

Extracellular ATP and adenosine: The Yin and Yang in immune responses?

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Abstract

Extracellular adenosine 5'-triphosphate (ATP) and adenosine molecules are intimately involved in immune responses. ATP is mostly a pro-inflammatory molecule and is released during hypoxic condition and by necrotic cells, as well as by activated immune cells and endothelial cells. However, under certain conditions, for instance at low concentrations or at prolonged exposure, ATP may also have anti-inflammatory properties. Extracellular ATP can activate both P2X and P2Y purinergic receptors. Extracellular ATP can be hydrolyzed into adenosine in a two-step enzymatic process involving the ectonucleotidases CD39 (ecto-apyrase) and CD73. These enzymes are expressed by many cell types, including endothelial cells and immune cells. The counterpart of ATP is adenosine, which is produced by breakdown of intra- or extracellular ATP. Adenosine has mainly anti-inflammatory effects by binding to the adenosine, or P1, receptors (A1, A2A, A2B, and A3). These receptors are also expressed in many cells, including immune cells. The final effect of ATP and adenosine in immune responses depends on the fine regulatory balance between the 2 molecules. In the present review, we will discuss the current knowledge on the role of these 2 molecules in the immune responses..

Keywords

ATP, Adenosine, Immune response, Inflammation..