

The backstage pass to study your favorite TRP channel

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Access All Areas using Port-A-Patch, Patchliner or SyncroPatch 384PE

Tom A. Goetze, Mohamed Kreir, Markus Rapedius, Alison Obergrussberger, Nadine Becker, Ilka Rinke, Andrea Brüggemann, Michael George, Niels Fertig

Nanon Technologies GmbH, Ganghoferstraße 70a, Munich, Germany, info@nanon.de



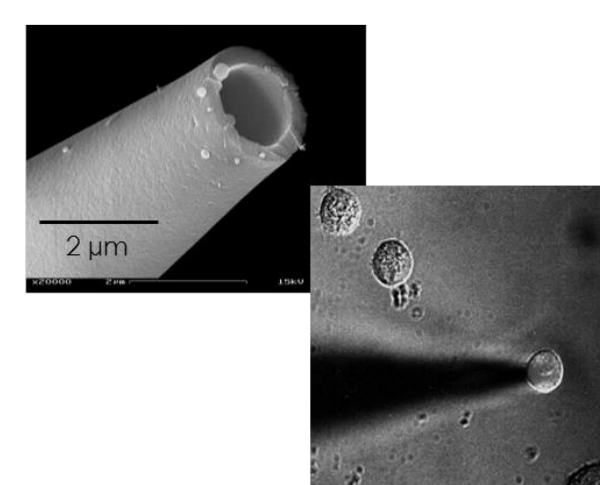
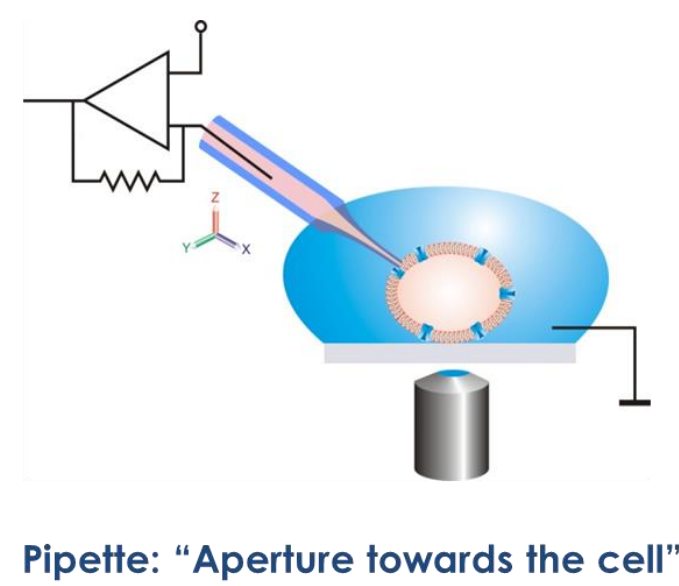
Abstract

TRP channels exhibit a large variety of functional properties and play diverse cellular and physiological roles. Due to their presence in the plasma membrane of cells from various tissues and even organelles, new biophysical properties and mechanisms of regulation are constantly discovered by academic laboratories over the years. Also, because of their relevance linked to disease and pain, TRP channels are important targets in the pharmaceutical industry. Extensive functional studies of ion channels are often compromised by technical limitations of the electrophysiological assay. Nanion's Port-A-Patch, Patchliner and SyncroPatch 384PE are specifically designed to marry the required experimental flexibility with high-throughput and Giga-seal data quality.

In order to demonstrate reliable pharmacology combined with high-throughput electrophysiology we show data of **TRPA1** activated by the agonist Supercinnamaldehyde and blocked by A-967079 in a concentration-dependent manner across a

SyncroPatch 384 chip in a single experiment. With the aim to highlight experimental flexibility we present data using the internal perfusion of the SyncroPatch 384PE applying NMM (biotinylated N-Methyl Maleimide) and AITC (allyl-iso-thiocyanat) to the intracellular side of the channel. **Port-A-Patch** in a report from Chen et al. (Nature Comm., 2014). Here, they measured whole lysosomes and demonstrated how synthetic small-molecule activators can restore mutant **TRPML1** channel function to rescue disease associated abnormalities in mucopolidosis type IV. Furthermore, single channel traces of **TRPA1** reconstituted into liposomes were recorded at various cold temperatures and the open probability was analysed. Finally, we show data featuring the temperature control of the **Patchliner** (available for the SyncroPatch 384PE shortly) by exposing **TRPV1** and **-V3** to a range of well-defined temperatures and generating the corresponding activation curves.

Planar Patch Clamp - Chip replaces pipette



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J. Behrends, N. Fertig: **Neuromethods** 2007, Patch-Clamp Analysis, Vol. 38, 411-433

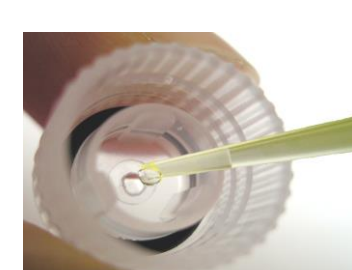
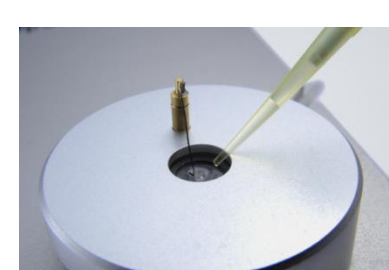
TRPA1 and TRPML1 – Port-a-Patch

Features:

