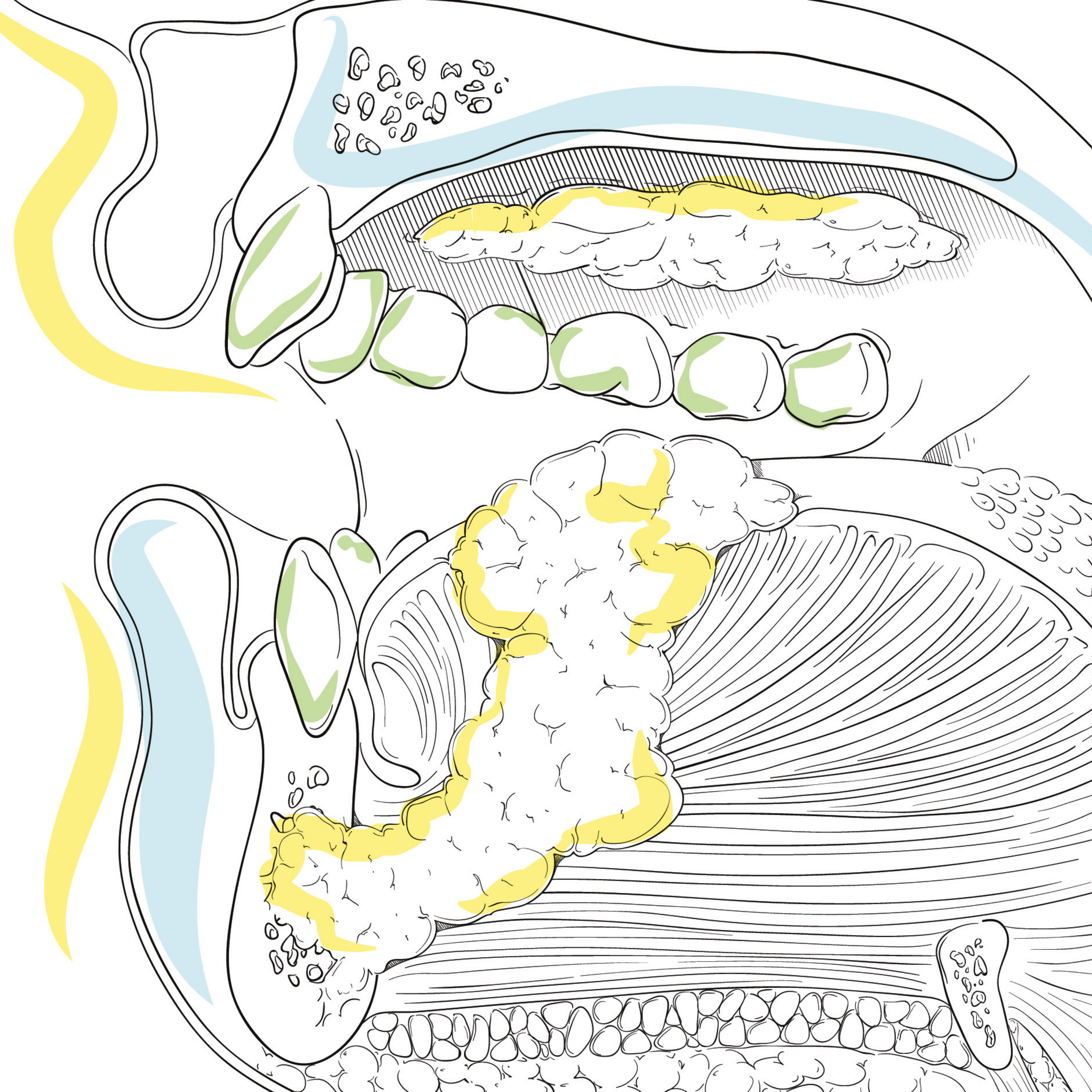


THE ART OF GROSSING

Gross examination underpins all diagnoses based on tissue samples – but is this vital skill given the credit it deserves?

It seems almost overly simplistic to say that every tissue diagnosis begins with a gross examination – and yet, many who think about diagnostic medicine picture screens, stains, and sequences, but overlook the study of tissue samples using only their own hands, eyes, ears... and occasionally noses. What exactly is the fine art of grossing? How is it performed? And why are some so eager to move past it when, in fact, the gross examination may be the most important – and indeed the most beautiful – investigation they perform?



