Analysing TRP channels using state-of-the-art artificial bilayer methodology

SY04-10

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Thermal Transient Receptor Potential (TRP) channels belong to an important class of receptors for drug screening as they are involved in sensations like pain and taste. TRP channels are found widely distributed throughout the mammalian central and peripheral nervous systems and are sensitive to temperature, ligands and mechanic stimulation. However, using electrophysiological assays, TRP channels are difficult targets to analyze due to their multiple and diverse pathways of activation and the requirement of a precise temperature control.

Here we demonstrate that TRP channels can be analyzed in a reliable manner with artificial bilayer recordings. In particular, we studied different reconstituted TRP channels (purified human TRP-A1, TRP-V1, TRP-V3 and TRP-M8) using Nanion's recently introduced Orbit mini setup.

Planar lipid bilayers were formed by painting lipids in organic solvents over Micro Electrode Cavity Arrays (MECA) in a highly inert polymer. The reconstitution of TRP channels were achieved by adding the purified proteins directly to the bilayers. The TRP channels were activated either by specific ligand or by temperature protocols using the integrated temperature control system of the Obit mini setup with a precision of ± 1˚C.

The data obtained from experiments involving artificial bilayers were compared to data obtained from experiments on stably-transfected HEK cell lines (Millipore, Charles River) using an automated patch clamp platform (Patchliner, Nanion) with temperature control.