

Application Report

CHO-Kv1.5 Voltage-gated potassium channels on QPatch

IV characteristics and dose-response results were achieved by using Kv1.5 channel blocker

Summary

The voltage-gated potassium channel Kv1.5 is a homotetrameric protein present in the heart. It is a delayed rectifier, participating in the early phase of the heart action potential. This report shows data from CHO cells stably expressing Kv1.5 tested on the QPatch platform. The cells are obtained through a collaboration with STZ (Germany).

Introduction

The voltage-gated potassium channel Kv1.5 is a homotetrameric protein present in the heart. It is a delayed rectifier, participating in the early phase of the heart action potential. This report shows data from CHO cells stably expressing Kv1.5 tested on the QPatch platform.

Results

Experiments were conducted to evaluate the IV-relationship of Kv1.5 as well as dose-response for inhibitors.

Figure 1 shows the currents elicited at potentials ranging from -90 mV to +50 mV in a representative experiment with CHO-Kv1.5. The corresponding IV plot for both maximum and steady-state current is shown in Figure 2.

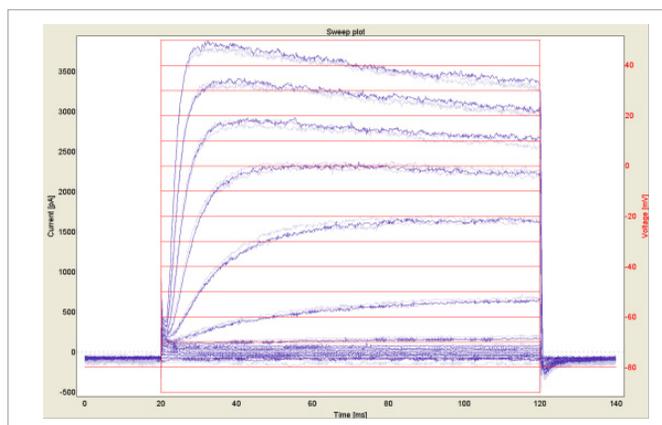


Fig. 1. KV1.5 raw data sweeps elicited in an IV-protocol with steps ranging from -90 to +50 mV.

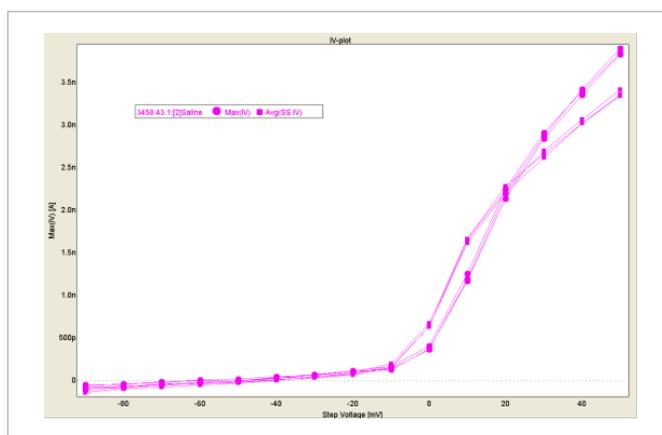


Fig. 2. Current-voltage relationship (IV plot) of the data shown in Figure 1. Circles show the maximum elicited current, squares show the steady-state current.

The response of Kv1.5 to a known blocker was also tested. Figure 3 shows the raw data traces of the steady-state response to six different concentrations of 4-aminopyridine. Figure 4 and Figure 5 show the corresponding current versus time (IT) plot and Hill fit, respectively. The resulting IC_{50} for 4-aminopyridine is 63.8 μ M.

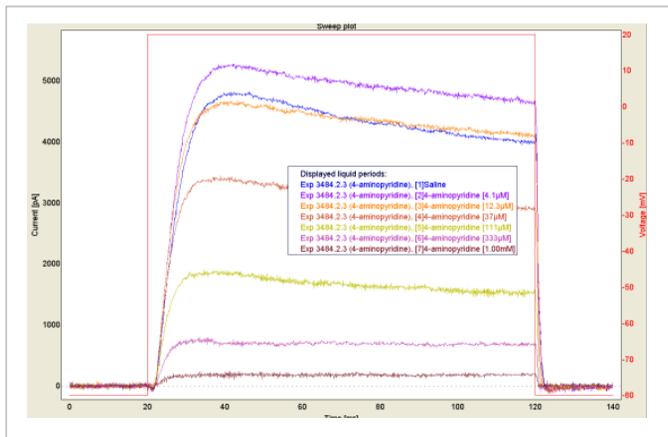


Fig. 3. Six-point cumulative dose-response experiment with 4-aminopyridine.

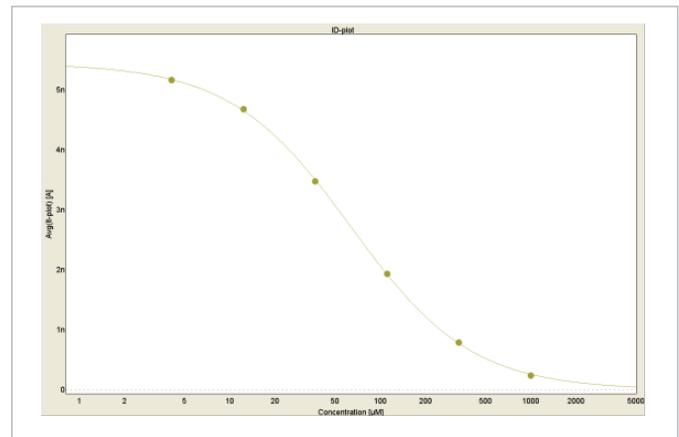


Fig. 5. Dose-response plot, with Hill fit, of steady-state current level at six concentrations of 4-aminopyridine.

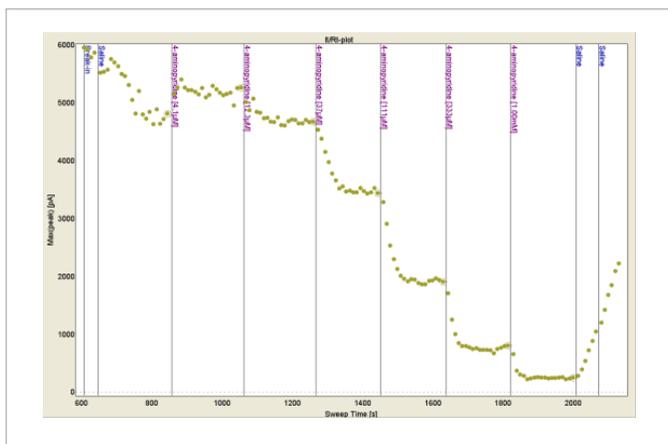


Fig. 4. IT plot of Kv1.5 channel response to increasing concentrations of 4-aminopyridine.

Conclusion

IV characteristics and dose-response experiments with a Kv1.5 channel blocker was successfully obtained using QPatch. Kv1.5 shows its characteristic outward rectification and an IC_{50} for 4-aminopyridine within range of reported literature values (e.g. Gutman et al., *Pharmacological Reviews* 57:473-508, 2005, 270 μ M).

Methods

Cells: CHO cells stably expressing Kv1.5 were obtained from STZ. Cells were cultured and harvested for QPatch experiments as described in the Sophion SOP. Data shown here is from STZ CHO-Kv1.5 clone 16.

References:

1. Gutman GA et al 2005. International Union of Pharmacology. LIII. Nomenclature and Molecular Relationships of Voltage-Gated Potassium Channels. *Pharmacological Reviews* 57:473-508