

The Journal of the American Osteopathic Association



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Letters must be submitted online at <http://www.osteopathic.org/JAOASubmit> and not have been published elsewhere. All accepted letters to the editor are subject to editing and abridgment.

Reclassification of the Sacral Autonomic Outflow to Pelvic Organs as the Caudal Outpost of the Sympathetic System Is Misleading

To the Editor:

The pelvic organs (hindgut, lower urinary tract, internal reproductive organs) serve storage and evacuation. The regulation of the pelvic organs is dependent on the sacral (parasympathetic) and thoracolumbar (sympathetic) autonomic nervous systems, each of them consisting of functionally distinct pathways that are coordinated by the brain. These pathways are differentiated with respect to the 3 pelvic organ systems on one hand and globally with respect to evacuative or storage functions on the other. The anatomical and functional organization of this autonomic innervation and its central representations in the sacral and thoracolumbar spinal cord and in the supraspinal region are the basis of the precise regulation of pelvic organs by the brain and the basis of manual interventions for the management of functional diseases of these

organs. Failure of the regulation of pelvic organ systems can have disastrous consequences.

A letter¹ was published in the February 2017 issue of *The Journal of the American Osteopathic Association* in reference to an article published in *Science*.² In this 2016 article, Espinosa-Medina et al² proposed that the sacral spinal outflow to the pelvic organs should be reclassified as the caudal outflow of the peripheral sympathetic nervous system. This proposal was based on the study of several transcription factors shared by both sacral and thoracolumbar preganglionic neurons but absent from cranial preganglionic neurons (exemplified by the dorsal vagomotor nucleus) and vice versa in mice at 11.5, 13.5, and 16.5 days of embryonic development. The reclassification would imply that the peripheral autonomic nervous system with preganglionic neurons in the spinal cord and brainstem is divided into a cranial (parasympathetic) system and a spinal (sympathetic) system. It would also seemingly simplify the description and teaching of the spinal autonomic nervous system.

We strongly object to this reclassification of the sacral spinal autonomic system innervating the pelvic organs as the caudal part of the sympathetic nervous system. It would replace the classical division of the spinal autonomic nervous system into sympathetic (thoracolumbar) and parasympathetic (sacral) systems as originally described by Langley,³ which has stood the test of time for more than 100 years.⁴ The authors ignore several aspects of organization of the autonomic outflow to pelvic organs, as follows:

1. Sympathetic and parasympathetic pathways are functionally almost completely separate.
2. Sympathetic postganglionic neurons regulating pelvic organs are mostly noradrenergic, and some are cholinergic (peptidergic or nitrergic). Parasympathetic postganglionic neurons are cholinergic, and some also are peptidergic and nitrergic.
3. The vasoconstrictor outflow is sympathetic but not parasympathetic.
4. The sympathetic pathway traverses the inferior mesenteric ganglion, hypogastric nerve, pelvic ganglia, and sacral paravertebral ganglia.

The reclassification of the spinal autonomic nervous system proposed by Espinosa-Medina et al² does not reflect the functional complexity of pelvic organ regulation (including the central spinal and supraspinal circuits); moreover, it leads to an oversimplification rather than advancement of our understanding. We believe such a reclassification would have a deleterious effect on diagnostic and therapeutic procedures related to the pelvic organs. (doi:10.7556/jaoa.2017.082)

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References

1. Hoehmann CL, Cuoco JA. Landmark article transforms traditional view of the autonomic nervous system. *J Am Osteopath Assoc.* 2017;117(2):72. doi:10.7556/jaoa.2017.016
2. Espinosa-Medina I, Saha O, Boismoreau F, et al. The sacral autonomic outflow is sympathetic. *Science.* 2016;354:893-898.
3. Langley JN. *The Autonomic Nervous System.* Cambridge, England: Cambridge University Press; 1921.
4. Jänig W. *The Integrative Action of the Autonomic Nervous System: Neurobiology of Homeostasis.* Cambridge, England: Cambridge University Press; 2006.

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The *JAOA* regrets an error that appeared in the following article:

Manfredonia JF. Prescribing methadone for pain management in end-of-life care. *J Am Osteopath Assoc.* 2005;105(3 suppl 1):S18-S21.

On page S20 in the last column 4 lines from the bottom, in the statement “the correct dosing would be 60 g every 12 hours” should have appeared as “the correct dosing would be 60 mg every 12 hours.” This statement will be updated in the online versions of the articles. (doi:10.7556/jaoa.2017.083)

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