FEATURE

The Art of the Biopsy

Finding beauty in the grossest room in the hospital

Looking around the surgical pathology lab, the uninitiated might think that the term “gross room” is self-explanatory – used to describe the plethora of specimens you might see strewn about the lab. After all, from biopsies to multi-organ resections and everything in between, you may see things that would give Wes Craven nightmares. Despite appearances, the term “gross room” does not, of course, refer to the awful things you might find in the lab, but to the act of gross examination – the macroscopic examination of organs, describing the size, shape, color, and consistency of tissue. It requires the use of your five senses (or rather, four – taste being the exception) and nothing more. For context, the antithesis of this is the microscopic examination, which requires the eponymous tool.

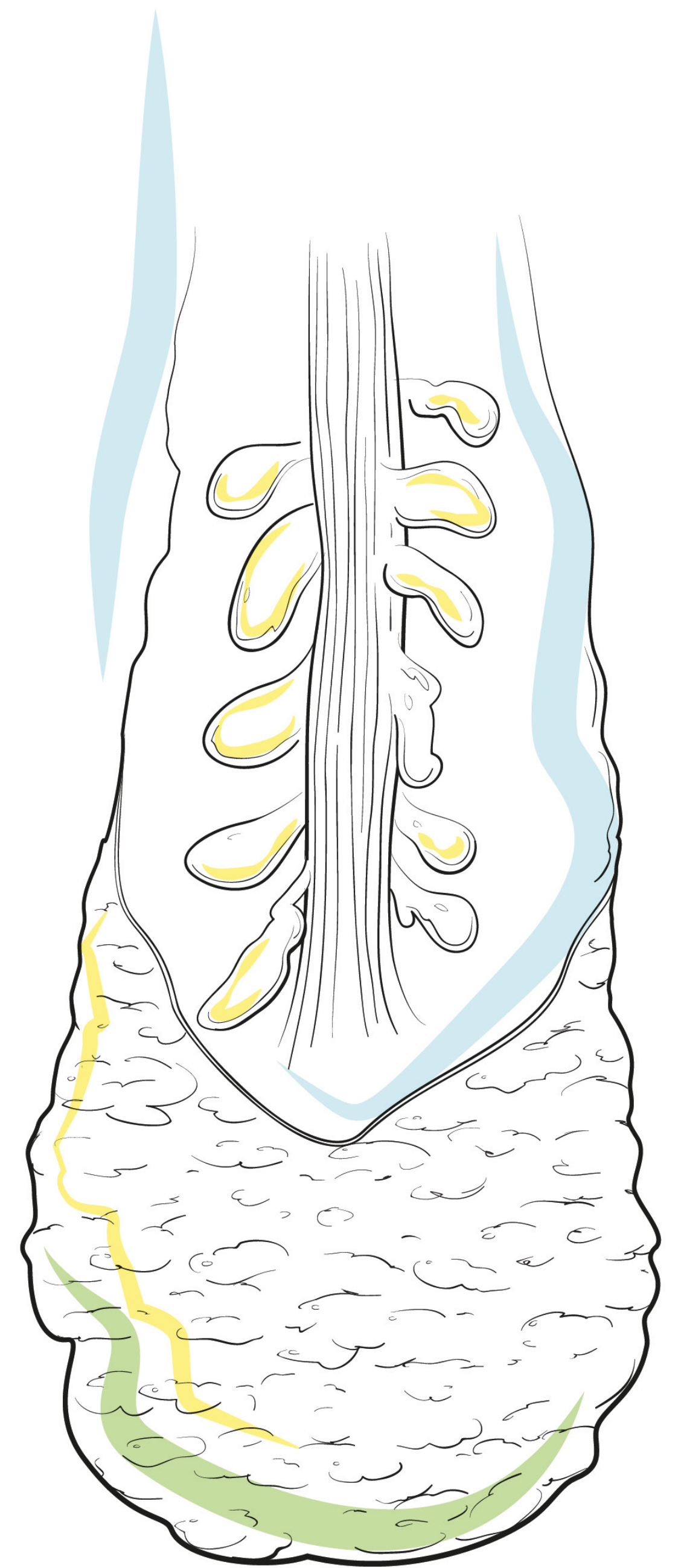
Making sense of chaos

To some who walk into a gross room, the lab is nothing more than organized chaos. Technicians type away at computers as they accession specimens. Pneumatic tubes drop in the background, dumbwaiters arrive and leave with the “ping!” of a bell, and doors constantly open and close as specimens are dropped off. All the while, surgeons are coming in and out of the lab wanting to orient specimens or to know where the results are on their frozen section. Residents scurry back and forth, almost as if they are partaking in a strange, ritualistic dance to appease the surgical pathology gods (all hail Virchow). Between grossing, frozens, and answering pages, residents are in a constant whirlwind of movement, trying to stay ten steps ahead in the hopes of

