Vasopressin receptor 2

Vasopressin receptor 2 (V2R), or arginine vasopressin receptor 2 (officially called AVPR2), is a protein that acts as receptor for vasopressin.

AVPR2 belongs to the subfamily of G-protein-coupled receptors. Its activity is mediated by the Gs type of G proteins, which stimulate adenylate cyclase.

AVPR2 is expressed in the kidney tubule, predominantly in the membrane of cells of the distal convoluted tubule and collecting ducts, in fetal lung tissue and lung cancer, the last two being associated with alternative splicing. AVPR2 is also expressed outside the kidney, and, when stimulated, can cause the release of Von Willebrand Factor from the Weibel-Palade Bodies in the endothelial cells of the vasculature. Because Von Willebrand Factor helps to stabilize circulating levels of factor VIII, the vasopressin analog, Desmopressin can be used to stimulate the AVPR2 receptor and increase levels of circulating factor VIII. This is useful in the treatment of Hemophilia A as well as Von Willebrand disease.

In the kidney, AVPR2's primary property is to respond to arginine vasopressin by stimulating mechanisms that concentrate the urine and maintain water homeostasis in the organism. When the function of AVPR2 is lost, the disease Nephrogenic Diabetes Insipidus (NDI) results.

Yang et al., from the Huashan Hospital, investigated the expression of vasopressin receptor 2 and 3 on corticotrophin tumor cells, their role in regulating ACTH secretion, and their potential therapeutic implications.

They retrospectively assessed 52 hospitalized patients with pathologically confirmed ACTH-secreting tumors. The expression of vasopressin receptor 2 and 3 was explored via qualitative and quantitative immunohistochemistry analyses. The role of vasopressin receptors in regulating ACTH secretion was further studied in the AtT20 cell line.

Among 50 cases of pituitary Corticotroph adenoma, 31 were vasopressin receptor 2 positive, 38 were vasopressin receptor 3 positive, and 24 were both vasopressin receptor 2 and 3 positive. Two patients with ectopic ACTH syndrome were vasopressin receptor 3 positive, and one was also vasopressin receptor 2 positive. In 12 patients who underwent bilateral inferior petrosal sinus sampling before surgery, the central ACTH increment ratio after desmopressin stimulation was correlated with vasopressin receptor 2 but not with vasopressin receptor 3 staining intensity. In an in vitro study, the expression of both vasopressin receptor 2 and 3 on AtT-20 cells was confirmed. The vasopressin receptor 2 antagonist Tolvaptan inhibited desmopressin-induced ACTH secretion in a dose-dependent manner.

Both vasopressin receptor 2 and 3 are expressed in ACTH-secreting tumors. Vasopressin receptor 2 rather than vasopressin receptor 3 is the primary receptor that seems to mediate the ACTH response in corticotrophin tumors. A vasopressin receptor 2 antagonist can inhibit ACTH secretion induced by desmopressin in AtT-20 cells¹⁾.

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Yang J, Yang Y, Wang Y, Zhang S, Cheng H, Wang S, Ge L, Li Y, Ye H. Role of Vasopressin Receptor 2 and 3 in ACTH-Secreting Tumors and their Potential Therapeutic Implications. Exp Clin Endocrinol

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