PERSPECTIVE

Adventures in the Jungle of the Neuro-Myofascial Net

An Interview with Prof. Dr. med. J. Staubesand

By Robert Schleip, Certified Advanced Rolfer

This is part 2 of a series focusing on the intricate network connecting fascia and the neuromuscular coordination system. Part 1 focused on the function of interstitial muscle receptors as well as new research on neural gravity receptors within fascia[1]. Future continuations of this series are planned, dealing with e.g. thixotropy, short-term fascial plasticity, and internal body representations. The following quote by the founder of osteopathy underlines the fundamental quest of this series[2]:

"The soul of man with all the streams of pure living water seems to dwell in the fascia of his body. When you deal with the fascia, you deal and do business with the branch offices of the brain, and under the general corporation law, the same as the brain itself, and why not treat it with the same degree of respect."

Andew Taylor Still
Philosophy of Osteopathy, 1899

Prof. Dr. med. J. Staubesand

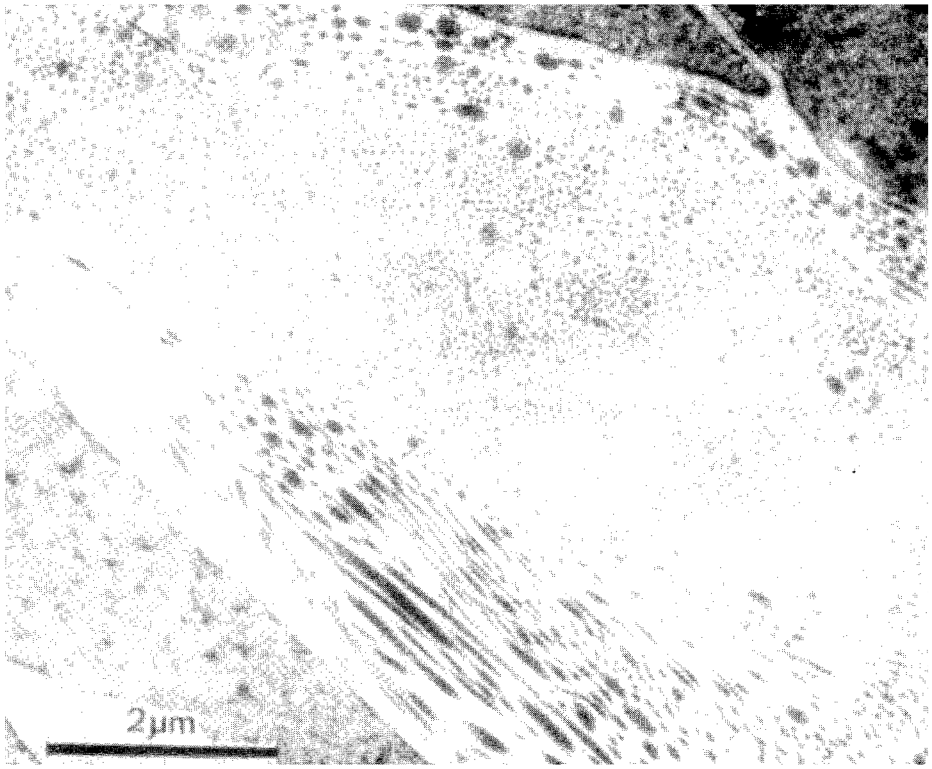
Robert Schleip: Professor Staubesand, you have made some interesting research findings about fascia. It seems to me that these findings could have some importance for manual therapists working with connective tissue. Could you briefly describe what your findings are?

Prof.Staubesand: We did some electron photomicrograph studies of the Fascia Cruris, which is the connective tissue covering the lower leg in humans. Rather surprisingly we found isolated smooth muscle cells within the fascia. Additionally we found some intrafascial nerve fibers and sensory nerve endings which have not been reported previously.

R.S.: Let's start with the smooth muscle cells you found in fascia. Do you think they have any functional significance?

Prof. S.: That is indeed possible, although at this time one cannot say for sure. There are all kinds of transitional stages between smooth muscle cells on the one hand and fibroblasts—from which smooth muscle cells generally originate—on the other hand. Some authors therefore even speak of 'myofibroblasts'. It seems that fibroblasts are generally able to differentiate into smooth muscle cells. Another factor is that because of the microscopically thin layers of tissue that we examined in our electron photomicrographic studies, we are not yet able to say anything about the relative 3-dimensional density of those smooth muscle cells within fascia. Yet it appears likely that these smooth muscle cells are there for a functional reason. Based on our findings it seems quite possible that the body is able to regulate a fascial 'Vorspannung' (pre-tension) via those smooth muscle cells, in order adjust to different muscular tonus demands. This function would also explain the amazingly widespread presence of autonomic nerves and capillaries which we found in fascia.

R.S.: Now, such an active regulation of the fascial tonus appears to me to



Intrafascial smooth muscle cell found in Fascial Cruris

shift our picture of fascia dramatically. The fascial tonus is then much more intimately connected with the nervous system and especially the autonomic nervous system.

