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Ni J¹, Wang X¹, Gu B¹

1. *Shanghai sixth people's hospital, Shanghai Jiaotong University*

SUPERIORITY OF DIFFERENT SPINAL NERVE ROOTS IN NEUROMODULATION OF REFLEX BLADDER ACTIVITY IN RATS

Hypothesis / aims of study

Electrical stimulation of peripheral nerves controlling the bladder, applied as to cause muscle contraction, to activate reflexes, and to modulate some functions of the central nervous system, may offer an alternative, non-destructive medical treatment for incontinence and urinary retention. The aim of the present study was to identify the most efficient sensory and motor spinal nerve roots of the bladder involved in micturition.

Study design, materials and methods Unilateral

Unilateral L5-S2 dorsal roots (DRTs) or ventral roots (VRTs) were electrically stimulated and bladder reflex contraction (BRC) was recorded under isovolumetric condition.

Results

Repeated stimulation of L6 or S1 DRT not only abolished BRC but also induced a post-stimulation inhibitory effect, while repeated stimulation of L5 and S2 DRT had no influence. Only L6 VRT directly caused bladder contraction when the VRTs from L5-S2 were electrically stimulated in sequence. The sacral parasympathetic nucleus (SPN) of L6 segment was more strongly pseudorabies virus (PRV) positive compared with the other segments in the spinal cord. On the other hand, the S1 dorsal root ganglia (DRG) was found having the highest density of PRV-positive neurons

Interpretation of results

In rat, many afferent and efferent nerves innervate the bladder and are involved in micturition reflex, but the L6 VRT could be the most efficient in producing detrusor muscle contraction, while the S1 DRT may have the superiority of inhibiting BRC.

Concluding message

This result may improve sacral neuromodulation therapy by optimizing the stimulation locations. The animal model established in the present study could also be used in future for further investigation of the superiority of rootlets involved in micturition or in any other aspects such as erection.

Disclosures

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Ethics Committee: The animal care and use committee of Shanghai Sixth People's Hospital