finding a second to use the bathroom or grab some food. Pathologists’ assistants pace the gross room as if it is a battlefield and they are commanding an army, rotating between grossing a specimen, helping a resident, and answering a question from a technician. Instruments are making all kinds of sounds, there are people talking at a bench about the best way to approach a specimen, and Stryker saws and band saws intermittently cry out, “Hear me roar!”

Despite the inherent “grossness” and commotion, there is immense beauty to be found in the surgical pathology lab – if you know where to look. The stainless steel benchtops are adorned with vials of ink in every color of the rainbow, displayed like a “House Pathology” banner. Specimens large and small are laid out on these benches, waiting for an artist to come along and perfect their craft. As the overhead light strikes the specimen, a practitioner of this art can manipulate the specimen in such a way as to show the relationship of the tumor to various structures and, simply by moving the specimen so that the light hits it at a different angle, a new set of structures can be appreciated.

Being able to describe the color of a specimen using ROYGBIV is no longer sufficient, because its variegation requires the artist to precisely, but succinctly, differentiate between yellow and tan, red and brown, grey and white. What does it mean to measure a tumor as 2.3 versus 2.4 cm in greatest dimension? Does a discrepancy as small as 0.1 cm really mean anything? Is it okay to just round to the nearest half or even whole centimeter?



“There is a trend in such programs to have residents gross less so that they can spend more time at the microscope”

Gross examination, often just called “grossing,” is an art form that is all too often overlooked as nothing more than a barbaric act – but there is value in it. There is beauty in something as simple as a stroke of the scalpel blade or the flick of an applicator stick as ink is applied to the rim of the resection margin, stopping just short of the mucosa. With that same overhead light shining off the scalpel, an expert artist can use these blades with such fine precision as to cut a piece of tissue only a few millimeters thick, yet still maintain all the appropriate margins and structures. To these artists, the scalpel blade is an extension of themselves. It is this blade that allows for the precise, yet complex manipulation of multi-organ resections that, to outsiders, may appear to be nothing more than an amorphous piece of tissue.