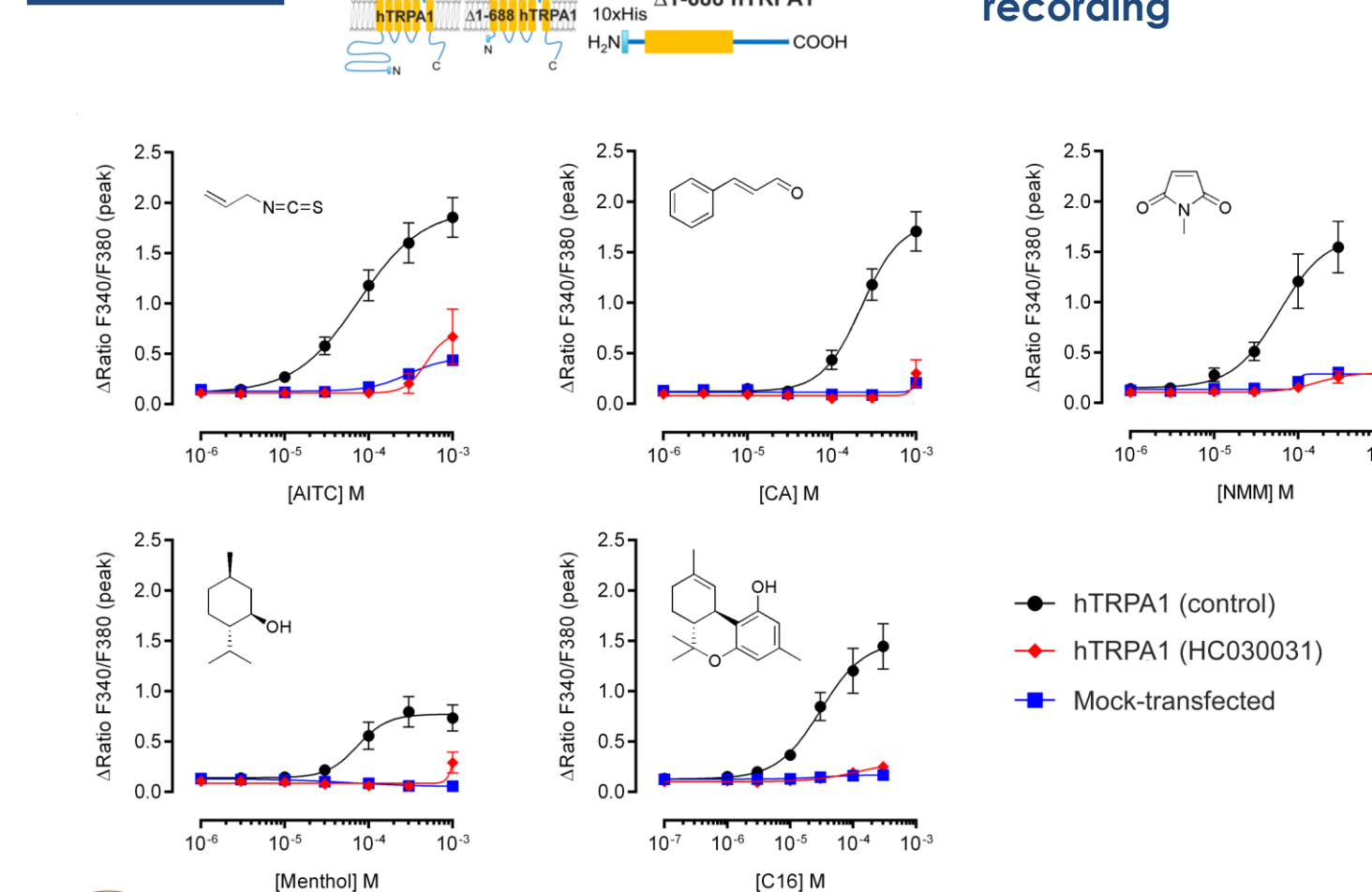
- Experimental flexibility
- Single channel
- Whole organelle
- Whole cell

Add-ons:

- Internal perfusion
- External perfusion
- Temperature control
- Fluorescence slide



