

Sliding into the future

New device improves efficiency, automates slide preparation and adds AI to pathology.

By Eric Butterman

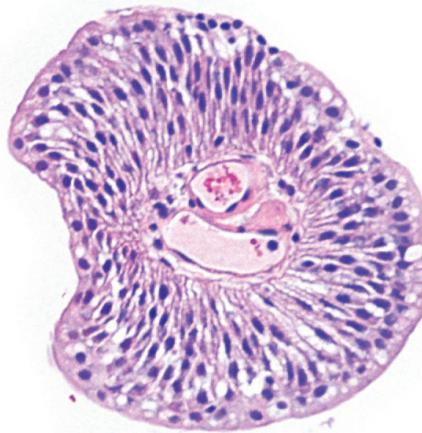
A foundation of pathology, histology slides are ubiquitous. Even small health systems spend hundreds of thousands of dollars a year on slides alone.

Now, Northwell Ventures has identified a new mode of manufacture that could potentially save millions for major healthcare providers while improving diagnosis.

Along with Clarapath, a Manhattan med-tech company, Northwell is investing capital and medical expertise to develop a unique, automated slide preparation unit called SectionStar.

Born from basic science

SectionStar's genesis was at Cold Spring Harbor Laboratory, where Partha Mitra, PhD, one of Clarapath's cofounders, worked on the lab's brain atlas project. "Dr. Mitra realized he needed to take hundreds of thousands of histological samples. His idea was that there must be a way to automate this," said Eric Feinstein, an investment director for Northwell Ventures. "He then made the leap to scan them all into digital slides."



Northwell and Clarapath are collaborating to bring the technology into clinical use, where its higher-quality digital images will provide exceptional advantages.

Current histological methods have been in use since the late 1800s. They involve taking human tissue retrieved by surgery or biopsy, processing it through fixative and a series of solutions and embedding it in a paraffin block. The block is cut into very thin slices. A histotechnologist floats these slices on the surface of a water bath, then lifts them out with a glass slide. The tissue-coated slide is baked in an oven, processed through dyes and then interpreted by a pathologist.

"Dr. Mitra realized he needed to take hundreds of thousands of histological samples; his idea was that there must be a way to automate this," said Eric Feinstein. "He then made the leap to scan them all into digital slides."

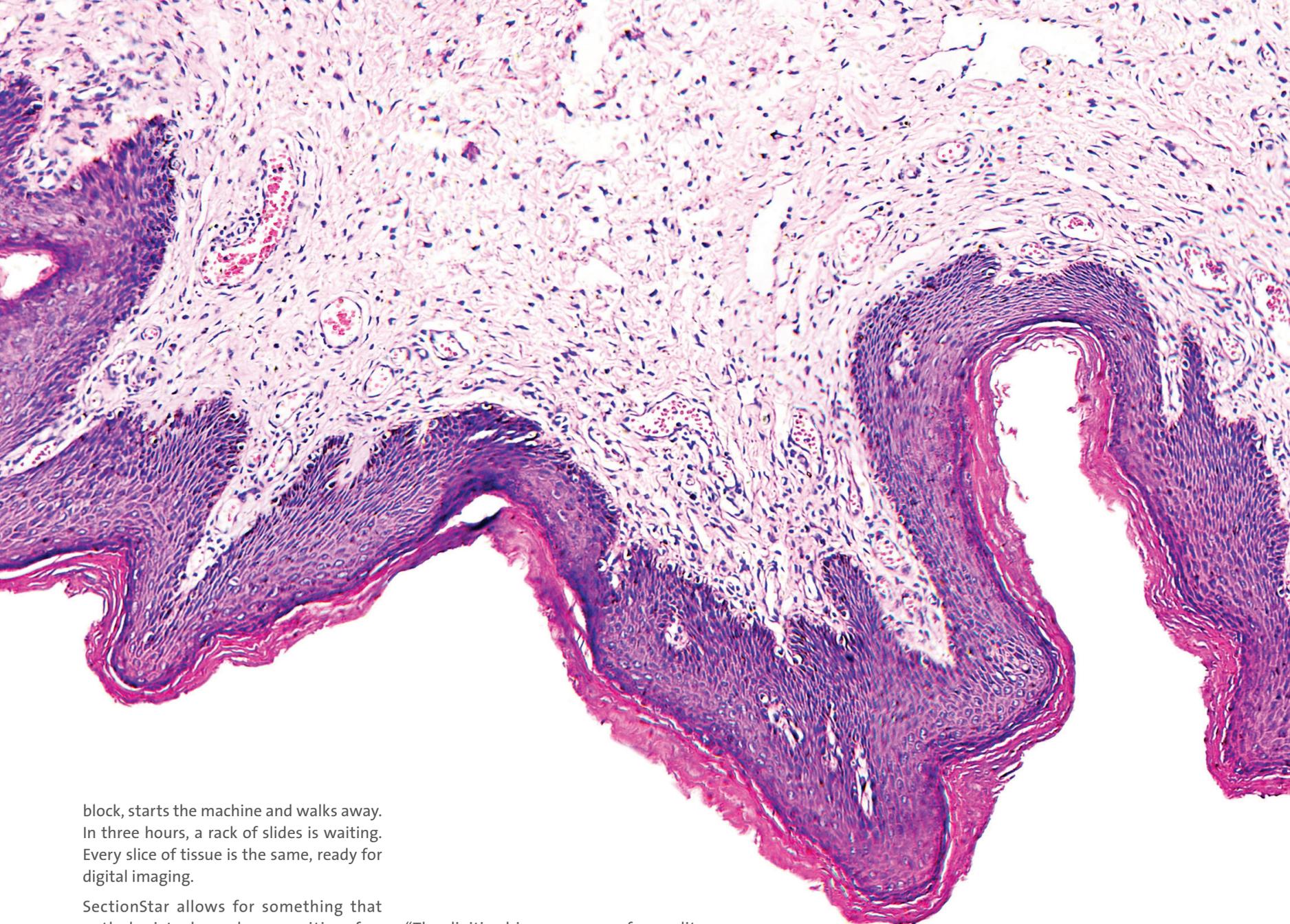
This process, while effective, is entirely manual, explained Mr. Feinstein. And that opens the door to inconsistency. Individual histotechnologists' ways of slicing tissue samples vary, making consistent digital images from human-prepared slides all but impossible.