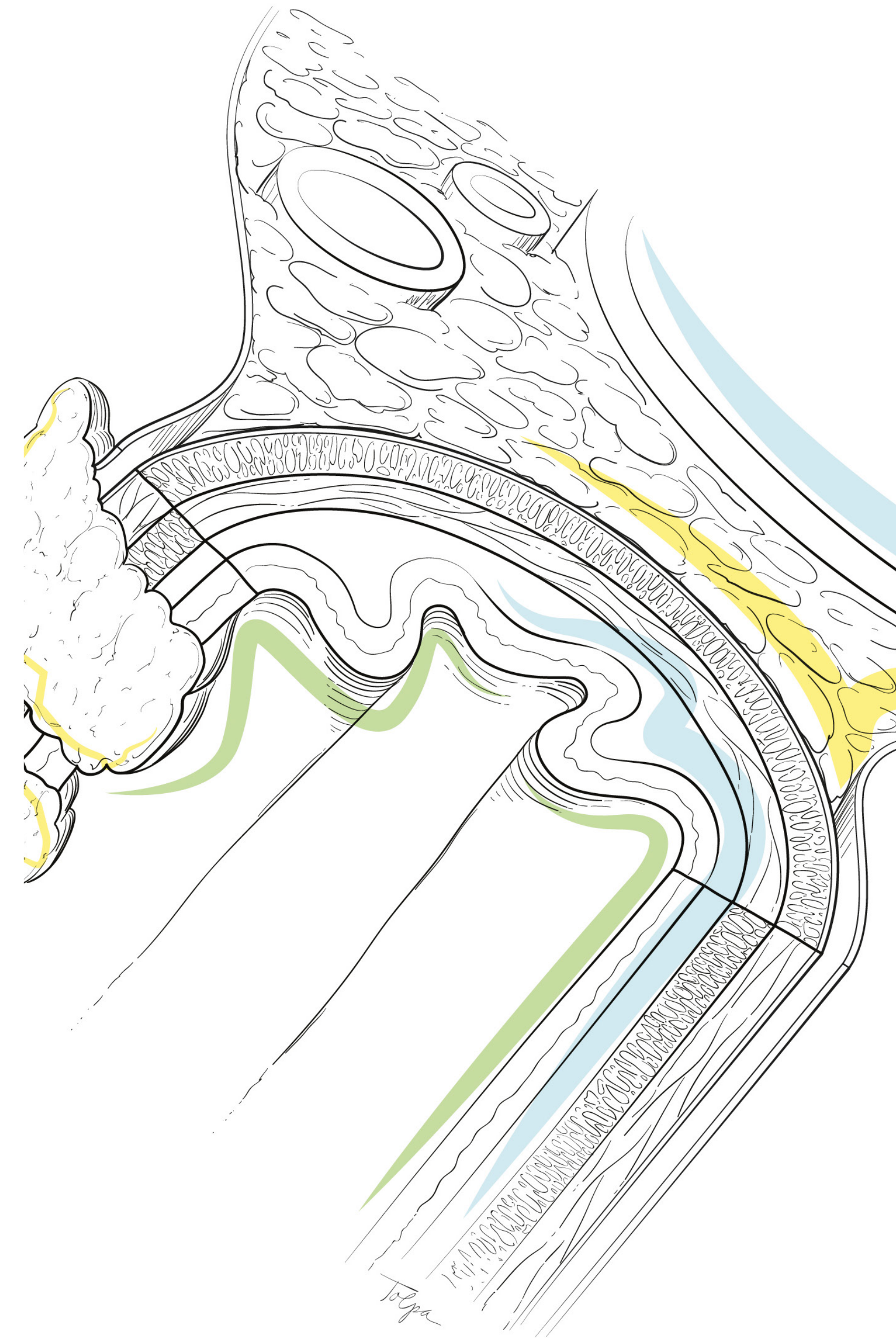
But this art form – this beauty – is dying. Just as medicine is constantly evolving, so too do pathology residency programs change and grow. There is a trend in such programs to have residents gross less so that they can spend more time at the microscope. Between writing papers, collecting data for research, and fine-tuning posters, residents are finding it harder to balance grossing and microscopy. Most pathology residents, if asked, would want more time at the microscope; few, if any, would ask for more time grossing specimens. And that’s understandable. If residents spend more time reviewing cases under the microscope, they will feel more confident in their ability to sign out cases when the time comes. For those pursuing surgical pathology, this will make the transition to becoming an attending much smoother. At what cost, though, do we take residents

away from grossing? This is a delicate balance that must be maintained to ensure that residents are leaving their programs adequately trained in every respect. One of the first things to feel the burden of this transition is the reduction – and eventual elimination – of biopsy grossing in residency.

The value of grossing

Some medical students have said that they do not want to apply to certain pathology residency programs because “they make their residents gross biopsies and that is a red flag.” Online medical student residency forums suggest that all such residency programs should be avoided.

Although some in these groups may claim to understand the importance of the biopsy, their willingness to overlook the importance of grossing suggests otherwise. It goes without saying that biopsies are arguably the most important specimens you will receive in a surgical pathology lab. The “more grossable” organs are resected because a biopsy has already been performed to provide a diagnosis. Biopsies help determine whether a mass is benign or malignant, whether a specimen needs to be resected, and whether further treatment is necessary. The results of a biopsy can help support and comfort a patient in their time of need and, irrespective of outcome, radically change their future.



Grossing biopsies is not just about putting pieces of tissue into cassettes for processing. It is about understanding why the treating physician, based on the patient's history and presentation, decided to take a piece of tissue from this site rather than any other. It is about differentiating why certain stains are ordered up front on one kind of biopsy, but not another that is taken from the same exact location on a different patient. It is about understanding how, even in tissue measuring only a few millimeters, you can determine a mucosal surface, a resection margin, inking, and even orientation. The tiniest details on the smallest piece of tissue can be overlooked by someone who does not take into account the art that goes into grossing – someone who may not understand how that single piece of tissue can convey an overwhelming amount of information.