Prof. S.: Yes. It is true that such a function puts fascia into a very different picture than in the past, where it was believed that fascia would only adjust passively to short term changes in tensional demands. In the past, medical science regarded fascia mostly as something of secondary importance, and one can say that fascia has been mostly neglected in its function. Medical students were trained not to respect fascia, by learning to chop it away in their dissections as a very first thing, in order to study the functionally important elements of the body. Yet this new picture of fascia as an actively adapting organ and the widespread existence of various intrafascial neural receptors, puts fascia into a much higher functional importance.

R.S.: So let's talk about these intrafascial nerves. What kind of nerve supply did you find in the fascial sheets that you studied? Are these sympathetic fibers?

Prof. S.: This we can't say with certainty. Further studies are necessary to clarify this question. Yet what we can say is that there are myelinated, as well as unmyelinated nerve fibers in fascia. The myelinated axons are generally regarded as sensory. The unmyelinated nerve fibers could have motor functions as the efferent nerves of the autonomic nervous system to the smooth muscle fibers, or they could also serve other autonomic nervous system functions. Based on studies from Heppelman and others[3] about pain receptors in the joint capsule of the knee in cats and because of striking similarities between the observed structures of humans and cats, we can assume that there are also pain receptors in the fascial tissues that we examined in humans.

In our studies we found that what had previously been described as perforations of the superficial fascial layer by the venae perforantes, are regularly created by a triad of vein, artery and nerve. And these perforations are quite numerous. For example in we humans there are about 150 such triade perforations in each leg.

R.S.: This sounds to me as if you could be talking now about the same fascial perforation points as Prof. Hartmut Heine[4]. What I understood is that Heine showed recently that the locations of the traditional Chinese acupuncture points—or to be more precise: at least 82% of those points—are topographical identical with fascial perforation points in which the superficial fascia is perforated by a triad of vein, artery and nerve. Do you see a correspondence between your described fascial perforation points and those acupuncture points or—and this is perhaps a different question—a correspondence between your perforation points and what has been described as myofascial Trigger points?

Prof. S.: I have yet to read Prof. Heine's research about acupuncture points myself. So I can't say anything about it. The same applies to trigger points: it is quite possible that they do relate to some of our anatomical findings. Yet we don't have enough data at this point to say so definitely.

R.S.: In your publications you also mentioned a possible relevance for the understanding and treatment of fibromyalgia. Could you explain this?

Prof. S.: With fibromyalgia the main understanding has been that the pain

receptors would be in the muscle tissue. Yet now we know that there are many sensory receptors, including pain receptors in fascia, which points our attention in fibromyalgia, as well as many other kinds of soft tissue pain syndromes, to a much higher value of therapeutic interventions in the fascia itself.

R.S.: What would you suggest could be the most important relevance of all those findings in your recent research for us as manual therapists?

Prof. S.: I believe that the most important aspect of our findings for your work is in regards to the innervation of fascia. The receptors that we found in the lower leg fascia in humans could be responsible for several types of myofascial pain sensations. If you could influence these fascial receptors with your manipulation this could be of significant importance.

Another and more specific aspect is the innervation and direct connection of fascia with the autonomic nervous system. It now appears that the fascial tonus might be influenced and regulated by the state of the autonomic nervous system. Plus—and this aspect should have ramifications for your work—any intervention in the fascial system might have an effect on the autonomic nervous system in general and upon all the organs which are directly effected from the autonomic nervous system. To put it more simply: any intervention on fascia is also an intervention on the autonomics.

R.S.: Prof. Staubesand, to complete this brief interview: where, and in what setting have your studies been done? And where have they been published so far?

Prof. S.: I am now Emeritus Professor of Anatomy at the Anatomical Institute of the Albert-Ludwigs-University of Freiburg, Germany. Together with my co-worker Dr. Yi Li, from China I have mostly concentrated my work there in the last decade or so on the microstructural analysis of the fascia of the lower leg. We have published these studies in numerous scientific journals since about 1984. Those specific and newer findings that we talked about today have been published so far in *Manuelle Medizin*[5] Vol.34, as well as in *Phlebologie* Vol.26. Both are professional medical journals with full text versions in German and their abstracts written in English. ❑

"This is pure unadulterated notion, but I think it is the mesodermal systems that give access to control of the autonomic functions of the body."

Ida P. Rolf

FOOTNOTES / REFERENCES

1. Schleip, R., *Adventures in the Jungle of the Neuro-Myofaslcial Net 1*, Rolf Lines, Vol.24, May 1996. (available also in the article collection on the internet webpage www.somatics.de)

2. For further reading along this theme see: Schleip, R., *Talking to Fascia—Changing the Brain, 2nd edition.* (available at the Rolf Institute and the European Rolfing Association).

3. Heppelman, B., Messlinger, K., Neiss, WF. and Schmidt, R.F., *Fine Sensory Innervation of the Knee Joint Capsule by Group m and Group rv Nerve Fibers in the Cat*, J Comparat Neur ol, 251,1995, p. 415-428.

4. Heine, H., *Functional Anatomy of Traditional Chinese Acupuncture Points*, Acta Anat., 152, 1995.

5. Staubesand, J., Lin, Y., *Zum Feinbau der Fascia Cruris mit besonderer Berücksichtigung epi- und intrafaszialer Nerven*, Manuelle Medizin , 34, 1996, p.196-200.