COMPONENTES REGULADORES DE LA ADENILATO CICLASA UN MODELO DE TRANSMISION DE INFORMACION A TRAVES DE LA MEMBRANA CELULAR

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SUMMARY: *REGULATORY COMPONENTS OF THE ADENYLATE CYCLASE. A MODEL OF INFORMATION TRANSDUCTION THROUGH THE CELLULAR MEMBRANE.- In the adenylate cyclase system, the hormone binds specifically to the receptor protein at the external surface of the cellular membrane. In the second step, the hormone-receptor complex H.R. interacts with a second protein, situated within the membrane and referred as N protein.*

In the third step, the activated N protein interacts with the catalytic component C of the adenylate cyclase, and the activation of this component, a transmembrane protein, provokes the intracellular formation of cAMP from ATP in the presence of Mg^{++} and GTP.

There are two species of N proteins: one of them is called N_s of $\alpha_s\,\beta\gamma$ subunits composition and the other is called N_i of $\alpha_i\,\beta\gamma$ composition. There are also two types of hormones able to work through the adenylate cyclase system: H_s or stimulant hormones which increase the synthesis of cAMP through N_s protein, and H_i or inhibitory hormones which decrease the synthesis of cAMP through N_i protein.

N_s protein can be preactivated by the hormone-receptor complex $H_s \cdot R_s$, with the participation of GTP and Mg^{++}, and the preactive form GTP–$\alpha_s\,\beta\gamma$ is afterwards dissociated in GTP–α_s and $\beta\gamma$ complex. N_i protein can be likewise preactivated by the hormone-receptor complex $H_i \cdot R_i$, and the preactive form GTP–$\alpha_i\,\beta\gamma$ is afterwards dissociated in GTP–α_i and $\beta\gamma$. The active complex GTP–α_s* is able to interact with C increasing the synthesis of cAMP, and the active complex GTP–α_i* decreases such synthesis interacting with C at a different site of this catalytic component.*

In the subsequent processes of deactivation, provoked by the GTPase activity of N_s or N_i, GTP–α_s or GTP–α_i* are hydrolysed at the GTP group and simultaneously reassociated with the $\beta\gamma$ complex, so that the inactive GDP–$\alpha_s\,\beta\gamma$ or GDP–$\alpha_s\,\beta\gamma$ complexes are formed. These complexes may be reactivated, by loss of GDP and incorporation of GTP in the presence of Mg^{++}, when another H molecule binds to R starting in this way a new N activation cycle.*

The receptors affinity to the hormones is high when N proteins are deactivated and diminishes during N proteins activations. The interactions or interchanges between distinct N_s and N_i molecules may be possible through $\beta\gamma$ complex, as it is identical or the same to both species of N proteins.

In Fig. 5 are represented all the reactions mencioned above concerning to N_s protein. The cholera toxin (C.T.) blocks GTP–α_s deactivation by ADP-Ribosylation of α_s, which inhibits the GTPase activity of N_s protein.*

The functional value of the adenylyl cyclase system at the intestinal epithelials cells and the efficiency of laudanum and opiates in the control of diarrhoea are commented.