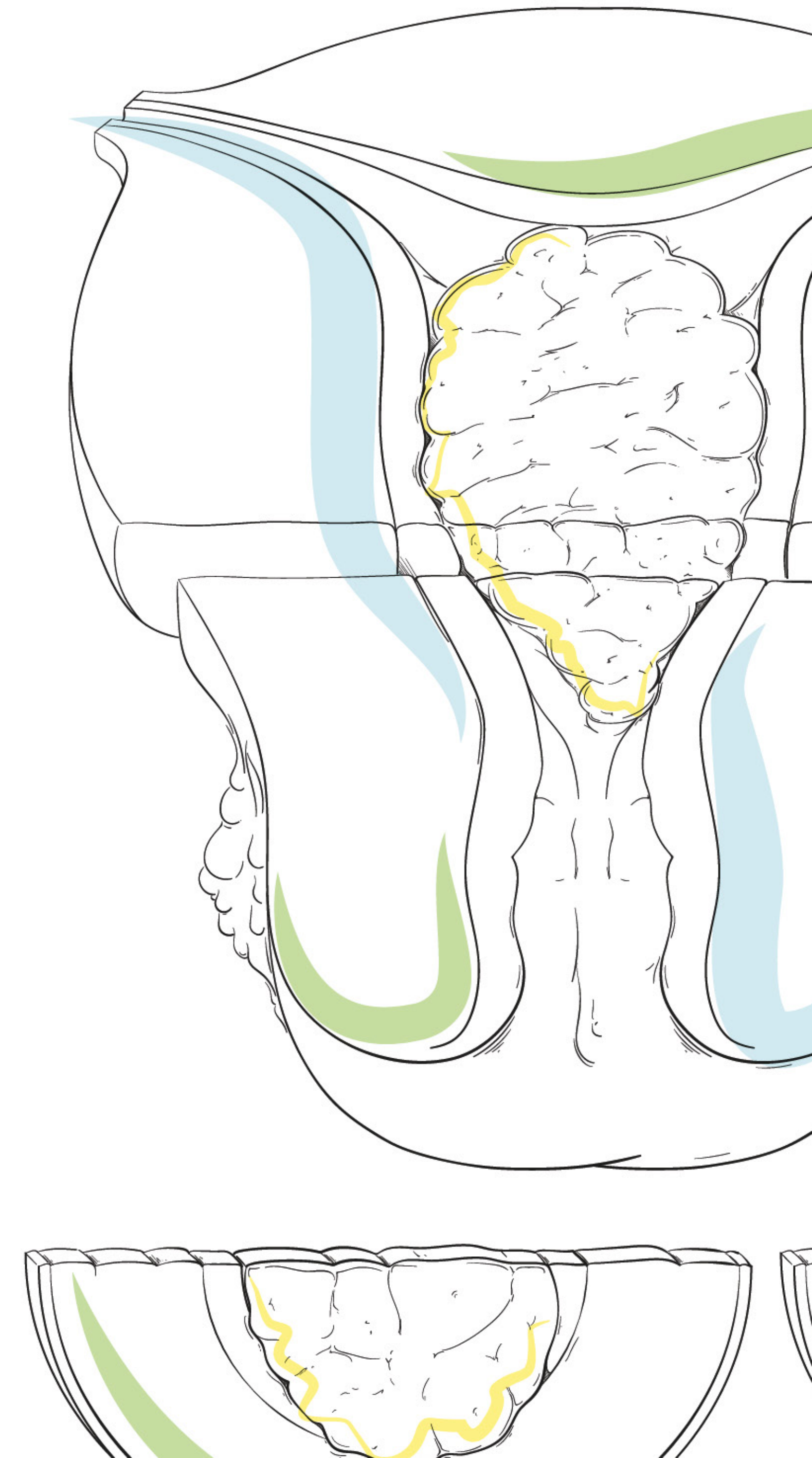
We need to re-instill in our trainees' minds not only the importance of the biopsy, but also its beauty. If you tell a resident that they need to start grossing biopsies again, but you don't take the time to explain to them what can be learned simply by looking at a biopsy, then you have failed before you begin. **We, as humans, innately want to learn. We want to teach and, in turn, be taught.** We want to take pride in what we do and know that our actions have an impact. If a resident takes a rectal biopsy for an infant patient with a history of constipation, they might know that there is a possibility they are looking for Hirschsprung's disease. Will they, however, know by looking at the biopsy that it needs to be embedded a certain way – or that, more likely, there may be a piece of submucosa attached that will help them determine how it should be embedded? If a resident were to see this rectal biopsy, would they even know to look for submucosa in the first place? If they did see the submucosa, would they ignore it as just an aberration of the mucosa and nothing more?

