

Characterization of Calcium-Signalling Mediated by Human GPR55 Expressed in HEK293 Cells

Authors : Yousuf M. Al Suleimani, Robin Hiley

Abstract : The endogenous phospholipid lysophosphatidylinositol (LPI) was recently identified as a novel ligand for the G protein-coupled receptor 55 (GPR55) and an inducer of intracellular Ca^{2+} [Ca^{2+}]_i release. This study attempts to characterize Ca^{2+} signals provoked by LPI in HEK293 cells engineered to stably express human GPR55 and to test cannabinoid ligand activity at GPR55. The study shows that treatment with LPI stimulates a sustained, oscillatory Ca^{2+} release. The response is characterized by an initial rapid rise, which is mediated by the $G\alpha_q$ -PLC-IP3 pathway, and this is followed by prolonged oscillations that require RhoA activation. Ca^{2+} oscillations are initiated by intracellular mechanisms and extracellular Ca^{2+} is only required to replenish Ca^{2+} lost from the cytoplasm. Analysis of cannabinoid ligand activity at GPR55 revealed no clear effect of the endocannabinoid anandamide, however, rimonabant and the CB1 receptor antagonist AM251 evoked GPR55-mediated [Ca^{2+}]_i. Thus, LPI is likely to be a key plasma membrane mediator of signaling events and changes in gene expression through GPR55 activation.

Keywords : lysophosphatidylinositol, calcium, GPR55, cannabinoid

Conference Title : ICSR2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020