Abstract

Trafficking of G-protein coupled receptors (GPCRs) plays a crucial role in controlling the precise localization of the receptor as well as its regulation. Metabotropic glutamate receptor 1 (mGluR1) is a member of the group I mGluR family. This receptor belongs to the family of G-protein coupled receptors (GPCRs). mGluR1 plays a critical role in neuronal circuit formation and also in multiple types of synaptic plasticity including learning and memory. This receptor has also been implicated in various neuropsychiatric disorders like Fragile X-syndrome, autism etc. Although it has been reported that similar to many other GPCRs mGluR1 also gets endocytosed on ligand application but the subsequent events after the internalization of the receptor and the cellular and molecular mechanisms that govern mGluR1 trafficking in the central nervous system has not been studied. We show in this study that mGluR1 internalized on ligand application. Subsequent to endocytosis, majority of the receptors localized at the recycling compartment and no significant presence of the receptor was noticed in the lysosome. Furthermore, mGluR1 returned to the cell membrane subsequent to ligand-mediated internalization. We found that the recycling of mGluR1 was dependent on the activity of protein phosphatase 2A (PP2A). Finally, we studied the role of a scaffolding protein Tamalin in the trafficking of group I mGluRs. Our data suggested that in primary hippocampal neurons Tamalin played critical role in the ligand-mediated trafficking of group I mGluRs as well as in mGluR-dependent AMPAR trafficking which is the cellular correlate for mGluR-dependent synaptic plasticity.