

An academic core facility for a Swedish university – how QPatch II ensured the best infrastructure



A high-throughput QPatch II automated patch clamp instrument from Sophion Bioscience enabled Linköping University to accelerate its research into a new epilepsy drug – and to get the green light to build a national core facility for ion channel research.



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Linköping University is one of Sweden's six largest universities. Its neurobiology division conducts research on the nervous system and sensory organs, including laboratory studies of ion channel function in different types of cells.

Nina Ottosson remembers well the moment her lab at Linköping University's Division of Neurobiology saw the full potential of its new QPatch II patch clamp instrument. She and the team had been accustomed to testing one compound on one ion channel per day using conventional manual equipment in their electrophysiology laboratory. The arrival of the automated QPatch II from Sophion Bioscience changed that at a stroke.

"It was a Friday, and we took delivery of eight new compounds for testing," recalls Ottosson, senior research coordinator at Linköping University (LiU) and an experienced electrophysiologist. "Before I went home that afternoon I had the full dose responses of all eight compounds – not from one, but from three different ion channels. The speed was incredible. It was quite a moment."

"We programed the machine, started it up, left it to work, and out came the data" *Fredrik Elinder*

Fredrik Elinder, professor of molecular biology at LiU, was similarly impressed. The speed was unbelievable compared to where we'd come from and what we were used to," he says. "The QPatch II can measure 48 cells at the same time almost as carefully as we could measure one cell manually. It was very exciting."

From 1 to 100 compounds

Elinder has worked in the field of voltage-gated ion channel research for 35 years. He believes the high productivity of the QPatch II can be a springboard for Swedish scientists to expand and deepen their studies relating to ion channels. "I think the way we've been thinking about research will change drastically now that these high-throughput assays are available to us. In the past, we explored one or two compounds at a time; now we can work on 100. It's a huge change."

LiU worked closely with Sophion for several years before finally deciding to purchase a QPatch II. This collaboration played a critical role for the financial donors to approve the purchase and secure the approvals for LiU to gain core facility status.

Elinder had spent a decade attempting to establish a core facility for ion channel research at LiU in Sweden. After several attempts, he approached the Swedish Research Council and other key decision-makers to explain LiU's cooperation with Sophion and how an automated patch clamp platform would boost its research. When the Chemical Biology Consortium Sweden's application to the Swedish Research Council was granted, the QPatch II could now be purchased.



“In the past, if I was lucky, I could fully test one compound for full dose responses on one ion channel in one day. Now I can test eight compounds on three ion channels and get full dose responses. It's a huge difference.”

Nina Ottosson

QPatch opens doors

“Our plans for automated patch clamping were very important for getting the go-ahead for the core facility. I explained to our funders and stakeholders that we wanted to bring a QPatch II to LiU. They understood this would be a great enabler for our ion channel research.”



The new core facility will create a national Swedish hub for automated electrophysiology measurements on cellular ion channels, not just for epilepsy research but in multiple areas. It will form part of SciLifeLab, a national Swedish life sciences network launched in 2010 and which today supports research activities at all Sweden’s major universities.

SciLifeLab projects are expected to take a front seat at the core facility. Elinder and Ottosson also anticipate interest in ion channel research opportunities from academic institutions around Sweden, including those allied to hospitals.

Using QPatch II for patient research

“We expect to hear from clinicians with specific questions about ion channels and who want to take cells directly from a patient and measure them using the QPatch II. That would be fantastic and also enable us to reach potential new users, including those interested in exploring a specific disease or ion channel,” Elinder says.

He and Ottosson also believe the QPatch II will help attract experienced electrophysicists, who want to expand their range of experiments, as well as pharmacologists seeking to broaden their chemical compound knowledge by using automated patch clamping for ion channel studies.

Epilepsy drug success a step closer

Switching from manual to automated patch clamp has helped advance research being conducted by Ottosson and the team to develop a new drug for epilepsy. The high throughput of the QPatch II, which can perform up to 48 recordings in parallel, has allowed the team to broaden their research and progress faster. “In pure mathematical terms the QPatch II is 48 times faster than manual patch clamping, but I think the gain is actually more than that. We can also exchange the solutions at the machine much faster than we could manually.” Ottosson explains.

“We’ve taken big steps forward in our epilepsy research that we wouldn’t have been able to without the QPatch II”

Nina Ottosson

With the help of ion channel responses from the QPatch II, LiU has succeeded in developing a drug that can prevent epileptic seizures in zebrafish and can successfully cross the barrier between blood and brain. “These are two very big steps forward for our research and we got there by using the QPatch II to select the compounds to use in our studies and by using the data it generated to support our findings,” Ottosson says.

Close collaboration between LiU and Sophion

According to Ottosson, the partnership with Sophion began well before LiU purchased its QPatch II. Application scientists from Sophion helped train LiU staff to use automated patch clamp platforms and prepare them to migrate to the QPatch II. The collaboration took place under Sophion's Technology Access Program and included guiding the team through trial recordings and familiarizing them with the instrument.

Our partnership with Sophion and access to their expertise made a big impression on our funders. It gave them a hands-on, real-world example of what you can achieve with automated patch clamping and an expert supplier."

Fredrik Elinder

"Our connection with Sophion really speeded up the process. Being able to attend the Sophion site and do test recordings and really get to know the technology and data analysis was a big plus," Ottosson says. "We had one ion channel that was a bit of a 'diva' and the application specialists at Sophion helped us enormously to work successfully on it with the QPatch II. I don't think there's anyone as good at handling cells as they are."



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Cell line quality guaranteed

Sophion's longstanding partnership with cell line manufacturer B'SYS was another advantage, giving LiU access to a ready supply of high-quality cell lines. "Cell lines can be a bit fickle, it's almost like they have their own personalities," Ottosson explains. "Even though they may be identical on paper, cell lines from different suppliers don't necessarily always behave the same. Sophion and B'SYS have the experience of handling that, and that makes things easier for us."

For LiU, the focus now is on using the QPatch II to make further progress towards a drug for epilepsy. At the same time, Elinder and Ottosson have high hopes for their new core facility. Depending on how demand for the facility's services develops within Sweden, they may consider adding a QPatch Compact to expand capacity.

Further down the line, they can foresee a day when they might upgrade to a Qube 384. "If you have a very high volume of compounds to test then the Qube 384 offers you the capacity to handle that," Elinder says. "Maybe that will be the next step for us. We'll see!"



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](https://sophion.com)