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## VIP-Containing Nerves in the Bladder and Sacral Cord

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## 5. VIP-containing nerves in the bladder and sacral cord

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It is known that the concentration of vasoactive intestinal peptide (VIP) in the dorsal sacral cord can be as much as 50 times the dorsal cervical level in humans and cats (Anand *et al.* 1983; Gibson *et al.* 1984). The role of VIP in nociception is unclear but it is contained in small diameter axons (these experiments investigate the origin of VIP in the sacral cord, and the possibility that this peptide is preferentially located in pelvic nerve afferent fibres). The immunocytochemical and radioimmunoassay methods have been described previously (Anand *et al.* 1983).

In the normal cat spinal cord, fibres and terminals containing VIP are most common in the sacral region, where dense aggregates of fibres can be seen in the dorsal roots, Lissauer's tract, laminae I and II, the lateral margin of the dorsal horn, the inter-mediolateral horn, and to a lesser extent, in the dorso-lateral funiculus, the area around the central canal, the ventral horn, and the sacral ventral roots. No immunoreactive VIP-like material could be found in cell bodies in the cord. Seven days after unilateral sacral dorsal root ganglionectomy, there is a striking decrease in the number of VIP-immunoreactive fibres in the dorsal roots, laminae I and II, Lissauer's tract, and the lateral margin of the dorsal horn in the sacral segments on the operated side.

These changes in the cord are in keeping with the radioimmunoassay results, which showed an approximately 90% decrease in VIP content of the dorsal quadrant of the second sacral segment, ipsilateral to the lesion.

Seven days after unilateral transection of the pelvic nerve, a marked reduction in the staining of VIP-immunoreactive nerves in the lateral dorsal horn could be seen on the side of the lesion. This distribution corresponds to the site of the central pathways of pelvic nerve afferents demonstrated by Morgan *et al.* (1981).

The level of the VIP in the bladder is largely unaffected by afferent degeneration following unilateral sacral dorsal root ganglionectomy, probably because VIP-containing cell bodies seen at the bladder base are likely to be the major source of VIP in this tissue.

These results suggest that VIP is present in pelvic nerve afferent fibres, but that its origin in the bladder is largely within ganglionic cells at the base of the bladder.

*References*

- Anand, P., Gibson, S. J., McGregor, G. P., Blank, M. A., Ghatei, M. A., Bacarese-Hamilton, A. J., Polak, J. M. & Bloom, S. R. 1983 *Nature, Lond.* **305**, 143–145.  
Gibson, S. J., Polak, J. M., Anand, P., Blank, M. A., Morrison, J. F. B., Kelly, J. S. & Bloom, S. R. 1984 *Peptides*. (In the press.)  
Morgan, C., Nadelhaft, I. & de Groat, W. C. 1981 *J. comp. Neurol.* **210**, 415–440.