Cell Communication and Signaling BioMed Central

Meeting abstract

Open Access

Modulatory function of PI3-kinase γ in nociceptive neurons

C König*[1], M Grün[1], R Bauer[1], G Segond von Banchet[2], O Gavrilova-Ruch[3], H-G Schaible[2], SH Heinemann[3] and R Wetzker[1]

Address: [1]Friedrich-Schiller-University Jena, Center of Molecular Biomedicine, Institute of Molecular Cell Biology, Jena, Germany, [2]Friedrich-Schiller-University Jena, Medical School, Institute of Physiology I, Jena, Germany and [3]Friedrich-Schiller-University Jena, Center of Molecular Biomedicine, Institute of Molecular and Cellular Biophysics, Jena, Germany

* Corresponding author

from 12th Joint Meeting of the Signal Transduction Society (STS). Signal Transduction: Receptors, Mediators and Genes
Weimar, Germany. 29–31 October 2008

Published: 26 February 2009

Cell Communication and Signaling 2009, **7**(Suppl 1):A108 doi:10.1186/1478-811X-7-S1-A108

This abstract is available from: http://www.biosignaling.com/content/7/S1/A108

Phosphoinositid 3-Kinase γ (PI3Kγ), the only known member of class Ib PI3K's, is activated by G-Protein coupled receptors (GPCRs), producing the second messenger phosphatidylinositol-3,4,5-trisphosphate (PIP3). In addition, PI3Kγ possesses an intrinsic protein kinase activity and might express a scaffold function in the signaling network of different cells. PI3Kγ is expressed in hematopoietic cells acting as a main mediator of proliferation, differentiation, migration and survival of leukocytes. Recent studies expand these well-established cell specific functions of PI3Kγ to other cell types like cardiomyocytes. In heart PI3Kγ exhibits a negative regulatory function on the contractility by controlling the intracellular cAMP-level in concert with Phosphodiesterase 3B (PDE3B).

In the present study we describe for the first time PI3Kγ expression and functional pattern in cell types of neuronal origin. PI3Kγ-protein is expressed in small diameter neurons of dorsal root ganglia (DRG), which form widely unmyelinated C-fibers into the body's periphery. These primary sensory neurons exhibit nociceptive functions and can lead to a slow, dull and long lasting pain perception. These neurons are heavily involved in the processes of neuropathic and inflammatory pain accompanied by molecular modifications in the interplay of extra- and intracellular milieus – the playground of PI3Kγ.

Now we take advantage of the PI3Kγ-knockout mice to evaluate the impact of PI3Kγ in behavioral studies and primary dorsal root ganglia cultures. Analysis of nociceptive behaviors and studies on DRG-cultures suggest an involvement of the signaling protein in the μ-opioid-receptor path. An important regulation of the opioid-receptor system is the sensitization and desensitization of the receptors. Effects of different μ-receptor-agonists point to a differential involvement of PI3Kγ in antinociceptive signaling in primary sensory neurons.