

The Journal of the American Osteopathic Association



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(JAOA) encourages osteopathic physicians, faculty members and students at colleges of osteopathic medicine, and others within the health care professions to submit comments related to articles published in the JAOA and the mission of the osteopathic medical profession.

The JAOA's editors are particularly interested in letters that discuss recently published original research.

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.

Landmark Article Supports Osteopathic Medicine? Setting the Record Straight

To the Editor:

In the November 2015 issue of *The Journal of the American Osteopathic Association*, Hoegerl¹ praises the 2015 *Nature* article by Louveau et al² for discovering functioning lymphatic vessels in the central nervous system. Hoegerl¹ claims this study “has provided evidence for what osteopathic physicians have been doing clinically since the time of Andrew Taylor Still, MD, DO.”

However, Louveau et al² have simply added to evidence cited in the 38th edition of *Gray's Anatomy*: “Although the evidence from tracer studies is scarce in man, there are anatomical pathways in the human central nervous system which correspond to the lymphatic drainage pathways of the brain identified in experimental animals.”^{3(p1202)} Also, citing Szentistványi et al,⁴ “Physiological studies emphasize that the extracellular space of the brain is in continuity with the CSF [cerebral spinal fluid] such that substances entering the extracellular spaces of the brain may drain either into ventricular CSF or along the perivascular and, ultimately, lymphatic drainage pathways.”^{3(p1222)}

Although the findings by Louveau et al² are important, they should be properly positioned in basic anatomy rather than be considered a validation of osteopathic principles and practice. (doi:10.7556/jaoa.2016.040)

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References

1. Hoegerl C. Landmark article supports osteopathic medicine [letter]. *J Am Osteopath Assoc*. 2015;115(11):646. doi:10.7556/jaoa.2015.134.
2. Louveau A, Smirnov I, Keyes TJ, et al. Structural and functional features of central nervous system lymphatic vessels [published online June 1, 2015]. *Nature*. 2015;523(7560):337-341. doi:10.1038/nature14432.
3. Williams PL. *Gray's Anatomy*, 38th ed. London, England: Churchill Livingstone; 1995:1202.
4. Szentistványi I, Patlak CS, Ellis RA, Cserr HF. Drainage of interstitial fluid from different regions of rat brain. *Am J Physiol*. 1984;246(6 pt 2):F835-F844.

Response

Heemstra points out some key citations worthy of a lengthier conversation on lymphatics in the central nervous system (CNS).¹ She suggests that there is enough existing literature to support the existence

of lymphatics and drainage in the CNS; however, I disagree.

Unfortunately, I was not able to access the edition of *Gray's Anatomy* that she cites in her letter. Most anatomy textbooks and literature that I have referred to clearly state that there is not enough evidence to support lymphatics in the CNS. For example, in *Junqueira's Basic Histology*, Mescher states, “With exceptions such as the bone marrow and most of the CNS (central nervous system), most tissues with blood microvasculature also contain lymphatic capillaries (or lymphatics).”²

Also, in a 2015 article, Iliff et al^{3(p977)} state that “the apparent absence of conventional lymphatic vessels from the CNS has remained a persistent mystery of neuroscience, particularly in light of the exquisite sensitivity of neurons to the composition of their extracellular environment.”

I believe there is enough evidence here to say that lymphatic drainage of the CNS was either thought to be nonexistent, done through another means, or believed to be a mystery. Much of the osteopathic manipulative treatment techniques that osteopathic physicians have been taught focus on promoting adequate lymphatic drainage from the head and neck (eg, osteopathic cranial manipulative medicine). If the article by Louveau et al⁴ does not help to validate part of osteopathic principles and practice, then it certainly goes a long way to help support it. (doi:10.7556/jaoa.2016.041)