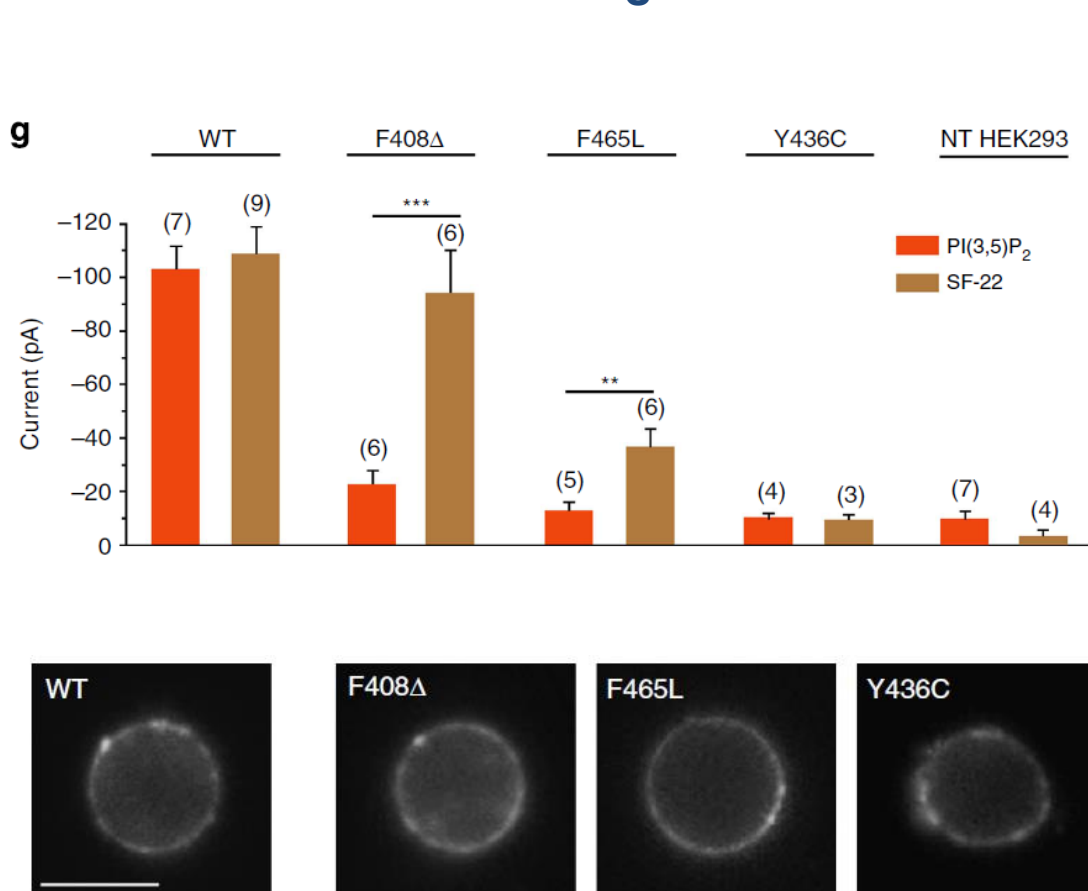
TRPA1



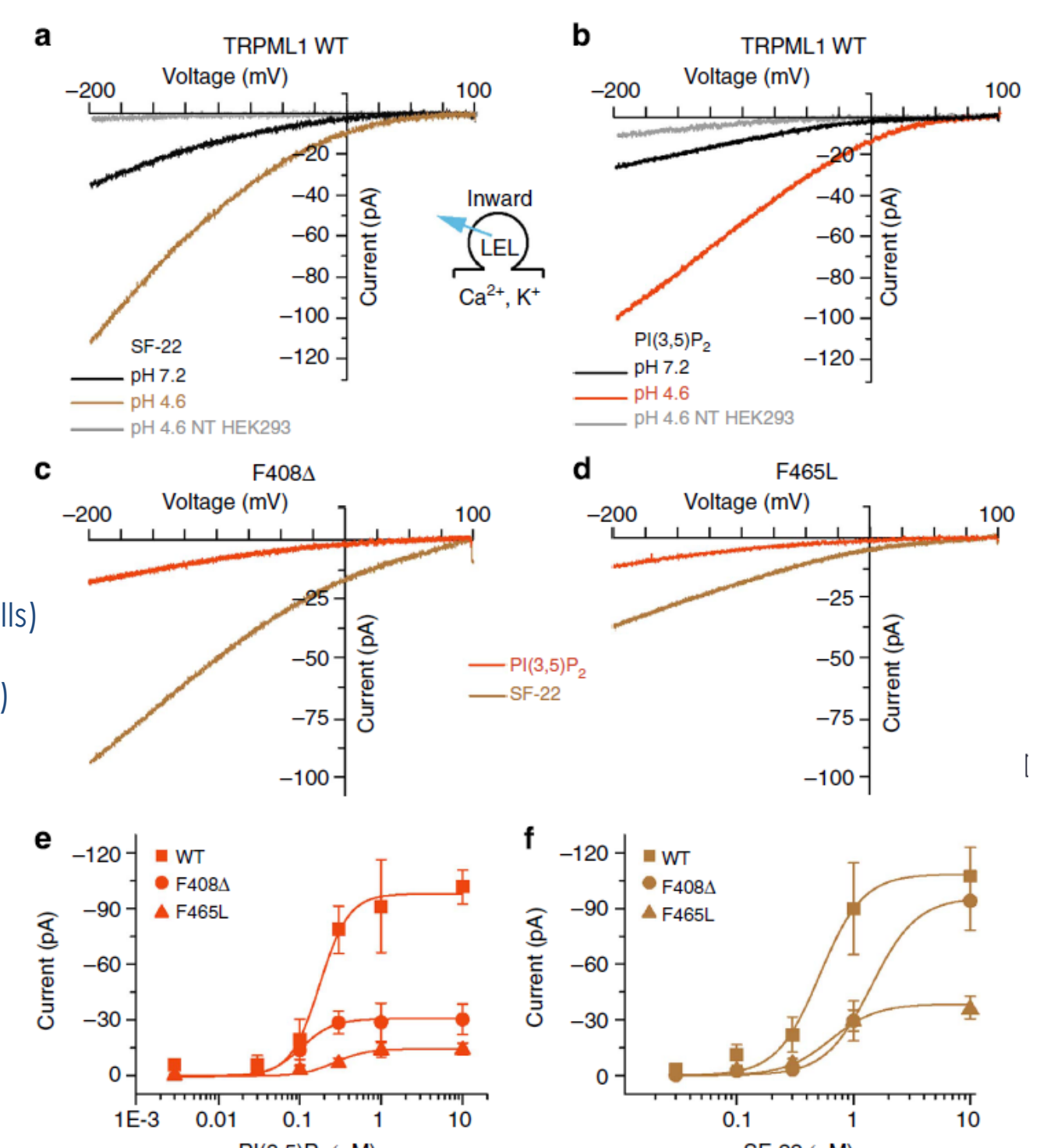
L. Mopartha, S. Surverya, M. Kreir, C. Simonsend, P. Kjellboma, E.D. Högestätt, U. Johansson, P.M. Zygmunt: **PNAS**, 2014, Nov 11;111:16901-16906