The key to re-establishing the importance of grossing biopsies with residents is to have them take pride in that tan-pink “scrap” of tissue, and know that what they are doing will affect someone's life. We need to get residents excited about finding that submucosa to the point that, when they do find it, they feel a sense of accomplishment and say to themselves, “I got it!” I have seen this excitement on residents' faces when they are able to orient a difficult specimen, or when they find a ureter on a cystoprostatectomy specimen. Why should that excitement and sense of accomplishment be limited to complex cases when the same sense of elation can be felt with an everyday biopsy?

Patients may not know what we do in the surgical pathology lab. They go into their doctor's office, have a biopsy performed and, magically, a few days later, they have their answer. They do not know how the doctor got that answer, or that there was a team of highly trained, highly motivated professionals working behind the scenes to provide it. We are the unseen healthcare providers critical to their diagnosis. This is unlikely to change soon, but we need to make sure residents know this, and remind them of why we went into medicine in the first place: to help patients. We may not be the poster children of medicine, but what we do in the surgical pathology lab is important. Perhaps by reminding our residents of the beauty that can be found in the gross room, we can slowly start to change their frame of mind. That tan-pink piece of tissue sitting at your bench has a hidden beauty to it that is just waiting to be uncovered.

Cory Nash, Pathologists' assistant in the Department of Pathology at the University of Chicago, USA.

**REFERENCES AVAILABLE ONLINE AT:
TP.TXP.TO/GROSSING**



FEATURE

Behind the Grossing Guidelines

The Macroscopic Examination Guidelines
from concept to delivery

As a pathologists' assistant, an evolving "lab hero" (1), I serve as a key provider in the medical laboratory diagnostic continuum. As part of that role, I provide critical diagnostic information through the macroscopic gross examination, evaluation, and dissection of surgical cancer cases. That information provides pathologists with essential diagnostic information that, in turn, yields prognostic criteria to dictate treatment protocols and outcomes.

To align with the highest standards of patient care, the information we provide at the gross bench must be compliant with the criteria established by both the American Joint Committee on Cancer (AJCC) Cancer Staging Manual and the College of American Pathologists (CAP) Cancer Reporting Protocols. Recognizing quality patient care as a primary core value, the American Association of Pathologists' Assistants (AAPA) spearheaded a project to provide a source document integrating both sets of established criteria for those "involved in the macroscopic handling of surgical cancer cases" (2). The AAPA Macroscopic Examination Guidelines: Utilization of the CAP Cancer Protocols at the Surgical Gross Bench, colloquially known as the "Grossing Guidelines," is not only a wonderful practice aid and teaching tool, but also a catalyst for many new relationships between the AAPA, AJCC and CAP. The guidelines have strengthened professional relationships among the vast network of contributing volunteer PAs and validated our long-sought-after sense of belonging to the anatomic pathology and laboratory medicine community (3).

Laying the groundwork

I have had the honor of serving alongside over 100 volunteers (and counting) in developing this immense working tool. I serve as Art Director and Illustration Liaison, a position I have held since 2012. The first edition of the Grossing Guidelines was a six-year labor of love and commitment – and a true marriage between my passions and professions as a medical illustrator and pathologists' assistant. The guidelines were conceived in 2011 by a number of AAPA Board of Trustee members, including Editor-in-Chief Jon Wagner, the foremost driver of the project (4). Their vision was to provide a standardized, systematic approach to support medical professionals engaged in the macroscopic examination of cancer resection specimens (2).

The scope of this project was beyond anything the AAPA had previously attempted. With 67 protocols to cover, an initial call for volunteers went out to the membership. Contributions would be "non-paid, time-intensive, and peer-scrutinized... however, there was an overwhelming response" (5). Each of the protocols required authors, content reviewers/editors, illustrators, publishing editors, managing editors, molecular considerations editors, technical support, and project managers. I've said before that what sets those who choose the PA profession apart is our variety and versatility (1) – and the Grossing Guidelines was an endeavor that demanded the versatility our profession offers.



“My vision was to facilitate the creation of world-class, innovative illustrations the anatomic pathology community hadn’t seen before.”

The guidelines mirror the applicable CAP Cancer Protocols and include molecular and immunohistochemical considerations. Each guideline includes procedures and general anatomic considerations, content that address ambiguous terminology, and methods and procedures for grossing cancer specimens. Each section is color-coded based on the AJCC tumor, lymph node, and metastasis (TNM) schema.