During the water bath process, cells from tissue samples can come loose and attach to another patient's slide. "This is how people who don't have cancer are told they do, or vice versa," said Mr. Feinstein. "It's a real clinical problem." Six percent of all detected errors have led to "some" patient harm, according to LabCE.com.

Furthermore, the process is slow. A histotechnologist can only prepare so many samples in a day. However, Clarapath has the potential to prep 24 blocks hourly for 20 to 22 hours a day — roughly 480 to 528 blocks per day.

21st century improvements

SectionStar solves these problems by eliminating the water bath and automating the process. The new method essentially begins with applying a strip of tape to the paraffin block. The tissue sample is sliced by the SectionStar machine and adheres to the tape. The tape moves like a conveyor belt to the glass slide to deposit the tissue directly. A technician sets up the paraffin



block, starts the machine and walks away. In three hours, a rack of slides is waiting. Every slice of tissue is the same, ready for digital imaging.

SectionStar allows for something that pathologists have been waiting for: artificial intelligence (AI) in pathology. “AI will help us automate diagnosis,” said Mr. Feinstein. “Algorithms that can look at a slide and assist a pathologist’s evaluation for a more accurate diagnosis. We can’t do that now with the histopathology we have because the quality and consistency are so variable.”

Northwell on the inside

James Crawford, MD, PhD, chair of pathology and laboratory medicine at North Shore University Hospital and Long Island Jewish Medical Center, and a scientific adviser for Clarapath, is a strong advocate for the SectionStar. His epiphany came four years ago, when he had an opportunity to examine Dr. Mitra’s slides at the Cold Spring Harbor Laboratory.

“The digitized images were of a quality beyond anything we achieve in routine human histology,” Dr. Crawford said. “It’s technology that can provide a highly reliable, high-quality tissue section for pathology diagnostics.”

Northwell Health is uniquely positioned to create clinical solutions like SectionStar.

“We’ve been leveraging our assets to build a product that works for a clinical environment from the inside out,” Mr. Feinstein says. “We are the customer. We know exactly what we want. We know the return on investment. We know how to use it and why we would use it.”

Not only can SectionStar improve care to the thousands of patients seen within the Northwell system — Northwell provides care to more than one percent of all cancer

patients diagnosed per year in the U.S. — but the technology can be outsourced to smaller health systems. “We can provide a higher quality product at lower cost, for a broader healthcare market,” Mr. Feinstein said.

The product is projected to be a device-as-service model, with an outright purchase price of \$75,000 to \$150,000, depending on customization and features. For labs that choose to invest directly in the SectionStar technology, Clarapath’s market studies reveal, the system is so efficient that they may see a return on investment within 12 months, Mr. Feinstein said.

For Northwell and Clarapath, the hope is that the medical community will seize this opportunity.