Dopamine receptor expression in rabbit corpora lutea

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Dopamine is a neurotransmitter involved in the control of several cerebral function as well as of the brain-pituitary axis. It plays also a role in modulating autonomic and peripheral functions, control of cardiovascular and renal function being the best characterized peripheral actions of dopamine. These actions are mediated through the interation with specific dopamine receptors (DR) which are G protein-coupled receptor sites belonging to five subtypes, grouped in the superfamilies of DRD1-like (D1 and D5) and DRD2-like (D2, D3 and D4) receptor sites. DRD1-like are positively coupled with adenylate cyclase and stimulate phospholipase C; DRD2-like are negatively coupled or uncoupled with adenylate cyclase.

Dopamine is assumed to affect the ovary function after its conversion into noradrenaline, but it cannot be excluded a modulatory direct and different activity of dopamine on ovarian tissues.

The expression of DRD1-like and DRD2-like, was investigated in rabbit ovarian tissues, collected at early- (day 4), mid- (9) and late- (13) luteal stages of pseudopregnancy, by immunohistochemical techniques.

Immunosignals for DRD1 and DRD3 were observed in the corpora lutea and in the component of the vasal wall during all pseudopregnancy stage considered, whereas DRD2, DRD4 and DRD5 were not immunoexpressed.

D1 dopamine receptor could play a pivotal role in modulating ovarian calcium intracellular levels by several machanisms. Many pharmacological agents interact particularly with the D2-like receptor subfamily such as D2 and D3 which have a high degree of sequence homology. Interestingly, we have found that D2 dopamine receptor are no- or down-expressed in the luteal and vasal cells, while the DRD3 was highly expressed. DRD3, compared to DRD2, has a greater affinity for dopamine and for several dopamine agonists; on the contrary, it is weakly coupled to G proteins. Furthermore, DRD2 and DRD3 are often co-expressed in the same neuron in native tissues; it is possible that in the luteal and vasal cells DRD2 and DRD3 do not interact functionally by forming heterodimers receptors combining their pharmacological and functional characteristics.

These preliminary results support the hypothesis that dopamine receptors are involved in the control of the rabbit corpora lutea lifespan.