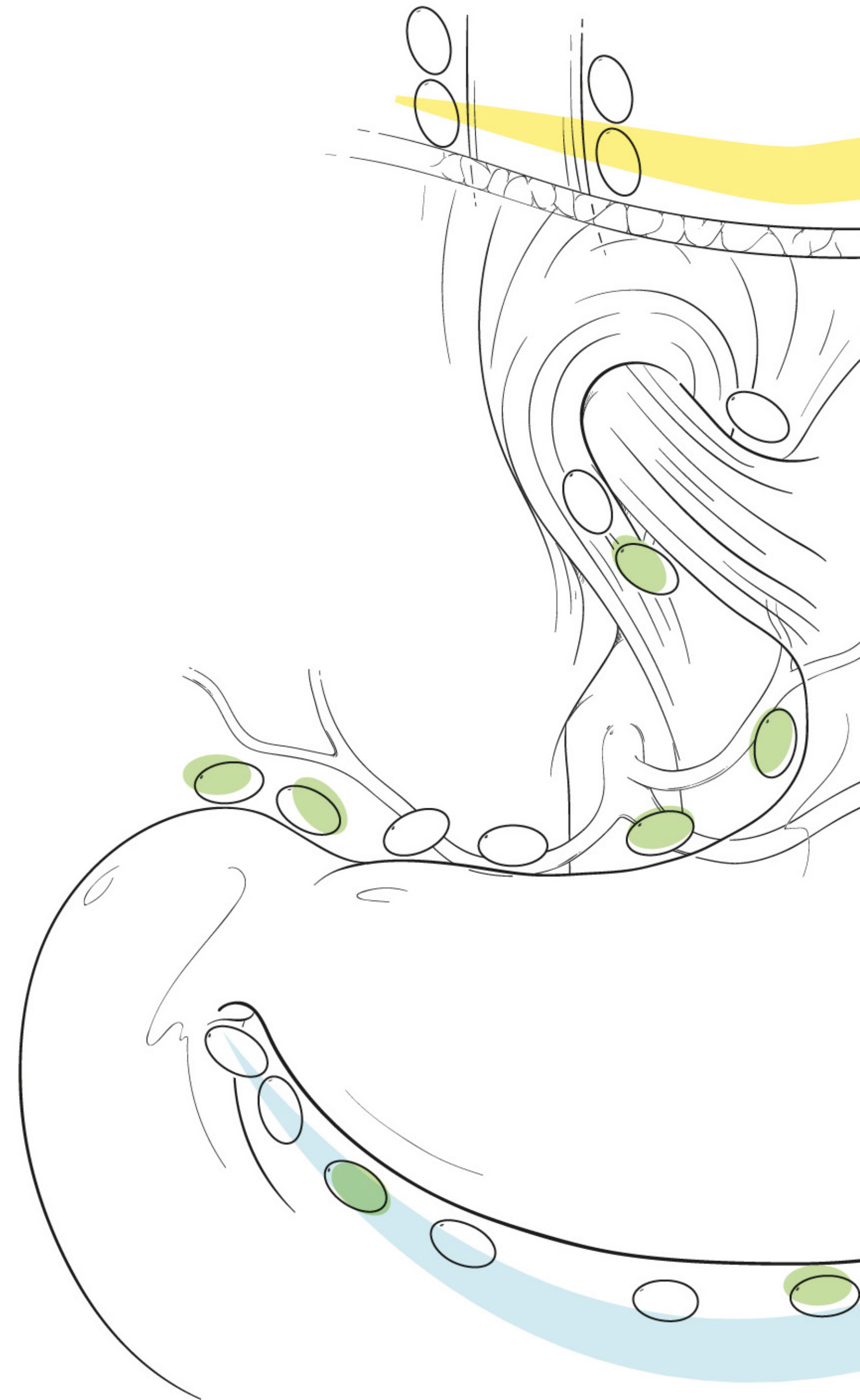
The making of a guideline

The vaginal protocol was chosen to be the proverbial guinea pig. A shorter and less commonly used protocol, it seemed ideal for the first flex of our Grossing Guidelines development muscles – so we assembled a small team of authors and began developing content. Endless emails and teleconferences ensued. I served as the illustrator for this first protocol. Everything was a journey through trial and error – content development, editing, formatting, illustration creation, basic organization skills, and even navigating the novel cloud file-sharing system we chose to use. Even after we had the first draft in place, we still faced seemingly endless revisions, additions, and modifications.