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- Mescher AL. The circulatory system. In: Mescher AL. *Junqueira's Basic Histology*. 14th ed. New York, NY: McGraw-Hill; 2016. <http://accessmedicine.mhmedical.com/content.aspx?bookid=1687&Sectionid=109633081>. Accessed February 14, 2016.
- Iliff JJ, Goldman SA, Nedergaard M. Implications of the discovery of brain lymphatic pathways. *Lancet Neurol*. 2015;14(10):977-979. doi:10.1016/S1474-4422(15)00221-5.
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Effect of Table Trainer–to-Student Ratios on Outcome in Student Assessments of Cervical Muscle Energy Techniques

To the Editor:

The study by Snider et al¹ in the September 2015 issue of *The Journal of the American Osteopathic Association* examined table trainer–to-student ratios (TTRs), which is a vital component of osteopathic medical education. However, the study design failed to incorporate elements widely recognized as fundamental to the effective teaching of osteopathic manipulative treatment (OMT), thus limiting the conclusions that may be drawn. For example, OMT requires palpatory skills that cannot be taught by a handout or video but rather by repetition and practice under the hands-on guidance of experienced osteopathic physicians. Snider et al¹ chose to use a combined Microsoft PowerPoint and video presentation, the limitations of which they acknowledge in their discussion. However, they offer few details about the context of the workshops: What was the level of experience of the table trainers? Was hands-over-hands training offered? How much time was spent at the treatment tables? It is unclear to what ex-

tent the study workshops reflected OMT laboratories as they are conducted in colleges of osteopathic medicine today.

Perhaps most importantly, the study¹ looked at retention after a single workshop. Yet OMT skills—as with all clinical skills—are only honed through repetition. It is difficult to draw a meaningful conclusion regarding TTRs when the learning environment was compromised in these critical ways. The authors note that post-workshop practical assessment scores were higher for the 1:4 and 1:8 TTR groups, but not the 1:16 group. This finding begs the question of whether this disparity might also prove to be the case after OMT laboratories. Since laboratories are conducted weekly, it is reasonable to consider that repetition and consistent study in an environment with lower TTRs may, over the course of the 2 academic years, result in students' improved practical skills.

Additionally, it is worth noting that the dropout rate for the 1:16 TTR group was 3 times higher than that for the 1:4 and 1:8 TTR groups. Perhaps, without the close engagement of table trainers, these students simply lost interest. I hope that future research takes these points into account. (doi:10.7556/jaoa.2016.039)

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Reference

- Snider KT, Dowling DJ, Seffinger MA, et al. Effect of table trainer–to-student ratios on outcome in student assessments of cervical muscle energy techniques. *J Am Osteopath Assoc*. 2015;115(9):556-564. doi:10.7556/jaoa.2015.113.

Editor's Note: Dr Snider was shown this letter and declined to comment.

Corrections

The *JAOA* regrets errors that appeared in the following article:

Chikly B, Roberts P, Quaghebeur J. Primo vascular system: a unique biological system shifting a medical paradigm. *J Am Osteopath Assoc*. 2016;116(1):12-21. doi:10.7556/jaoa.2016.002.

Millimeters should have appeared as micrometers in several statements, as follows:

- In the second paragraph on page 12: “The primo vascular vessels have been identified in rabbits as thin, semitransparent structures with an average diameter of approximately 20 to 30 μm . Each vessel contains up to 20 smaller ductules 3 to 10 μm in diameter that are lined by a single layer of endothelial cells and surrounded by extracellular matrix.”
- In the first paragraph on page 17: “The mean (SD) speed of flow of the primo fluid was measured to be approximately 0.3 (0.1) mm per second in rabbits, using alcian blue, and at around 100 to 800 $\mu\text{m}/\text{s}$ with direct measurement using fluorescent nanoparticles.”
- In the third paragraph on page 17: “Primo fluid contains a high concentration of cells resembling stem cells called primo microcells, approximately 1 to 4 μm in diameter, whose exact function remains to be determined.”

These corrections will be made to the online versions of the article (doi:10.7556/jaoa.2016.043)