Abstract

The nucleoside adenosine plays an important role as a neurotransmitter or neuromodulator in the central nervous system, including the retina. In the present paper we review compelling evidence showing that adenosine is a signaling molecule in the developing retina. In the chick retina, adenosine transporters are present since early stages of development before the appearance of adenosine A1 receptors modulating dopamine-dependent adenylate cyclase activity or A2 receptors that directly activate the enzyme. Experiments using retinal cell cultures revealed that adenosine is taken up by specific cell populations that when stimulated by depolarization or neurotransmitters such as dopamine or glutamate, release the nucleoside through calcium-dependent transporter-mediated mechanisms. The presence of adenosine in the extracellular medium and the long-term activation of adenosine receptors is able to regulate the survival of retinal neurons and blocks glutamate excitotoxicity. Thus, adenosine besides working as a neurotransmitter or neuromodulator in the mature retina, is considered as an important signaling molecule during retinal development having important functions such as regulation of neuronal survival and differentiation.

Keywords

nucleoside, receptors and transporters, development, cell culture, uptake and release.