sterile Ink
The Global Leader for Tissue Orientation

possibilities. Confirmation bias is when there is a greater tendency to only look at supporting data – without considering data that may contradict a favored diagnosis. The dangers of misdiagnosis are broad, but chiefly – without the correct diagnosis – it is likely that the proper treatment and management plan will not be given.

How important is the doctor–patient relationship for the diagnosis and management of a rare skin condition?

The doctor–patient connection is key because patients really need to feel safe in order to share their worries, concerns, and personal tribulations. This is particularly important to people with rare diseases, where there may be a lack of information on the real-world, day-to-day experiences of a patient with the condition. So, it's very important for the patient to feel comfortable with raising issues that bring them difficulty, as there may be ways to medically manage such factors.

What responsibility do practitioners have in protecting patient safety – even on social media? And what are the effects of discreditation?

I believe we would all be better off if we reserve judgment and not assume that we know all that is going on from a singular video, post, or comment. Social media is filled with criticism; it is important for us all to remember that we shouldn't make hasty decisions. Cognitive bias affects us all, and one's response to social media is also influenced by availability, premature closure, and confirmation bias. Having a knee-jerk response to discredit a patient on social media may – or may not be – valid. Incorrectly discrediting someone on social media, however, leads to a whole host of negative effects, including misdiagnosis and its associated dangers.

What would you like other healthcare professionals to know about rare skin conditions?

There is no way for a doctor, even a truly excellent one, to have in-depth knowledge about every single disease. It is very important for doctors to partner with patients to ensure they receive the best possible care – for rare diseases, as well as more common ones – because every patient is unique.

References

1. *T Kuo et al., Scientific Data, 9 (2022). PMID: 36028515.*
2. *TikTok (2022). Available at: https://bit.ly/3xxabCq*

VECTOR™ SURGICAL

VectorSurgical.com | +1 (262) 798-7970

Infectiously Radical

Sitting Down With… Ayesha Khan, social justice activist and Clinical Microbiology Fellow, Department of Pathology, Vanderbilt University Medical Center, Nashville, USA

What led you into infectious disease?

I was born in an impoverished rural town in Bangalore, India. And I noticed early on that there was a disproportionate amount of people in my community specifically dying of a cold or drinking bad water. I came to realize there's a strong social-political context that explains why certain communities are disproportionately targeted by infectious diseases. And to this day it's the number one cause of death in the Global South.

I saw very early on that governments are terrible everywhere, but there are also people doing good work everywhere. I understood that a lot of communities were struggling with the same sorts of issues in terms of human health outcomes. Marginalized communities everywhere had similar health outcomes, died of similar things, and had higher morbidity or mortality for similar reasons regardless of location. This remained very obvious when I came to the US.

As I grew older, I had to deal with the fact that capitalist healthcare systems, almost everywhere, are profiting from sickness – without ever addressing the core root to social conditions that are making people sick in the first place.

What was medical school like as a neurodivergent person – and how has your experienced changed?

I think what's changed is my understanding of the colonization of very logical human responses to correction – or, to put it another way, the pathologization of divergence in general. Without going down the biological route, we exist in multitudes. And many of us are now even rejecting the label "neurodivergent" because it has more biological implications; instead there's a move towards "divergent" because you can't really separate the mind and the body. It's all one system. But you can't separate me from my environment either. So I've somewhat let go of the illusion of individuality. I'm always thinking about the impact of being socialized under oppressive systems and what it does to our global health.

Where do you focus your attention?

I focus a lot on trauma and how it manifests in our bodies and systems as infection, but also in how they trickle down. I'm also focusing on decolonizing medicine, and specifically psychiatry because I think it's a beautiful example of an entire branch of medicine that's based on social constructs. It's made up of diagnostic criteria that are impossible – even today – to validate with biomarkers. In infectious disease, I do actually have to culture something to be able to say what the etiology is. But in the case of psychiatry, it's just an arbitrary list of criteria and boxes that we have to check. What hit me is realizing that medicine pathologizes the individual right to fall out of line in some way.

So you think society, politics, health, and science are inextricably intertwined…

I believe everyone, regardless of what they do, has to ask themselves about the choices they have to make. For example, if I care about providing care, am I really achieving that in the systems that I'm working within? Am I using the tools offered to me by the system? So far, the answer has been no. So much of my work has been focused on looking at healing through a much more politicized, collectivist lens.

One pattern that I've recognized is that capitalism reduces everything to overly simplistic binaries – good and bad, right and wrong, positive and negative. And it's essentially the same in the medical system. Our approach to healthcare is reductive – even though there's plenty of research to support different kinds of public health measures.

There's a reason that medicine around the world focuses solely on public and community halls. If you think that we really care about keeping people healthy, it makes sense to say that we need to provide them with the basic social conditions that are required to have a baseline level of health, right? Everyone needs food, water, shelter, and community. So the answers are already there.

In terms of antimicrobial resistance, how scared should we be for the future?

Most AMR is not due to overuse of antibiotics in hospitals, but overuse of antibiotics in agriculture – industrialized capitalist factory farms that mass produce brutal abuse of animals, because they are also objectified. The fertility of soil everywhere is dramatically decreasing because we're pumping herbicides and pesticides into the ground because it's the best way to maximize yield.

