

Automated patch clamping – a silver bullet for higher customer demands and growing assay complexity



Metrion Biosciences successfully met the challenge of growing complexity in ion channel research by adopting Sophion Bioscience's QPatch II and Qube 384 automated patch clamp platforms. The move transformed Metrion's research output, enabling it to take on more – and larger – projects and grow its customer base.



Gary Clark, PhD
Director of Screening Technologies
at Metrion Biosciences



Metrion Biosciences is a UK-based contract research organization specializing in ion channel drug discovery services for pharmaceutical and bioscience customers in the UK, Europe, N. America, and Japan. With headquarters located at Granta Park in Cambridge, Metrion centers its services on automated and manual patch clamping across a spectrum of disease areas including; neuroscience, cardiology, respiratory disease, oncology, and inflammation.

At the Metrion Biosciences laboratory, a research scientist is preparing a Sophion Qube 384 automated patch clamp instrument for operation. The instrument will work unattended through the night. When the scientist arrives the next morning, the Qube's built-in software will already have prepared the overnight data for analysis. This advanced, hands-off setup has fundamentally changed Metrion's ability to meet growing customer demands for high-throughput screening assays.

"We needed a machine that was flexible, simple to use, reliable, and came with easy-to-use software. The Qube met those requirements." *Gary Clark*

Novel targets and greater complexity

"Clients increasingly come to us with more ion channel targets – and also targets that are more challenging," Clark explains. In other instances, customers may want to explore novel targets on which little research has been done in relation to a particular disease state. Often the target is difficult to express as a functional protein at the cell surface or the ion channel current can be unstable over time.

According to Clark, this makes assay development more complicated. "We need to understand how those channels work and their physiological relevance in the human body and in human disease states. That takes time. And as the screening process becomes more complex, development of robust assays takes longer to complete."

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More complicated assays create another potential hurdle: the time required to analyze the resulting data. Electrophysiology is data-rich, and part of Metrion's challenge is to analyze the data in a timely fashion. Unless high-throughput data is matched by high-throughput analysis capability, the work-hour bottleneck solved by automated patch clamping simply shifts from data collection to analysis.

Higher assay throughput and fidelity

For Clark and his team, access to automated patch clamping – and Sophion's QPatch and Qube solutions in particular – makes a significant difference to their ability to undertake more complex, high-capacity projects.

"Automated electrophysiology has come a long way in the last 15 years or so. Our automated patch clamp systems today allow us to screen many more compounds than we can achieve by the manual patch clamp technique. They give us greater throughput and the scope to take on projects of a size that we just could not implement in the past," Clark says.



“We've now got the ability to prosecute almost any project with whatever assay capacity is required and without being intimidated by the volume of work required.”

Andrew Southan, CEO

Metrion operates a full range of patch clamp services, offering traditional manual patch clamp alongside automated patch clamp technologies. However, the manual patch clamp technique is both labor-intensive and time-consuming. Automated instruments can offer equivalent data quality and reliability along with a far greater capacity. Thus, freeing up our skilled manual patch clamp scientists to perform recordings from more challenging cells or using protocols not currently possible in automated patch clamp format.

Quality, reliability, throughput

Currently, Metrion has three Sophion QPatch instruments in its laboratory as well as a high-capacity Qube 384 recently installed in 2021. Their presence in the laboratory is a sales advantage during discussions with customers.

“Sophion’s automated patch clamp technologies are industry standard. They are well known in the drug discovery industry and established in many laboratories around the globe. For our customers, they’re akin to quality, reliability, and high throughput,” Clark says. “People are more accepting of automated instruments and today’s machines come very close to the manual patch clamp gold standard. More often than not we do not see any disconnect between manual patch clamp and QPatch or Qube results.”



..... increase in customer base in the first six months after the newest installation of Sophion instruments and Metrion’s increased global visibility

Effective solutions for every ion channel recording

So how do the instruments operate in practice? Clark explains that in larger projects the Qube 384 enables high-throughput screening of hundreds or even thousands of compounds to identify suitable start points for medicinal chemistry optimization.

“We test numerous compounds to find ones that interact with our client’s ion channel of interest. Then with client chemists or one of our own chemists, those structures are modified, the new compounds tested, and the potency data relayed back to the client chemists. We can either use the Qube again or the QPatch to identify whether the compounds’ effectiveness against the ion channel is improved,” Clark says.

Both the QPatch II and Qube 384 give Metrion’s scientists fine control of protocols to study ion channel pharmacology and biophysics. They also allow them to apply compounds quickly and easily, yielding detailed recordings that allow mechanistic profiling and mechanism-of-action studies of different drugs and binding molecules (ligands).

“Ultimately, customers come to us because of our scientific credibility and then because we have the instruments to back up that science.” *Gary Clark*

Powerful software designed for analysis optimization

For every assay, the instruments generate copious quantities of data. Data analysis software from Sophion works in tandem with the instruments, significantly shortening the time taken to process relevant findings. “One of the reasons we adopted the Qube was because we knew the analysis software was very powerful and could provide the data needed to advance our client’s projects,” Clark observes.



Another advantage of automated patch clamp solutions such as the QPatch II and Qube 384 is the short operator training that is required. This contrasts with manual patch clamping, which is a highly skilled technique that requires extensive expertise in electrophysiology and other associated techniques.

“Using a QPatch or Qube is fairly simple. You can train someone up very quickly, within half a day, to use the instrument. In a few more days, with appropriate supervision, they can generate data, conduct analysis, use the software and plot their data to show how their compounds interact and obtain a potency value for analyzed compounds.” *Gary Clark*

A close partnership between Metrion and Sophion

Metrion is a key Sophion customer, and the two companies have forged a close relationship over the years working together. According to Clark, Sophion’s input on assay optimization, application and technical instrument support, and instrument service is integral to maximizing the in-laboratory benefits of automated patch clamping.

“Sophion’s application scientists always know their instruments inside out and they are really engaged. They want the instrument to be a success for their clients, so they’re always willing to help us. The technical service from Sophion’s engineers is also always excellent,” Clark says.



Sophion Bioscience is a leading global life science company, founded in 2000 by a group of passionate electrophysiologists. We develop, manufacture, and market solutions for automated patch clamping. With our complete technical, biological, and application support, we help our partners pioneering ion channel research and drug discovery. Through continued development of our QPatch Compact, QPatch, and Qube platforms, we offer uncompromised data quality in a user-friendly environment from assay setup to advanced data analysis. We are headquartered in Denmark and have subsidiaries in Japan, China, and the United States. For more information, visit Sophion.com



To learn more and contact, visit metrionbiosciences.com

Metrion’s recent investments in high-quality laboratory instrumentation and highly trained staff (with the workforce increasing by more than 30% in just six months) is evident inside the boardroom, where revenue is sharply up. The investments in instrumentation and staff reflect the company’s upscaling and ambition to become the first-choice outsourcing partner for ion channel drug discovery research and cardiac safety services for the worldwide pharmaceutical industry.

“We have more projects than we would have had in the past and it just means our processes have to be more robust in making sure we execute those projects in a timely manner as possible.” *Gary Clark*

“This year, we’re working with nearly a dozen new clients – and more work is coming in. The Qube, in particular, has enabled us to respond positively to incoming customer requests. Actually, it’s made life more complicated to schedule because we have more work coming in. But frankly, that’s a nice problem to have!”