

VIEWPOINT

Research from the Arctic Circle could save lives in Delaware



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Guest Columnist

People are often surprised when I tell them that my company, Genome Profiling LLC (GenPro), which works with researchers and clinicians at Christiana Hospital and at A.I. du Pont Hospital for Children to diagnose breast cancer and cerebral palsy before they become symptomatic (thereby dramatically improving the treatment outcome), got its start after 20-plus years of research in Antarctica studying non-medical invertebrate marine organisms. But they're not surprised when I tell them that much of our recent success is due to the support of Delaware's innovation ecosystem.

We are an early-stage biotech company spun out of the University of Delaware in 2014 that creates "EpiMarkers" that identify patients who are most likely to respond to drug therapies in clinical trials and for early (pre-symptomatic) disease detection.

To be more specific (or at least more scientific), we work in the world of epigenetics, the study of biological mechanisms that will switch genes on and off. Epigenetics affects how genes are read by cells, and subsequently whether the cells should produce relevant proteins. Our novel "EpiMarkers" are derived from the immune system's highly

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sensitive and selective response to the stress of disease and the change of disease state due to therapeutic intervention.

In the early 2000s, as a University of Delaware researcher, I had become interested in epigenetics and environmental imprinting in harsh, polar habitats.

Working with non-medical invertebrate organisms at the bottom of the world was very challenging. I had to develop an approach to measuring and analyzing DNA methylation patterns that could not use any of the methods or techniques in use in human health research.

By 2011, I solved this problem with a new analytical approach using computational biology, statistics, programming, and algorithm development. But perhaps more important, I realized that this approach might also be applicable to problems of human health. And the UD Office of Economics, Innovation and Partnerships helped me start exploring this idea.

Through UD's connections to the local biotechnology network, I found serial entrepreneur, Jeb Connor, who was intrigued with the technology enough to think that it might have legs. We began working together to find and fund opportunities to apply this new EpiMarker approach to Parkinson's disease, leukemia and breast cancer.

These early studies were very successful, and I received an Innovation Grant from the National Science Foundation in 2013 to explore and evaluate commercial market opportunities for the technology.

The idea and the need that spurred my efforts to approach DNA methylation from an entirely new angle remained an important connection to that polar origin. I was working "so far away and separate" from problems of human health that I had a fresh angle from which to view the challenge and tackle it.

Disruptive ideas often come from outsiders who see a problem from a different perspective. They find a novel, unimaginable (to the established wisdom) solution that changes the status quo. Success also depends on the innovation community that help you formulate and develop your idea. You must find resources, networks, referrals, connections, meetings and opportunities that accelerate your efforts. And in this respect, the Delaware ecosystem excels. Yes, we worked hard on our own to bring this idea forward, but the Newark to Wilmington to Philadelphia biotech corridor provided the fertile field that nourished our ideas and efforts.

By 2018, we had grown from a basic research novelty to a scalable, cloud-based, commercial bioinformatics platform serving biopharma clients with novel EpiMarkers matched to their pipeline drugs to improve clinical trial enrollment and clinical research groups with novel EpiMarkers for early-disease diagnostic assays.

Our greatest traction has come in the exponentially growing area of immunology, focusing on unleashing the power of a patient's immune system to fight cancer. But each patient's immune system is unique to them and their own health/disease status. Enter GenPro. With an automated analytical platform, we provide important immune system epigenetic profiles from a simple whole blood sample. Biopharmas are beginning to embrace this information as critical evidence for making decisions about drug treatments that are designed to interact with a patient's immune system.

You can find GenPro at the Helen F. Graham Cancer Center, Christiana Health Care System, embedded with clinicians and researchers.

Although epigenetics has long been known to be important for determining who we are, a vast majority of medical research over the last two decades has been highly focused on genetic mutations as the drivers of cancer and non-pathogenic diseases. However, this is changing, and I truly believe that we are ushering in that change with our unique focus on decoding the immune system for clinical value.

And we feel strongly that other companies have similar opportunities to experience what we have in Delaware. ■

Adam Marsh is co-founder and chief science officer for Genome Profiling LLC (GenPro) and a UD faculty member in the School of Marine Science and the Center for Bioinformatics and Computational Biology.