Guanylate cyclase

Guanylate cyclase (EC 4.6.1.2, also known as guanyl cyclase, guanylyl cyclase, or GC) is a lyase enzyme. Guanylate cyclase is often part of the G protein signaling cascade that is activated by low intracellular calcium levels and inhibited by high intracellular calcium levels. In response to calcium levels, guanylate cyclase synthesizes cGMP from GTP. cGMP keeps cGMP-gated channels open, allowing for the entry of calcium into the cell.[1] Like cAMP, cGMP is an important second messenger that internalizes the message carried by intercellular messengers such as peptide hormones and NO, and can also function as an autocrine signal. Depending on cell type, it can drive adaptive/developmental changes requiring protein synthesis. In smooth muscle, cGMP is the signal for relaxation, and is coupled to many homeostatic mechanisms including regulation of vasodilaton, vocal tone, insulin secretion, and peristalsis. Once formed, cGMP can be degraded by phosphodiesterases, which themselves are under different forms of regulation, depending on the tissue.