TRPML1

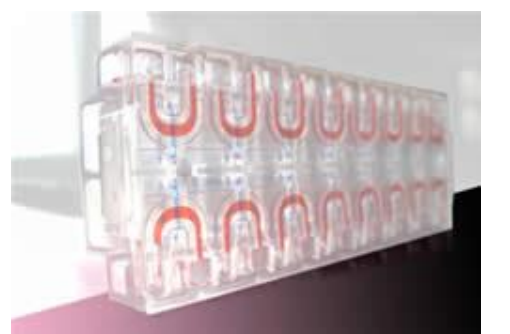
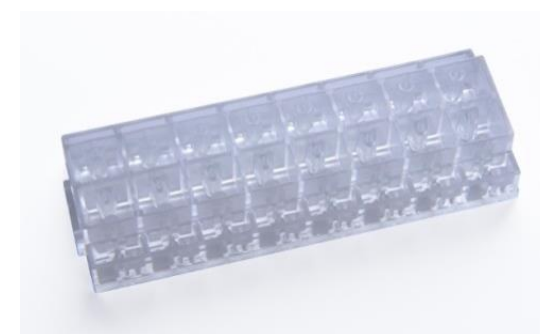
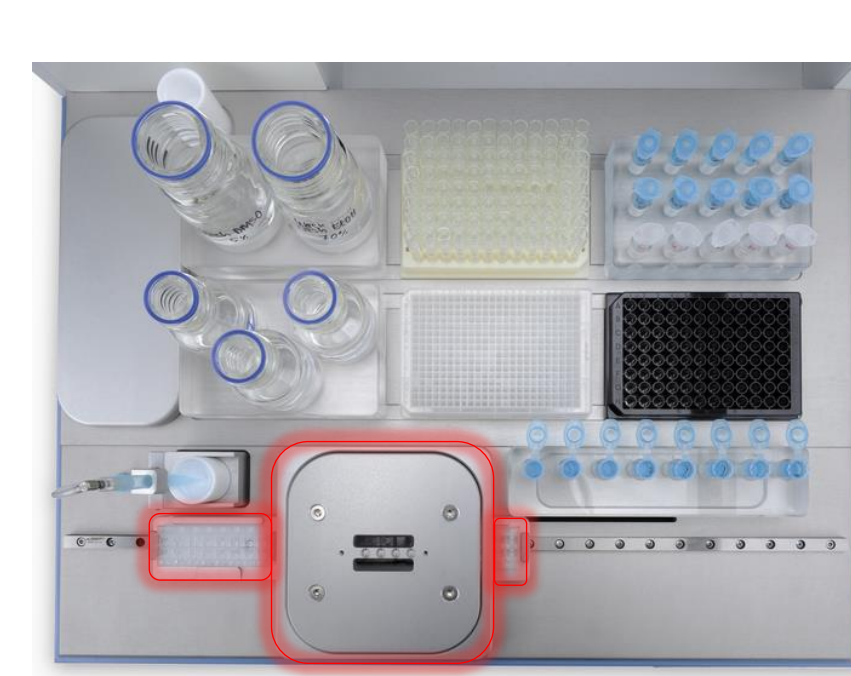
- Patch-clamp access to ion channels in organelles
- „Whole-lysosome“ recording



C.-C. Chen, M. Keller, M. Hess, R. Schiffmann, N. Urban, A. Wolfgart, M. Schaefer, F. Bracher, M. Biel, C. Wahl-Schott, C. Grimm: **Nat Commun.** 2014 Aug 14;5:4681



