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Vascular Plasticity and Vasopressin Secretion in the Neurohypophysis

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Summary

Hypothalamo-neurohypophysial system releases oxytocin (OXT) and vasopressin (AVP) from axonal terminals of the neurohypophysis into blood circulation for controlling body fluid homeostasis and lactation. The vasculature of the neurohypophysis (NH) has wider perivascular space as compared with that of the brains, but it is not completely unknown about functional significance of this wide perivascular space. In the present study, light and electron microscopic observation showed the presence of wide perivascular space between the inner and outer basement membrane and the profile of the outer basement membrane was complicated and rough. Interestingly, there observed perivascular protrusions that extended from perivascular space and accompanied with fine cellular processes of pericytes. OXT- and AVP-containing axonal terminals were likely to localize at these perivascular protrusions rather than smooth vascular surface. The fluorescence of blood-derived tracer molecule fluorescein isothiocyanate (FITC) was mostly seen around or within perivascular protrusion. Chronic salt loading with drinking of 2% NaCl significantly increased the number of perivascular protrusions and length of pericyte cellular processes. The salt loading increased vascular permeability of FITC and surface area of perivascular protrusion. Thus, the present study indicates that wide perivascular space acts as main diffusion route of OXT and AVP, contributes to increase of contact area between axonal terminals and the outer basement membrane of the vasculature, and is reconstructed in response to chronic physiological stimulation or demand of neuropeptide.