Unless we acknowledge that our health is inextricably tied to the health of every living being within our ecosystem, I don't think we're actually going to be able to fight or defeat AMR. We need to get to the point where we see ourselves as in sync and in collaboration with microbes.

Do you see any sort of professional pushback for being politically vocal?

Until three or four years ago, I was very much the "good diversity" hire. It was a good story. Institutions loved me because I was the person who came from nothing to climb the colonial ladder. My work today has really required me to step back from all of that; I no longer speak on career panels (because I'm no longer invited to do that sort of stuff!). The political work for sure has limited my opportunities in terms of where I can apply for fellowships. But it's also led to me having to do a lot more work on myself to be successful.

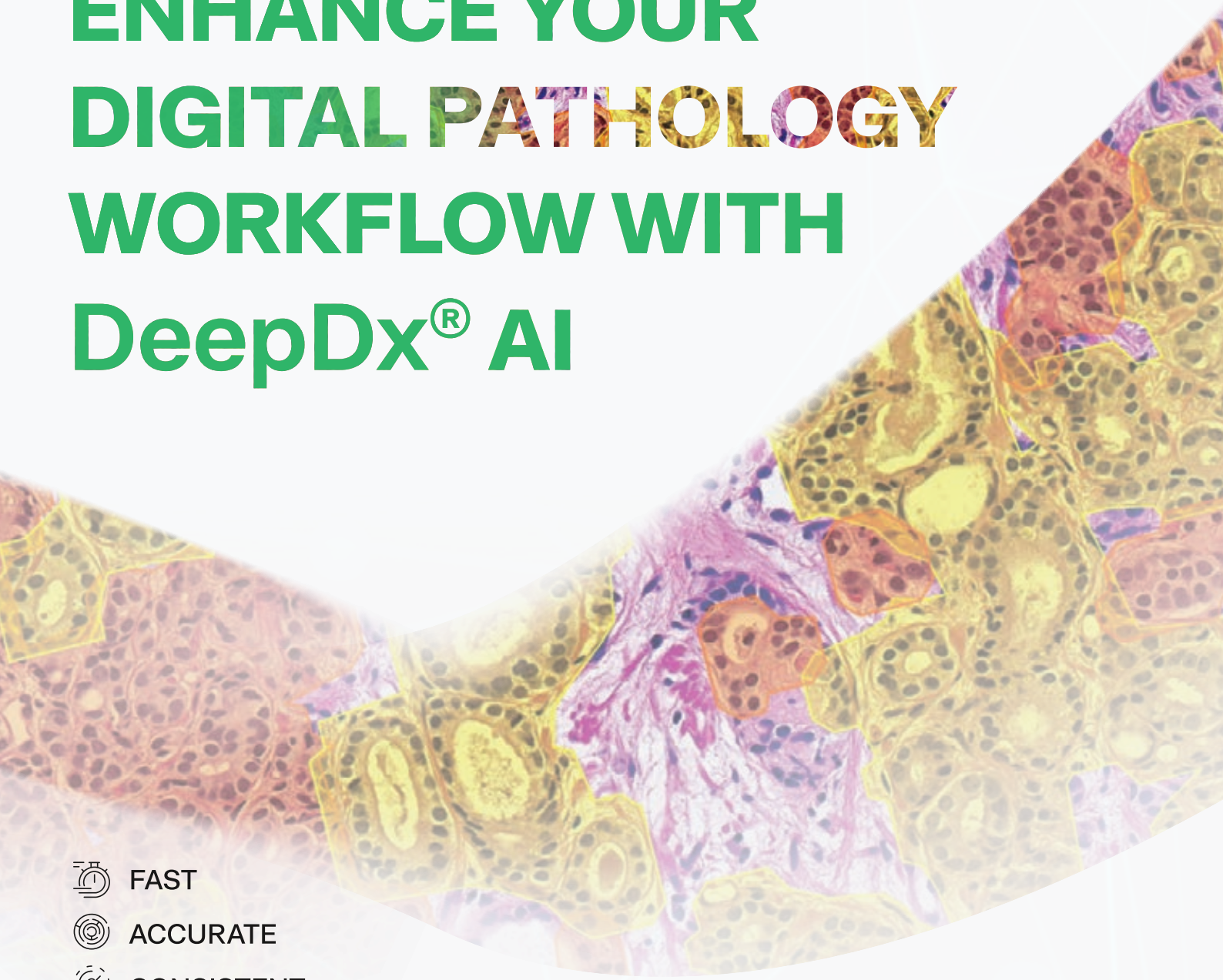
If you could say one thing to the entire world, what would it be?

We need each other. We should care for each other. We should take care of each other. We should protect each other, keep each other safe, and feed each other. Whichever way you can, embody our right to interdependence.

deepbio

www.deepbio.co.kr

ENHANCE YOUR DIGITAL PATHOLOGY WORKFLOW WITH DeepDx® AI



- FAST
- ACCURATE
- CONSISTENT

700K+ PROSTATE CORES ANALYZED TO DATE AT US CLIA LABS.

Contact Us

sales@deepbio.co.kr
+82 70 7703 4746

Follow Us

LinkedIn: Deep Bio Inc.
Twitter: @deepbio_ai

CE Ministry of Food and Drug Safety


AMP
EUROPE
2023
Milan, Italy
June 18–20, 2023
NH Milano Congress Centre
www.amp-europe-congress.com
REGISTER NOW
AMP
Association
for Molecular
Pathology