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Cardio Conversations: Vektor Addresses 'Global Health Crisis' With Arrhythmia Mapping

by [Reed Miller](#)

Rob Krummen, the CEO of Vektor Medical, talked to *Medtech Insight* about Vektor's vMap computational modeling system that relies on 12-lead electrocardiography data to identify cardiac arrhythmias.

Use the player below to hear the entire interview.

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Improvements in cardiac mapping could help bring more effective treatments to more people suffering from cardiac arrhythmias.

In 2022, about five million people in the US were diagnosed with atrial fibrillation (AF or Afib), according to Vektor Medical CEO Rob Krummen. Of those people, about 1.5 million started taking antiarrhythmic drugs, but only about 100,000 were treated with cardiac ablation to block the electrical pathway causing AF.

"The most effective form of treatment [is ablation] and that's just 2% of AF sufferers," Krummen told *Medtech Insight*. "That's a massive failure." Only a few of the people who might benefit from ablation undergo the procedure because it has a reputation of being ineffective on the first try, he said.

"We tried to figure out why only 2% of patients are getting the most

effective treatment. And largely, it's based on a lack of information and based on fear of the procedure." – Rob Krummen

"That's true. A lot of ablations are only 50 to 60% successful and that really gets to the importance of mapping," he said. "We've been able to develop a product that leverages the [electrocardiogram (ECG/EKG)] and provides information to the electrophysiologist to find those locations of the faulty circuitry."

Results from the [VMAP validation study](#) showed Vektor Medical's vMap non-invasive, three-dimensional electrophysiology mapping system can accurately identify the location of a premature ventricular complex in nearly 99% of cases by analyzing 12-lead electrocardiogram data. (Also see "[Cardio Catch-Up: Updates From B-Secur, egnite, Vektor, And Other Under-The-Radar Companies](#)" - Medtech Insight, 20 Jun, 2022.)

In an interview with *Medtech Insight*, Krummen talked about the development of vMap, the company's mission, and how it plans to bring its technology to more cardiologists and more patients.

Here are some more highlights from that interview.

Q How does Vektor define its mission?

A Rob Krummen: Arrhythmias are incredibly common – 25% of all adults, one and four, will experience a serious arrhythmia in their lifetime. And one in four of us will experience a stroke, with afib being one the most common causes.

This was a startling statistic to me: 10% of all deaths worldwide are estimated to be associated with arrhythmias.

We've spent the last three years – rightly so – talking about COVID. But with arrhythmias, we're talking about a serious disease that is potentially 10 times worse than COVID. And we need to be talking about it more. So, our mission is to educate, triage and help [to bring about] better, more effective treatment of arrhythmias and bring attention to the issue.

Another bit of non-positive news in the area is that recent research suggests that 10% of those of us who've had COVID may experience a new arrhythmia – new onset of AF or another arrhythmia.

It's a really big problem. Arrhythmias are a global health crisis. But the one last bit of good news is that arrhythmias are very treatable. Arrhythmias can be diagnosed with a simple [electrocardiogram (ECG)]. And they can be treated or even cured with appropriate medical care.

And so, as a company, our mission is to make sure that those arrhythmia sufferers are receiving better care or getting appropriate medical triage. We have developed a technology that uses computational intelligence – advanced computing to get information to your doctor that can more specifically help treat your arrhythmia.

And we want to get to those locations [in the heart] – the malfunctioning circuitry of your heart. And we can do that just from an ECG. Our goal is to take that information, give it to your doctor and give it to you as the patient to improve the outcome of your procedure, all the while improving efficiencies and saving medical costs.

Q So why is it so important to have electrophysiological mapping for cardiac arrhythmias? What does it tell you that you cannot already see from the ECG?

A Krummen: With this global health crisis, the medical system is failing many cardiac arrhythmia sufferers. Really interesting research over the last few years out of Europe and the United States has made clear that the most effective treatment for the arrhythmia is an ablation – not antiarrhythmic drugs or other therapies – but ablation. (Also see "[Minute Insight: Trials Sponsored By Medtronic and Biosense Webster Show Benefits Of AFib Ablation](#)" - Medtech Insight, 11 Nov, 2022.)

Last year, 5 million people in the United States were diagnosed with AF, a million and

a half of those went on antiarrhythmic drugs, and only 100,000 of them went to the most effective form of treatment, which is ablation.

That's 2% of AF suffers – that's a massive failure. We tried to figure out why only 2% of patients are getting the most effective treatment. And largely, it's based on a lack of information and based on fear of the procedure. They've heard through the grapevine – their uncle or their grandmother went and they had to have a second ablation and maybe even the first one didn't work and maybe the second one didn't work. And that's true. A lot of ablations are only 50 to 60% successful.

