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VGF-like Immunoreactivity in Amphibian Hypothalamo-Hypophysial System

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VGF is a neurotrophin-inducible early-delayed gene that encodes a 617-amino-acid polypeptide-VGF protein-bearing no significant homology with known sequences. The VGF protein is selectively expressed in specific groups of cells in the mammalian central nervous system, particularly in the hypothalamus (e.g., suprachiasmatic, paraventricular, and supraoptic nuclei)¹ and in endocrine cells such as adenohypophysial and adrenal medullary cells.² VGF is stored and transported in secretory granules and processed to intermediate to small molecular weight products, which are preferentially released.³

In the present immunohistochemical study, the distribution of VGF protein was examined in the hypothalamo-hypophysial complex of two anuran species: *Xenopus laevis* and *Rana esculenta*. The two antibodies a-VGF^d used were: anti-VGF₂₁₅, raised against the C-terminus, and anti-VGF₂₁₆, against a potential cleavage product of VGF. Double labellings were performed in a simultaneous procedure using a-VGF and a-LH^e (luteinizing hormone) antibodies.

VGF NEUROENDOCRINE LOCALIZATION

In *Xenopus laevis*, the hypothalamus is a major site of VGF localization: many VGF-immunoreactive (-ir) fibers and scattered bipolar neurons were detected in the anterior and supra/retrochiasmatic areas. The most conspicuous VGF-ir cell group (liquor-contacting neurons) was observed in the paraventricular organ (PVO) (FIG. 1a). Immunostained beaded fibers were also observed along the preoptic-hypophysial tract, and a strong VGF-immunoreactivity was found in the fibrous layer of the median eminence and in the pars nervosa (FIG. 1b) of the pituitary (in perivascular terminals and Herring bodies). Small clusters of VGF-ir cells were seen in the pars distalis, while no reaction was detected in the pars intermedia of adenohypophysis.

In *Rana esculenta*, only after a-VGF₂₁₆ incubation, a strong reaction was observed in clusters of liquor-contacting neurons in the lateral infundibular recesses of the posterior hypothalamus. No positivity was detected in other hypothalamic areas and in pituitary pars nervosa. In contrast, numerous adenohypophysial cells were immunopositive in the pars distalis, where, after double immunostaining, some cellular colocalizations of VGF- and LH-immunoreactivity were found. VGF-ir fibers were also seen, after a-VGF₂₁₆ incubation, in the pars intermedia of the gland.

^dFrom G.L. Ferri, university of Cagliari (Italy).

^eFrom Affinity Research Products (Ilkeston, United Kingdom).

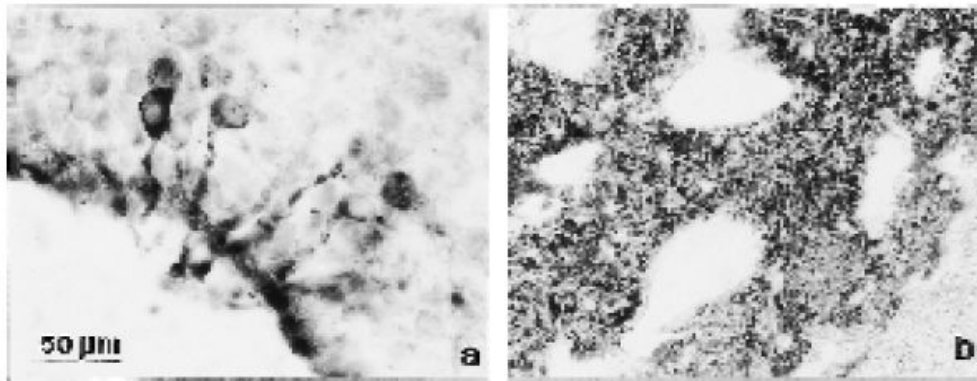


FIGURE 1. Sections of PVO (a), and pituitary pars nervosa (b) of *Xenopus laevis* immunostained with a-VGF antisera.

The present data show the occurrence of a VGF-like antigen in the CNS of amphibians. The observed VGF-immunoreactivity in various mammalian species,^{1,2} as well as in amphibians (present study), indicates a phylogenetic conservation of this protein, although the different distribution patterns observed with the two antibodies (VGF₂₁₅ and VGF₂₁₆) might reflect species-specific processing of the molecule.

It has been suggested that in mammals VGF may represent a precursor of bioactive peptides and control pituitary secretion. Given the abundant VGF-immunoreactivity in the hypothalamo-hypophysial complex, we propose that a similar role could be active also in the neuroendocrine regulation mechanisms of amphibians.

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