

## Reply to “Why Meridians?”

I thank Dr. Silberstein for his remarks. He raises two interesting points.

The first point concerns the distant effects of acupuncture and whether it can be explained by a neurological model. As he indicates, there is good evidence to suggest that acupuncture can have both local and more remote (distant) effects. It is clear from our studies evaluating the central neural physiological mechanisms underlying acupuncture's influence on the cardiovascular system that its action in both spinal and supraspinal regions can, for the most part, account for its action both locally and remotely. In this regard, we have been able to show that electroacupuncture along the stomach and pericardial meridians, located respectively on the leg and the arm, can modulate excitatory sympathetic responses that originate from the visceral region [1]. This occurs because somatic afferent nerves stimulated during electroacupuncture converge on common interneurons in areas in the medulla and elsewhere that ultimately regulate cardiovascular function. Thus, it is possible for acupoints in remote locations to have very similar effects with regard to their influence on the cardiovascular system. I believe that the same central neural anatomical mechanisms would apply to pain and other conditions treated by acupuncture.

One issue that I may differ with Dr. Silberstein is the concept of the meridians and their physical form. He states that some meridians are over a meter long and asks a question about their purpose. In my review article, recently published in JAMS [2], I tried to make it clear, that I do not believe that currently there is sufficient evidence to indicate that meridians exist in a physical form, unless one is willing to ascribe their existence to the sensory nervous system. In the latter respect, there clearly are afferent systems that travel from the foot to the spinal cord that are well over a meter in length in adults. Thus, taken together with evidence that stimulation of these diverse sensory systems can have very common effects that operate through activation of centers in the brain and spinal cord [3], there is little question in my mind that the nervous system is currently the best explanation for the ancient Oriental concept of meridians.

The second question raised concerned the action of laser acupuncture and whether it acts by

stimulating cutaneous sensory fibers. Fewer studies have been conducted with this form of acupuncture compared to more traditional needling. Our group has not yet evaluated this form of stimulation, and some of the other published studies on laser acupuncture are in lower quality journals. We have shown that magnetic stimulation over the pericardial meridian on the forelimb can stimulate deep somatic afferents, such as the median nerve, and through a spinal action evoke electroacupuncture-like responses [4]. Dr. Silberstein cites a theoretical study of his own suggesting a framework of superficial (cutaneous) afferents that might be responsible for the response to laser acupuncture. This is an interesting hypothesis, but it needs to be proven experimentally. In the study cited above [1], we did show that deep afferent systems, for example stimulation of the median or deep radial nerve, lead to a stronger acupuncture response than does stimulation of cutaneous nerves such as the superficial radial nerve, with respect to the action of electroacupuncture on elevated blood pressure. However, this study does not rule out an influence by laser acupuncture on more superficial sensory nerve systems, during interventions like laser acupuncture. This possibility remains to be proven.

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## References

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