And that really gets to the importance of mapping. Effective mapping allows the electrophysiologist to better understand those faulty circuits in the heart and target them quickly and efficiently and return the heart to its normal beating.

What we've been able to do is develop a product that leverages just the ECG and that provides really interesting information to the electrophysiologist to find those locations of the faulty circuitry. We published a paper [showing] we're able to locate source locations of these arrhythmias with with over 97% accuracy. (Also see "[Cardio Catch-Up: Updates From B-Secur, egnite, Vektor, And Other Under-The-Radar Companies](#)" - Medtech Insight, 20 Jun, 2022.)

Q What makes vMap different than any other system that is available to analyze ECGs?

A Krummen: There are some great technologies that help electrophysiologists understand arrhythmias. Some of them are extremely complicated, time-consuming and invasive. And some of them require technologies like a [computed tomography] scans or an [magnetic resonance image (MRI)]. And almost all of them can't be done ahead of a procedure. So vMap is a step change in understanding of arrhythmias.

What we were able to do is create incredibly detailed, complex simulations of cardiac

activity and model the billion heart cells in your heart electrically. These aren't models that you could run on your iPhone. In fact, when we were first running these cardiac models, we shut down a node of a local university supercomputer because we were using too much computing power.

But today, we live in an incredible world and we were able to serialize cloud computing to be able to do the calculations. And now we can run a simulation in about an hour. We did this work of hundreds, thousands, and then over a million simulations of cardiac activity. And then we harnessed machine learning. This is a different branch of machine learning that allows us to look and compare these simulations to the patient himself or herself. We're able to do all this work ahead of time, and then bring that to bear in the electrophysiologist lab.

With our eyes, we were able to understand [ECGs] pretty well. But it's amazing what a computer can see that I can't see or you can't see or even a really skilled electrophysiologist can't see. And ECGs are so common. They're recorded in the ER and they're recorded in the the cardiologist's office.

And if we record that arrhythmia, we can map your arrhythmia in less than a minute – both atrial and ventricular arrhythmias – and we can then use that both before during or in the middle of a procedure to help the physician find your arrhythmia.

"We were able to serialize cloud computing to be able to do the calculations. And now we can run a simulation in about an hour." – Rob Krummen

Q What are your priorities for commercialization, improving access to the system, and getting more people to take advantage of vMap?

A Krummen: We're focused on accelerating our rollout to hospitals and clinics around

the country. By the end of 2023, we hope to be in about 25 hospitals and other centers around the country.

There are some really great partners out there. We've been delighted with our interaction with a number of large medical device companies that work in this space that are an intimate part of the procedure. And the exciting part about our technology is that it really enhances existing technologies.

There are some great manufacturers who make mapping catheters and ablation catheters and helping them get [to patients earlier] is really a rising tide that lifts all boats. Our goal for 2023 is to continue to help doctors, help the medtech community and, clearly most importantly, help patients.

Q What is 'next' for the company and the technology?

A Krummen: When we started the conversation, we talked about how we're only serving 2% of the patients with the most effective care for their arrhythmia. And that's completely unacceptable to me and it should be unacceptable to the medical community.

What's next for Vektor is expanding the use of our technology to cardiologists and hopefully to patients themselves.

We can get ECGs ourselves from our doctor [so] there are also opportunities for at-home 12-lead ECG monitoring systems. And we would love to expand the opportunity to have a patient understand their rhythm themselves and interact with it on a system on their smartphone or on a web browser to help them understand and triage to get more effective care.

We absolutely have to improve the information – not just what the doctors are getting, but what the patients are getting – about arrhythmia care and move care 'up

the chain' to the 98% of the patients who are likely being treated sub-optimally.

That's our commitment. That's what we're going to be working on – to bring the technological innovations that advanced computing can provide to the doctors and patients and radically improve cardiac arrhythmia care.

Further Reading

For more information on Vektor Medical, atrial fibrillation and ECG technologies, check out these articles at [Medtech Insight](#).

[*Hyfe Hopes To Unlock Utility Of Monitoring Coughs*](#)

[*Cardio Catch-Up: Updates From B-Secur, egnite, Vektor, And Other Under-The-Radar Companies*](#)

[*Apple Vs. AliveCor: ECG Patent Battle Headed To Import Ban Decision*](#)

[*AliveCor's Smartphone-Linked ECG First Product Assessed Under UK's Rapid HTA Pilot*](#)

[*FDA Clears Eko's Smart Stethoscope To Detect Heart Murmurs*](#)

[*CMS Proposes National Payments For Long-Term Continuous Electrocardiogram Monitoring*](#)

[*Exec Chat: As Reimbursement Questions Get Answers, iRhythm Looks To The Future*](#)

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