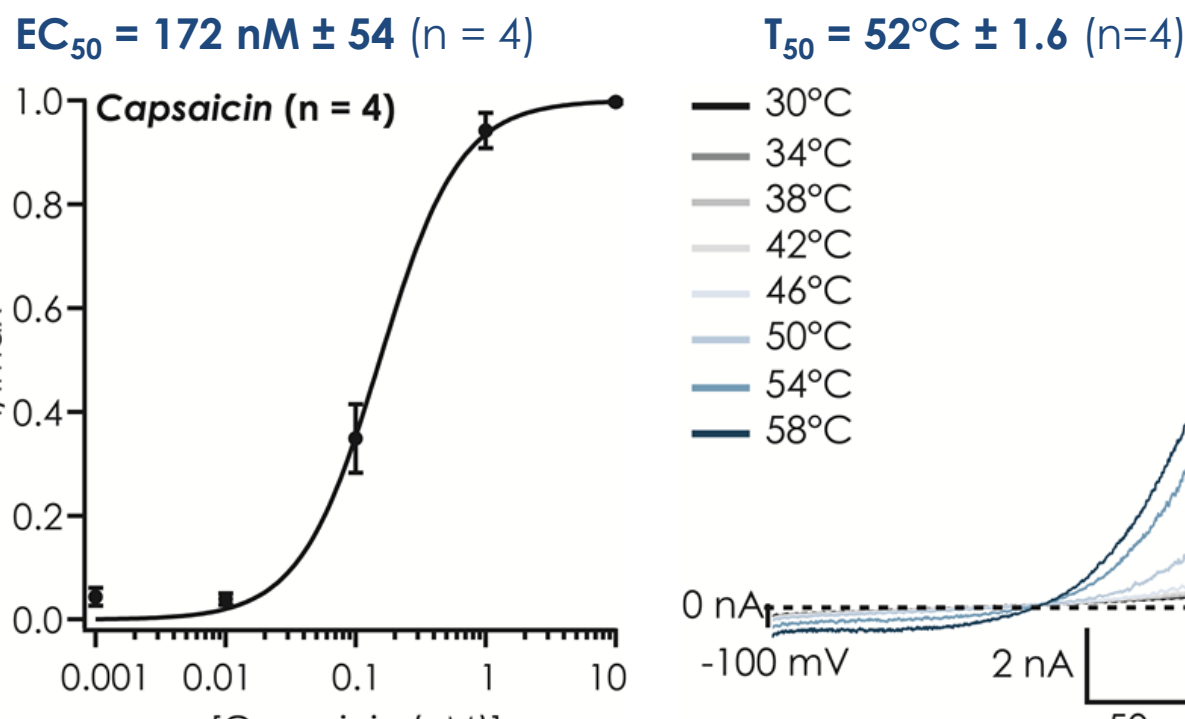
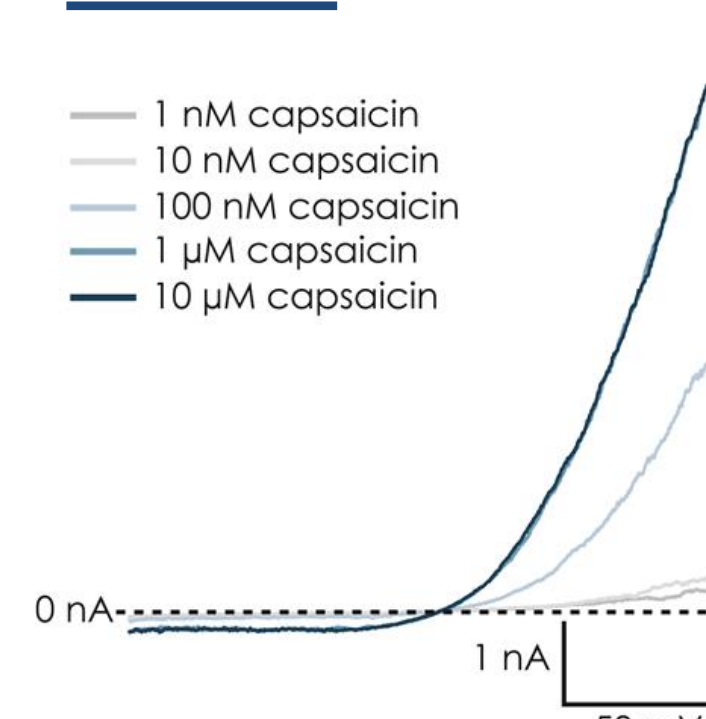
TRPV1 and TRPV3 – Patchliner



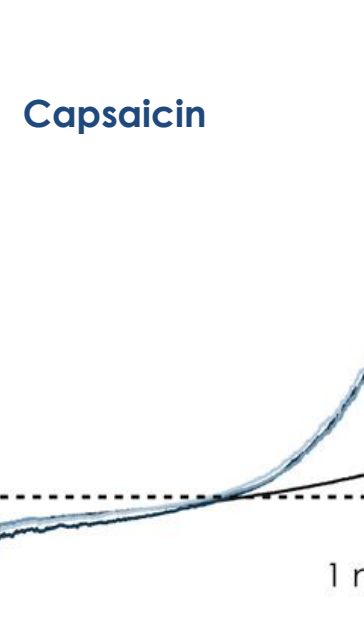
Features:

