

# MEMBER SPOTLIGHT



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translated into machine learning for pathologist support. There was an obvious (though often overlooked) link between the disciplines, which I discussed at Pathology Visions in 2016 (“Insights from neuroscience: formulating digital pathology solutions based on vision and decision theory”). I continue to approach most experiments from a neuroscience standpoint, using cognitive models and biologically inspired algorithms to investigate tissue and disease in a quantitative way.

### HOW LONG HAVE YOU BEEN WORKING WITH DIGITAL PATHOLOGY?

I began working in this area in 2012 following my faculty appointment in the Department of Pathology at Drexel University College of Medicine in Philadelphia. I worked closely with the medical director in the department, Dr. Fernando U. Garcia, who was the primary driver of the department’s expansion into digital pathology many years before.

### HOW LONG HAVE YOU BEEN WITH YOUR CURRENT EMPLOYER AND WHAT IS YOUR ROLE?

In addition to conducting research in digital pathology, I’m also the Technical Director of Pathology Imaging and Informatics at Drexel. I oversee operations in this area, which includes our whole-slide imaging and microscopy services as well as our LIS and other related information systems.

### HOW HAS DIGITAL PATHOLOGY DIRECTLY AFFECTED YOUR BUSINESS?

Digital pathology has done two things for our department. First, it’s expanded our capabilities to effectively treat patients. Digital consultation and on-call is improved using telepathology, whole-slide imaging helps provide quantitative support for immunohistochemistry, and integration of our information systems with each other (and with the hospital EHR) has led to more efficient workflows for pathologists and technicians alike. Second, digital pathology has enhanced our educational mission at Drexel, providing a substrate for teaching, tumor board, conferences, and research projects to flourish.

### TELL US ABOUT YOURSELF – WHERE YOU COMPLETED YOUR UNDERGRADUATE/POSTGRADUATE, FAMILY, WHAT A TYPICAL DAY LOOKS LIKE FOR YOU, ETC.

I got my start in digital pathology in a rather roundabout way. I majored in physics and electrical engineering at the University of Massachusetts. At that time, I became intrigued with circuit design and the concept of feedback, which ultimately led me down a path to study feedback in the most complicated of circuits: the brain. In 2002, I began a PhD program in neuroscience at the State University of New York where I studied visual processing in primate visual cortex using a variety of tools including neuroimaging, electrophysiology, and behavior.

In 2012, I came to work for Drexel University where I applied the very same insights I gained from neuroscience to the study of pathology. Where I had previously been investigating visual processing, I was now applying similar concepts in image processing to whole-slide images. My studies in decision processing in the brain naturally

## HOW IS DIGITAL PATHOLOGY IMPACTING THE HEALTHCARE AND DIAGNOSTICS INDUSTRIES AS A WHOLE?

Nearly every application of digital pathology results in an improvement in communication in some way. Not just between pathologists who may be separated by vast distances, but also between pathologist and machine. Computer-aided diagnostics cannot be fully realized without the ability to efficiently and effectively communicate information to computers and computational results to the pathologist. Digitization provides a number of benefits – from archival and preservation, to identifying trends in “big data” – but communication is paramount.

## FROM YOUR PERSPECTIVE, WHAT IS THE MOST IMPORTANT REASON FOR YOUR USE OF DIGITAL PATHOLOGY?

Patients are owed reliability, reproducibility, accuracy, and timely results. Digital pathology enhances all of those factors.

## WHAT DOES THE FUTURE OF DIGITAL PATHOLOGY LOOK LIKE TO YOU? PARTICULARLY, WHEN DO YOU SEE, OR DO YOU SEE ITS ADOPTION AS AN EVERYDAY OCCURRENCE?

In many ways, the future is already here. Whole-slide imaging, for example, has been experiencing a rapid increase in adoption among academic medical centers in particular. With greater and, often, more affordable options hitting the market every year, I think we'll continue to see rates of adoption increase outside large academic and urban centers.

However, I think the next great step in digital pathology will showcase alternative tools (that don't necessarily rely on the notion of a glass slide) to become viable in clinical practice. In vivo microscopy refers to a rather broad area of applying microscopy to patient tissue without necessarily requiring resection or other invasive procedures.

The future of digital pathology will involve harnessing these tools, as well as the expertise of optical engineers, physicists, and data scientists toward this end. This will require that pathologists actively participate in the process and will ultimately represent a significant shift in the way that pathology is currently practiced.

## HOW LONG HAVE YOU BEEN A MEMBER OF THE DIGITAL PATHOLOGY ASSOCIATION (DPA) AND WHAT FIRST ATTRACTED TO YOU TO THE ASSOCIATION?

I've been a member of the DPA since 2013. My initial impression was that it was a society that appealed to a diverse group of scientists, engineers, and medical professionals. After five years of membership, my initial impressions have been confirmed – but I've also discovered that the DPA has an interesting mix of academic and industry professionals. The cohesiveness between industry and academia is not something you often see in other disciplines.

## HOW DID YOU INITIALLY GET INVOLVED WITHIN THE ASSOCIATION AND WHAT IS YOUR CURRENT INVOLVEMENT?

I currently serve on the DPA's Education Committee, which is a newly formed committee combining the previous white paper task force with the webinar task force. I've also been a member of the Website Committee since 2016.

## WHAT DO YOU ENJOY MOST ABOUT THE DPA?

The Pathology Visions meeting is outstanding. It's really a nice combination of cutting edge research, guidance from experts in the field on regulatory matters, and a pretty good number of vendors to visit.

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