

Research report

## Expression of functional receptors and transmitter enzymes in cultured Muller cells

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### Abstract

Glia represents the most numerous group of nervous system cells and CNS development and function depend on glial cells. We developed a purified Müller glia culture to investigate the expression of several neurotransmitter markers on these cells, such as dopaminergic, cholinergic, GABAergic and peptidergic receptors or enzymes, based on functional assays measuring second messenger levels or Western blot for specific proteins. Purified Müller cell culture was obtained from 8-day-old (E8) embryonic chick. Glial cells cultured for 15 days (E8C15) expressed D<sub>1A</sub> and D<sub>1B</sub> receptors mRNAs, but not D<sub>1D</sub>, as detected by RT-PCR. The binding of [<sup>3</sup>H]-SCH 23390 revealed an amount of expressed receptors around 40 fmol/mg protein. Dopamine (100 μM), PACAP (50 nM) and forskolin (10 μM) induced a 50-, 30- and 40-fold cAMP accumulation on glial cells, respectively, but not ip<sub>3</sub> production. The dopamine-promoted cAMP accumulation was blocked by 2 μM SCH 23390. Carbachol stimulated a 3-fold ip<sub>3</sub> accumulation. Western blot analysis also revealed the expression of tyrosine hydroxylase, L-dopa decarboxylase, PAC1 receptor, GAD67 and β<sub>2</sub>-nicotinic receptor subunit by these cells. These results indicate that several components of neurotransmitter signaling and metabolism are found in cultured Müller cells.

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*Topic:* Glia and other non-neuronal cells

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### 1. Introduction

Glia represents the majority of nervous system cells and CNS development and function depends on glial cells. These cells are involved with the guidance of migrating post-mitotic cells toward their final location [28], are implicated in the spatial buffering of extracellular potassium and glutamate [1,21], induce neuroprotection, regeneration

and support neuronal survival through trophic factors [7,19,30]. Glial cells also participate actively in synapse maturation [25,37].

Müller glia is the predominant glial element of the vertebrate retina, comprising 90% of the retinal glia. Müller cells interact with most of the neurons in the retina, resembling a symbiotic relationship [33]. They span the whole length of the retina, extending from the internal limiting membrane to the outer limiting membrane, with cell bodies located in the inner nuclear layer and lateral processes expanding into the plexiform layers of the tissue [32]. In this sense, it has been shown that the Müller cells

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