- Parallel 4-8 channel amplifier
- Internal perfusion
- Temperature control

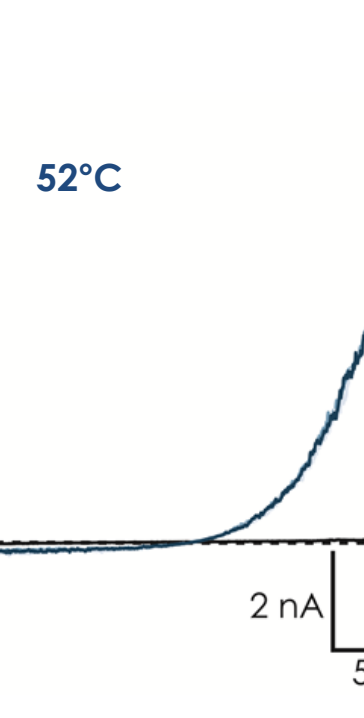
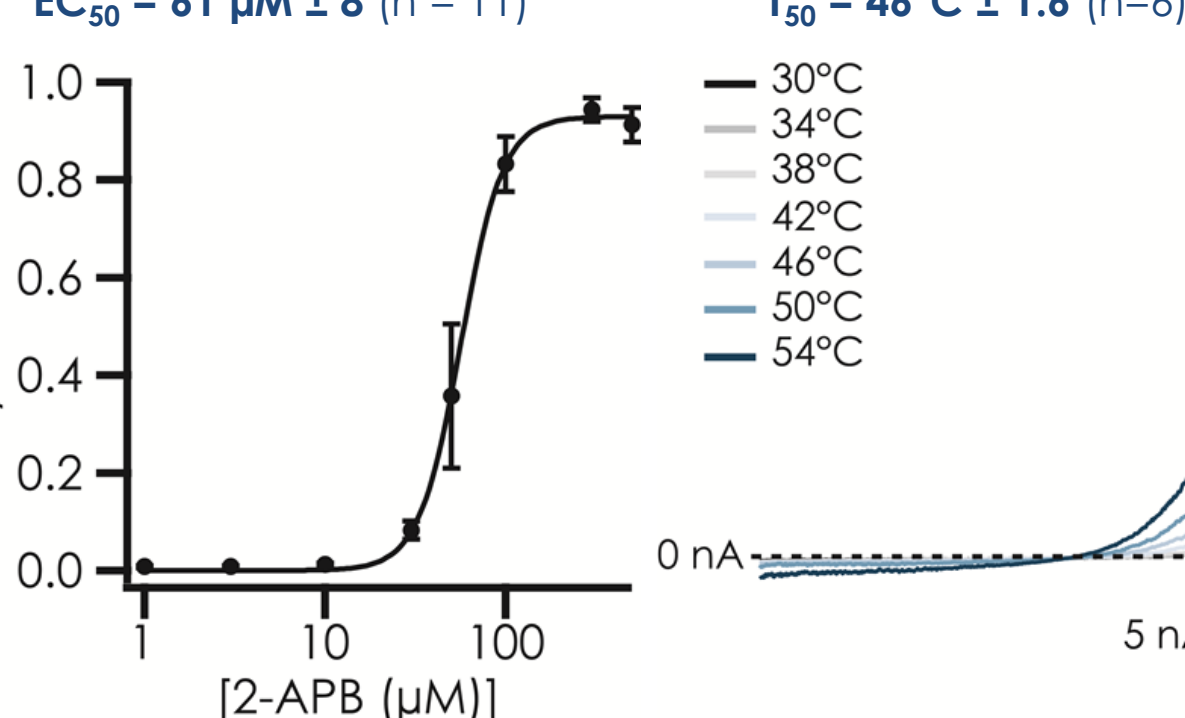
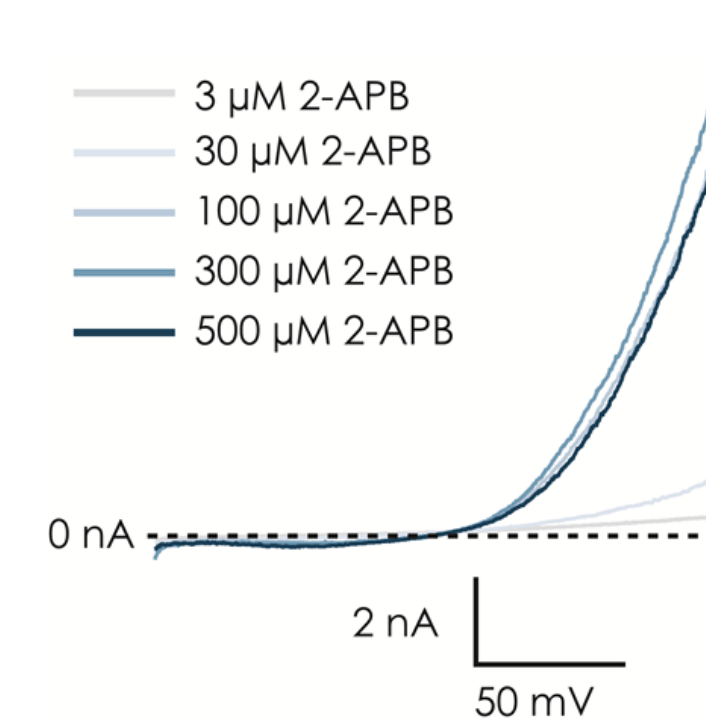
TRPV1



Reproducibility



TRPV3



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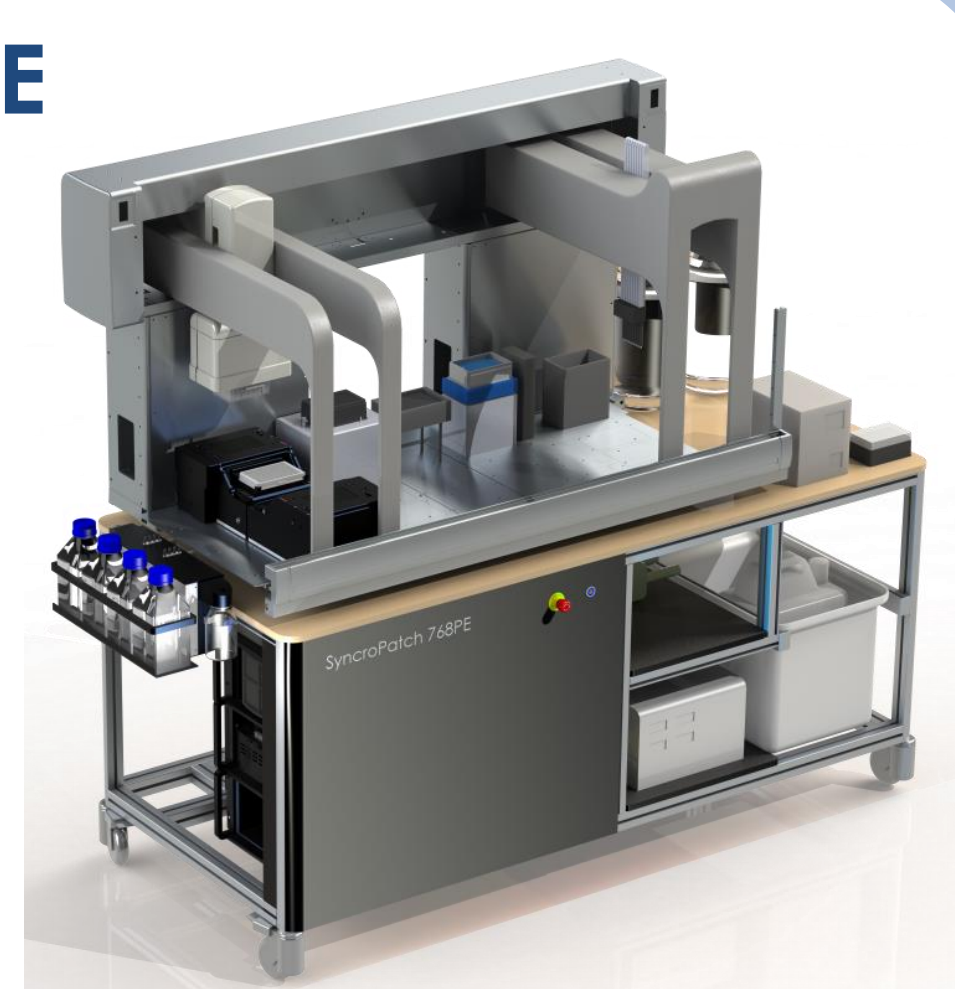
S. Stoelze, A. Obergrussberger, A. Brüggemann, C. Haarmann, M. George, R. Kettenhofen, N. Fertig: **Front Pharmacol.** 2011; Vol 2: Article 76

