From the President’s Desk

Pathology in a big data world

October 2022—When I was in pathology training back in the ’90s, physicians carried around an index card for each patient, with all of the information we needed to know about them easily covered in that small space.

Today, the practice of medicine—and specifically the practice of pathology—looks very different in the era of big data. Of course, we still have to fill our traditional roles: making the correct diagnosis for individual patients and ensuring the integrity of laboratory results. But increasingly large data sets inform the diagnosis in individual cases and, at the same time, individual cases become data points in large data sets that inform the health of populations.

Beginning in the 2000s with the value-based care movement and accelerating with the rise of high-parameter tests, we find ourselves having to be data scientists as much as physicians. We are being asked to incorporate data-heavy tests and pipelines, some of which require clinical decision support algorithms that demand a certain fluency with more sophisticated software. We find ourselves in the new position of considering population health in addition to patient health, an element that can involve predictive analytics and data mining.

For those of us who started our pathology careers in the days of the patient index card, this has been a really big change. In oncology, for example, we used to rely solely on morphological and immunophenotypic subtyping to help guide treatment decisions. That is no longer enough. Pathologists today have to be familiar with the genetic signatures of tumors and the various therapies each signature might imply to help their clinician colleagues in the treatment selection process.

Dr. Volk

This new paradigm has an impact both on individual patients and entire patient populations. On the patient level, we can tailor treatment guidance better than ever thanks to the tremendous amounts of very specific data we gather on the way tumors will behave, or the way diseases may progress. On the population level, the evolution of electronic health records (and their somewhat improved interoperability) has given us the opportunity to look across our patient community to gain new insights.

At all levels, the data making these advances possible is largely generated by pathologists. As more data-driven algorithms are used in hospitals to make important predictions about patients, it is essential that pathologists have a seat at the table to ensure the information is being used correctly. So much about whether these algorithms make sense and will have the desired effect pertains directly to the laboratory data we produce or use.

Consider the common scenario of algorithms designed to flag patients at risk of developing sepsis. If lactic acid levels are interrogated by point-of-care testing, the clinicians or nurses who run that test may not be aware that data is not uploaded to the hospital’s network until the point-of-care device is docked back into the main system. If docking doesn’t happen immediately after testing, then any life-saving alert for the patient could be dangerously delayed.

The Rothman Index is another good example. This index of clinical severity, which takes into account more than two dozen data points every hour to predict when a patient might be at risk of rapid deterioration, factors in things like WBC count, clinical chemistry values, and vital signs. Laboratory-generated results are important components of the Rothman Index and pathologists should have a role in deploying the algorithm to ensure that all inputs are working properly.

Because pathologists are trained to think about how these systems work and how the data flows, we are going to be able to quickly identify weak spots where an algorithm might fail and help to create protocols to overcome those problems. Some of those issues may be simple, with practical solutions such as docking the point-of-care device after each use, while others may be more complex, requiring a deep understanding of reference ranges or other factors. For establishing new algorithms, the point of view and clinical expertise of pathologists are very useful.

If you're looking for ways to get up to speed on the latest in augmented intelligence and machine learning or incorporating big data tools into your practice, I encourage you to explore educational resources from the CAP. There are a number of CME courses, and this topic is well represented in the CAP's annual meetings too. These resources are intended to help pathologists wrap their arms around this new role we have in augmented intelligence tools, population health practices, data-rich tests, and more. These educational sessions are an excellent way to feel more confident in using big data for pathology-based patient diagnosis and clinical management.

Dr. Volk welcomes communication from CAP members. Write to her at president@cap.org.