## Pituitary adenylate cyclase activating polypeptide

The endogenous neurotrophic peptides pituitary adenylate cyclase-activating polypeptides (PACAP-27/38) protect against stroke, but the molecular mechanism remains unknown.

Primary rat neural cells were exposed to PACAP-27 or PACAP-38 before induction of experimental acute ischemic stroke via oxygen glucose deprivation reperfusion injury. To reveal PACAP's role in neuroprotection, Kaneko et al. from the University of South Florida and Xuanwu Hospital employed fluorescent live/dead cell viability and caspase 3 assays, optical densitometry of mitochondrial dehydrogenase and cell growth, glutathione disulfide luciferase activity, ELISA for high mobility group box1 extracellular concentration, ATP bioluminescence, Western blot analysis of PACAP, NMDA subunits, apoptosis regulator Bcl-2, social interaction hormone oxytocin, and trophic factor BDNF, and immunocytochemical analysis of PACAP.

Both PACAP-27 and PACAP-38 (PACAP-27/38) increased cell viability, decreased oxidative stressinduced cell damage, maintained mitochondrial activity, prevented the release of high mobility group box1, and reduced cytochrome c/caspase 3-induced apoptosis. PACAP-27/38 increased the protein expression levels of BDNF, Bcl-2, oxytocin, and precursor PACAP. N-methyl-D-aspartate receptor (NMDA receptor)-induced excitotoxicity contributes to the cell death associated with stroke. PACAP-27/38 modulated the protein expression levels of NMDAR subunits. PACAP-27/38 increased the protein expression levels of the GluN1 subunit, and decreased that of the GluN2B and GluN2D subunits. PACAP-27, but not PACAP-38, increased the expression level of the GluN2C subunit.

This study provides evidence that PACAP regulated NMDAR subunits, affording neuroprotection after OGD/R injury  $^{1)}$ .

The effect of pituitary adenylate cyclase-activating polypeptide (PACAP) on LH and FSH secretion by human pituitary gonadotrophinomas in cell culture was studied. PACAP (1-38 peptide, 0.2-20 nmol/L) dose-dependently stimulated both LH and FSH secretion after 24 hours incubation. Of 11 tumours studied, PACAP (20 nmol/L) stimulated LH and/or FSH secretion by 1.7-4 fold in 9 cases. Two tumours did not respond to PACAP, although LHRH was stimulatory in these. None of the 11 tumours contained gsp mutations, excluding the possibility that these were the cause of the occassionally observed non-responsiveness to PACAP. A combination of PACAP (20 nmol/L) together with TRH (25 nmol/L) resulted in greater stimulatory effects on LH and FSH secretion than exerted by either peptide alone, but this was not observed with LHRH. In 3 tumours tested, PACAP stimulated cAMP production 2-3 fold by cultured human pituitary gonadotrophinomas but had no effect on rate of phosphatidylinositol (PI) turnover. These results indicate that PACAP can directly stimulate LH and FSH secretion by human pituitary gonadotrophs and that PACAP-receptors in gonadotrophin-secreting tumours are coupled with adenylate cyclase but not the PI second messenger system.

Petersen et al. conclude that PACAP may play a role in controlling gonadotroph function in the human pituitary gland <sup>2)</sup>.

## 1)

Kaneko Y, Tuazon JP, Ji X, Borlongan CV. Pituitary Adenylate Cyclase Activating Polypeptide Elicits Neuroprotection Against Acute Ischemic Neuronal Cell Death Associated with NMDA Receptors. Cell Last update: 2024/06/07 pituitary\_adenylate\_cyclase\_activating\_polypeptide https://neurosurgerywiki.com/wiki/doku.php?id=pituitary\_adenylate\_cyclase\_activating\_polypeptide 02:58

Physiol Biochem. 2018 Dec 4;51(4):1982-1995. doi: 10.1159/000495722. [Epub ahead of print] PubMed PMID: 30513524.

Petersen B, Buchfelder M, Fahlbusch R, Adams EF. Pituitary adenylate cyclase-activating polypeptide directly stimulates LH and FSH secretion by human pituitary gonadotrophinomas. Exp Clin Endocrinol Diabetes. 1996;104(3):250-5. PubMed PMID: 8817243.

From: https://neurosurgerywiki.com/wiki/ - Neurosurgery Wiki

Permanent link: https://neurosurgerywiki.com/wiki/doku.php?id=pituitary\_adenylate\_cyclase\_activating\_polypeptide

Last update: 2024/06/07 02:58