TRPA1 – SyncroPatch 384PE



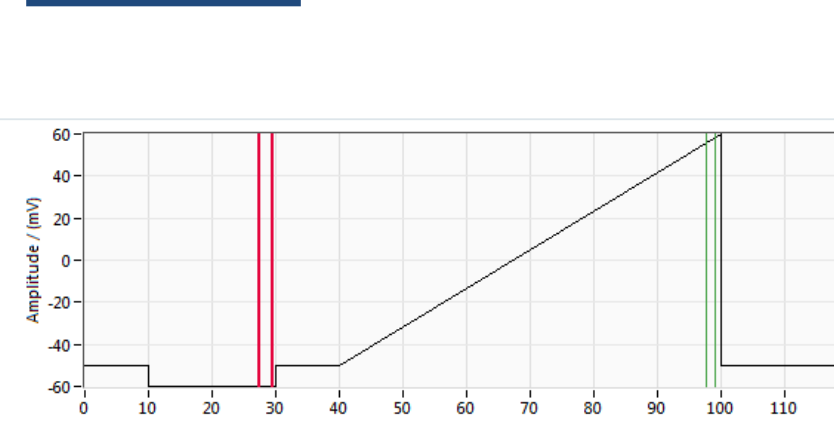
Features:

- Modular approach
- Parallel 384 amplifier and pipetting head
- Internal perfusion
- Temperature control (cell hotel, whole device)
- Nanon Software (for recording, analysis, batch export)

