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MEETING ABSTRACT Open Access

Signalling and function of the human G protein-coupled receptor 55

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Background

We have recently shown that the G protein-coupled receptor 55 (GPR55) responds to some of the cannabinoid and non-cannabinoid ligands in addition to the classical cannabinoid 1 (CB_1) and 2 (CB_2) receptors. Here we show multiple signaling pathways triggered by GPR55 in response to its agonists. In addition the cytoskeleton rearrangement mediated by GPR55 is investigated.

Materials and methods

HEK-293 cells stably expressing the human GPR55 receptor were characterized in terms of signaling properties. To this end, reporter gene, dynamic mass redistribution (DMR), mitogen-activated protein kinases (MAPK) activation and phalloidin actin staining assays have been performed.

Results

Here we show that GPR55 is activated by lysophosphatidylinositol (LPI), AM251, SR141716A (rimonabant) and AM281. GPR55 activation induces NF-κB, NFAT and CREB activation. Stimulation of GPR55 induces F-actin formation under the control of Gα13, RhoA and ROCK. We also show the suitability of Corning® Epic® DMR assay for GPR55 ligand screening. Furthermore, GPR55 activation leads to phosphorylation of extracellular signal-regulated kinase 1/2 (ERK 1/2).

Conclusions

GPR55 as the novel cannabinoid receptor triggers distinct signaling pathways in response to LPI and some classical CB_1 receptor inverse agonists/antagonists. Stress fiber formation mediated by GPR55 might indicate the probable function of this receptor *in vivo*.

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