Optogenetics: A Bright Future for Voltage Gated Ion Channels

1. Introduction and scientific background

- Channelrhodopsin-2 (ChR2) is a light-activated microbial cation channel which can be used to depolarize neurons through the incidence of blue light (470 nm). Responsibly, its expression can control neuronal activity through directive stimulation and optogenetic screenings.

- Proof of principle studies have been performed to verify the applicability of this tool for the development of high-throughput screening (HTS) platforms as microplate readers.

- An Axio Vert.A1 with a 20x, 0.8 NA objective was used to confirm the pharmacological profile.

- Data obtained for the ChR2/hCav1.3 cell line by light stimulation have been also compared to the extracellular potassium stimulus and to patch-clamp to cross-check their reliability.

- The possibility to optically control the plasma membrane voltage opens new and interesting perspectives for the characterization of voltage-gated ion channels.

2. Optogenetics: overview

- Isradipine is a blocker of low voltage activated Cav1.3. Isradipine was tested in the resting and the partial inactivated Cav1.3 states, and it was used to confirm the pharmacological profile.

- The pharmacology of this tool for the development of cell based assays in High Throughput Screening (HTS) platforms as microplate readers is opened new and interesting perspectives for the characterization of voltage-gated ion channels.

3. Material and methods

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4. Conclusions and future developments

- The pharmacology of this tool for the development of cell based assays in High Throughput Screening (HTS) platforms as microplate readers is opened new and interesting perspectives for the characterization of voltage-gated ion channels.

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