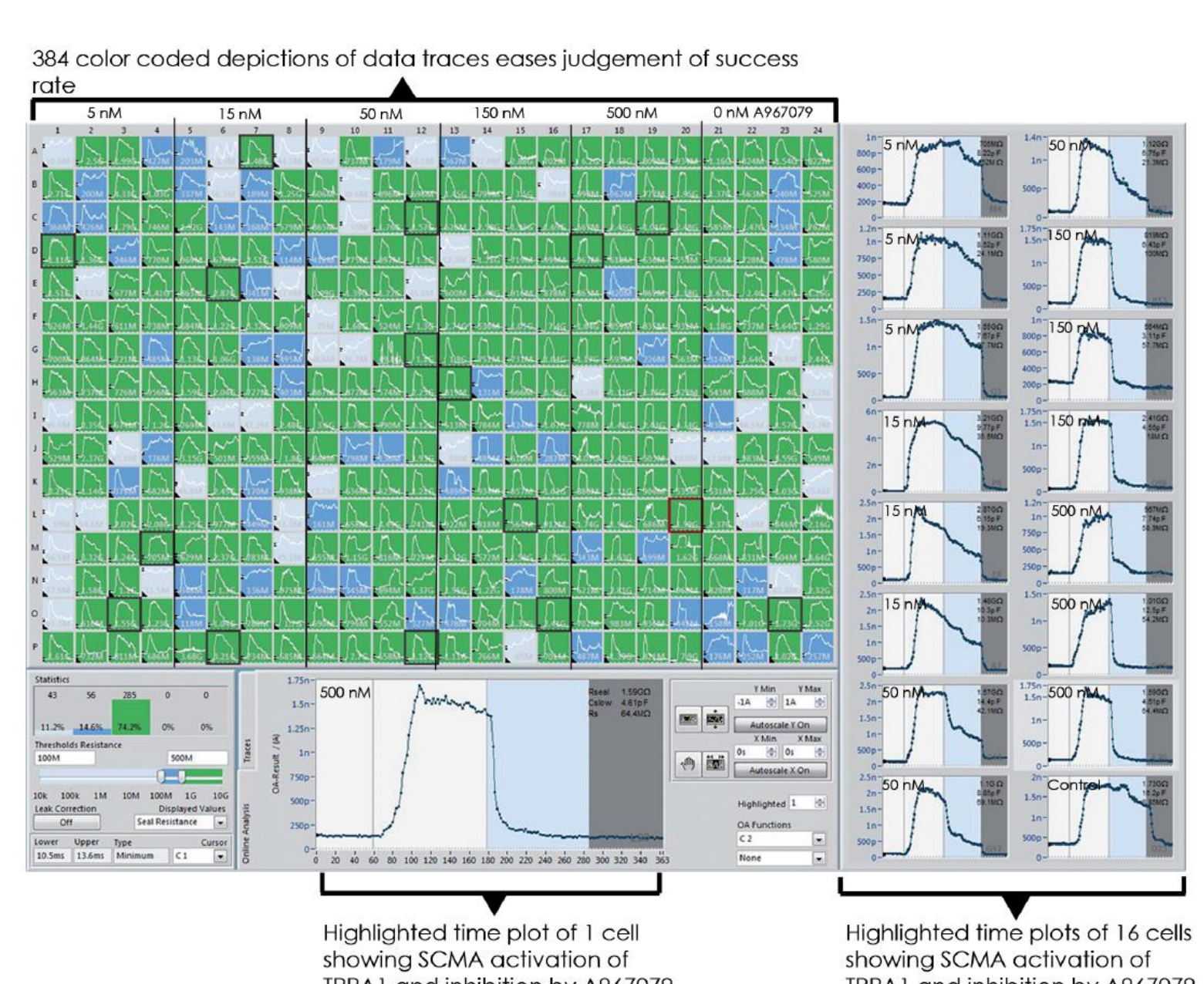


TRPA1

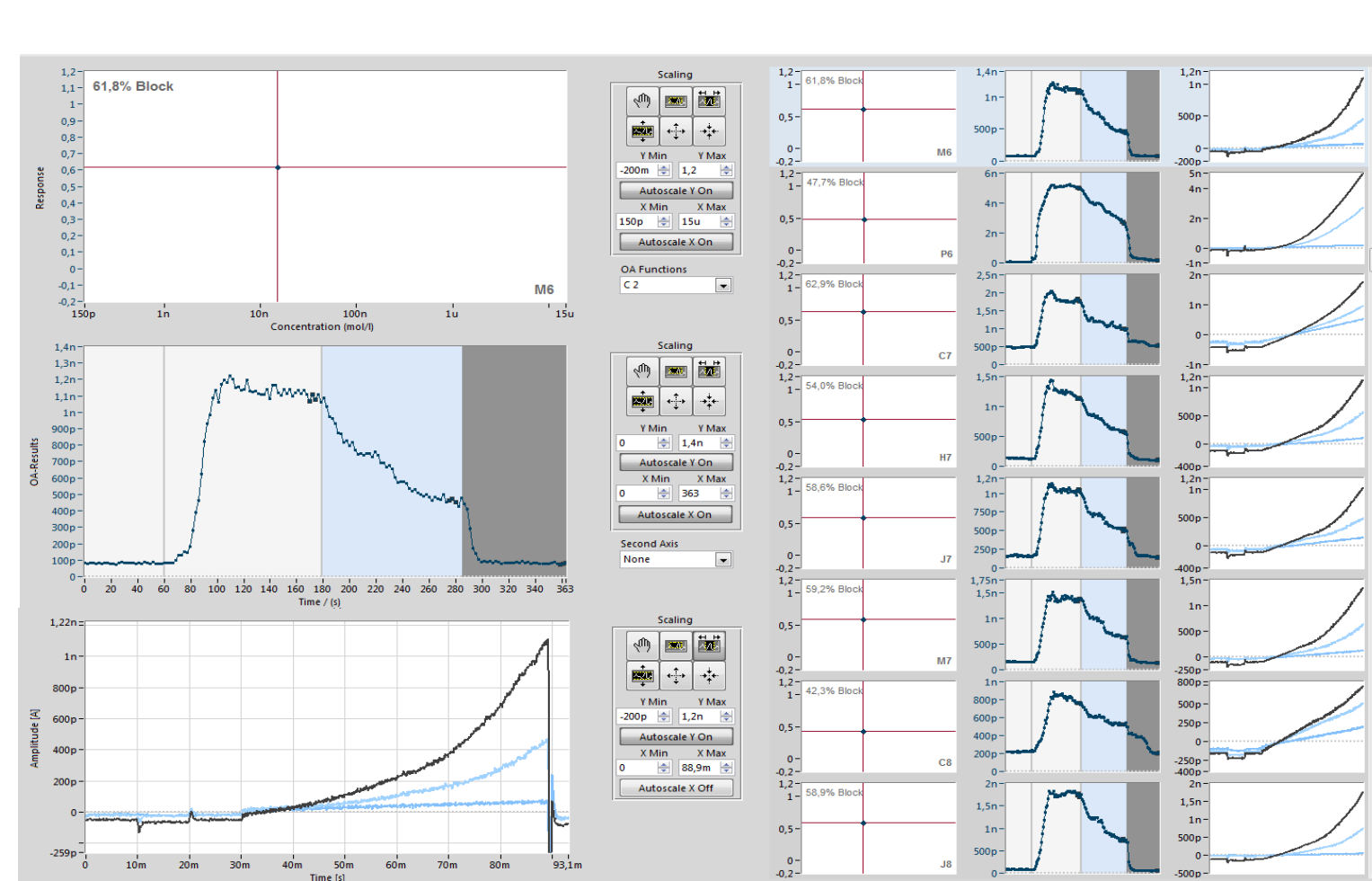
Recording in PatchControl Software



- activated by SCMA
- blocked by A-967079
- concentration range across the 384 chip



Analysis in DataControl Software



- Define QC parameters during experiment
- Include or reject wells
- Manual or automatic analysis
- Configurable export of raw and analysed data
- Batch processing

Example: Internal Perfusion