Once the vaginal protocol was complete, we began development on the remaining protocols. That step opened the project up to our large volunteer base – almost 10 percent of the AAPA’s total membership! Once content for each of the protocols was generated,

a content review team was organized and acted as an editorial board. The group consisted primarily of PAs based out of the Mayo Clinic; they assembled in conference rooms before work to scrutinize each protocol, dedicating countless hours to finessing the massive influx of content.

Then came the need for the remaining 90+ illustrations. I drafted an illustration request form, which the primary section authors used to communicate the needs of their individual guidelines. My vision was to facilitate the creation of world-class, innovative illustrations the anatomic pathology community hadn’t seen before. We interviewed and reviewed the portfolios of numerous illustrators, ultimately choosing to collaborate with a professional medical illustration team – Tami Tolpa and Matthew Brownstein. Once the requests came back from the section authors, I gathered an immense amount of reference material, including CAP protocols, AJCC staging criteria, photomicrographs, gross images, radiographs, sketches from section authors, and anatomic atlas illustrations. In fact, a large part of the Netter CIBA collection of medical illustrations adorned my coffee table for well over a year! With that information, I developed revised requests easier for the illustration team to understand. Using a web-based project and file management system, I oversaw the creation and revision of every illustration needed for the guidelines. The artists created an amazing collection of beautiful illustrations, making the Grossing Guidelines truly come alive.



Once the illustrations were complete, I partnered with the AAPA executive team to oversee their placement in the guidelines, textual annotations, labeling, and overall layout. We also relied on the administrative expertise of the AAPA executive team to manage publication. As the project progressed, we added a vast network of specialized editors, each in their respective specialties. Additionally, since the development of the second edition, we have continued to consult with CAP pathologist expert reviewers and incorporate their comments, suggestions and edits. The process of content development, editing, illustration creation, layout, and final publication may seem simplified as you read them on this page – but I assure you, it was an organic and sometimes overwhelming process, taking many years to streamline the coordinated efforts of such an enormous and high-caliber project. The dedication to both our patients and our profession are evident in the work our tireless group of volunteers continues to devote to this project.

And the story isn’t over yet; the Grossing Guidelines are continually evolving. We currently use the second edition, but the third revision is already in development. This new edition will have a host of significant additions (6), including:

- macroscopic photographs
- macroscopic structured data reporting
- a recommended block allocation key
- specimen handling and dissection guidelines
- an educational/background information section
- TNM criteria in appendices
- ancillary testing information
- frozen section considerations, and
- sample gross narrative descriptions.

The evolution of the Grossing Guidelines continues to align with AJCC Staging and CAP Cancer Protocol revisions. In particular, the second edition featured significant changes to the AJCC lung cancer staging, which affected both written content and illustrations, and required significant modifications to the protocol.

More than just a protocol

The Grossing Guidelines has served as a conduit, broadening inter-professional relationships in the anatomic pathology realm and opening active dialog between the AAPA and both CAP and AJCC. Since the release and subsequent revision of the guidelines, the AAPA now serves as an Association Member of the AJCC. Our relationship with CAP has also strengthened, particularly through our relationships with expert pathologist reviewers and staff. CAP has been instrumental in driving this project forward, and we are immensely grateful for this continued support and recognition.

I would be remiss if I did not thank the hundreds of volunteers who made this amazing vision come to fruition. To name them all would go beyond the constraints of print publication; however, there are a few who have served not only as key contributors on the Grossing Guidelines, but also as source material for this article: Jon Wagner, Editor in Chief; Mike Sovocool, Editor – responsible for recruiting me so many years ago; Connie Thorpe, Project Manager; and Michelle Sok, AAPA Executive Director. I would like to thank every one of these people for their unwavering commitment and diligence to our patients and profession.

Echoing sentiments expressed by Jon Wagner, this has been a profound experience, energizing and inspiring our practice habits (4). I look forward to future editions of the Grossing Guidelines with eagerness and will always be proud to contribute to this world-class teaching tool. I know that, for many years, the guidelines will set the standard for the macroscopic examination of cancer resections and, ultimately, drive the best possible patient care.

Jesse McCoy, Pathologists’ Assistant for Hampton Roads Pathology at Chesapeake Regional Medical Center, Chesapeake, Virginia.

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