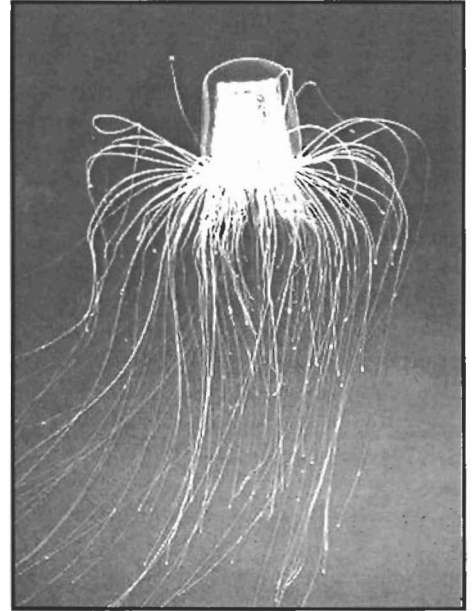

Practical Considerations for Structural Integration, Biased by the Nervous System

By Christoph Sommer, H.P., Certified Advanced Rolfer™, Rolfing® Instructor

Look at the jellyfish, floating in its nourishing environment - the sea - its fine tentacles united at the upper pole and webbed into the space it encompasses. Contemplating it may give you a floating sensation, a sense

of connectedness and differentiation that resembles our nervous system.

In the following pages I want to emphasize the *value* of certain selected peripheral nerves in relation to the Rolfing Ten



Series so that we can avoid unrewarding responses in our structural integration (SI) work. Differentiating our palpatory skills and therefore directly addressing nervous tissue is a valuable and recommended enterprise for your continuing education.

I want to preface this article with some basic facts that will help you to comprehend the biased point of view I wish to develop:

- The peripheral nerves approximate a length of 100,000 km.
- The central and peripheral nervous systems (CNS, PNS) are composed of 14 billion nerve cells (14,000,000,000) with 1412 interconnections - numbers I am unable to comprehend
- A peripheral nerve consists of the cell body of the neuron, the dendrites, and the long axons. Motor and sensory fibers are differentiated. The sympathetic ganglia of the sympathetic trunk also contain neurovisceral fibers.
- Most peripheral nerves consist of some type of myelin sheath encapsulating the nerve, and are then surrounded by connective-tissue sheaths (endo-, peri-, epi-, and mesoneurium).
- Within the epineurium we find blood vessels (vasa nervorum) supplying the needs of the nerve's metabolism.
- Within the epi-, peri-, and endoneurium we find nerve fibers (nervi nervorum), consisting of sensory and sympathetic nerves perceiving and regulating the local nerve environment (see Figures 1 and 2).

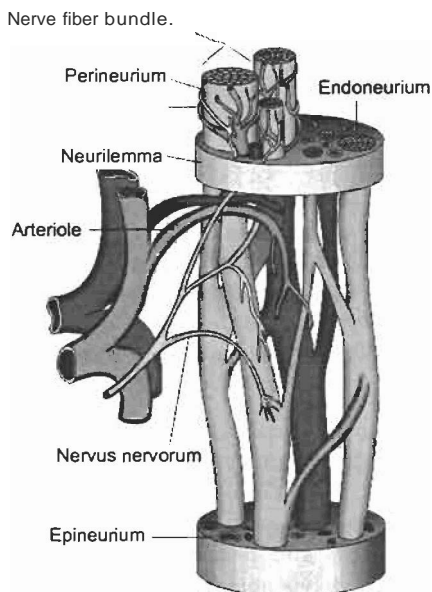


Figure 1: The nerve with its vascularization and the nervi nervorum.

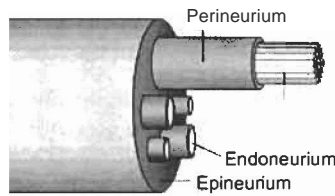
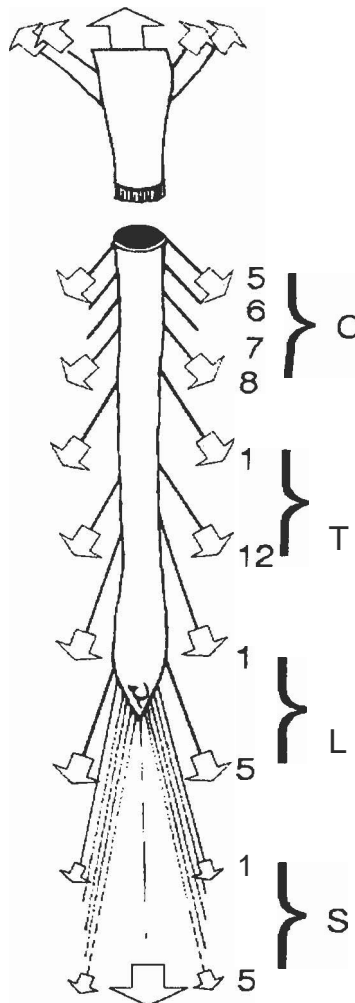


Figure 2: The nerve connective-tissue fibers.

- The epineurium internum ensures the movement of the individual nerve fascicles while adjusting to the movement of the extremities.
- Nerves consist of 50%-90% connective tissue, depending on their location, and can elongate 8%- 20%.



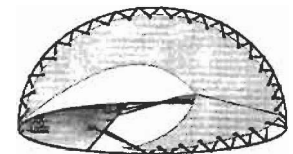
Total force concentrated on the upper part of the PCT results from the individual forces caused by each nerve root during flexion of the trunk.

Figures 3: Traction forces on the spinal cord.

Together all these systems are sustained by intraneuronal pressure and distal tension.

Imagine our jellyfish tentacles pressurized from inside and able to resist external compression along their pathways within the body.

The distal tension of the peripheral nerves and the vertical tension of the CNS results in a well-cushioned floating of the pons - spinal cord tract, our internal jellyfish suspended in space and giving buoyancy to the system, which we SI practitioners recognize as lift and vitality (see Figures 3 & 4).



The intercranial membranes may be compared to a perforated three-dimensional trampoline which overhangs the posterior cerebral fossa.



The neuraxis can be compared to a "bicephalic" mushroom: the foot represents the Pons-Spinal Cord Tract and the two hats represent the cerebral hemispheres.



The entire device in place. The hats are on the trampoline. the foot passes through the perforation (homologous with the free edge of the tentorium cerebelli). Every mechanical stress on the foot of the mushroom involves the foot-hat juncture. the hats themselves. and the entire system of intracranial suspension and cushioning.

Figures 4: The three-dimensional trampoline.

Practical Applications for 51

Let me take you through some general considerations for myofascial interventions before offering a few examples of "how to" work structurally utilizing the primary importance of the nervous system in regulating the body.

Peripheral nerves are everywhere we touch - the main branches are located in well-protected inter- and intra-muscular septa. *Nerves do not like compression!* Always work in oblique angles (as we were all taught) and *do not* compress tissues onto the bone.

When working in the area of the large peripheral nerve branches, work in the distal direction, not proximally. Keep in mind that your strokes should follow the tissues and meander around a chosen anatomically meaningful direction, not follow straight lines. When working near nerves, make sure that you use finger pads (not fingernails) or other soft surface tools. If you find highly sensitive places in the body (possibly caused by nerve irritation and the inflammatory processes involved), work proximal and distal to the "sensitive spot" in a light and slow viscoelastic manner until the "spot" diminishes in intensity.

In the following, I will relate some local goals within the structural series to the peripheral nerves that may be involved. These treatment ideas are based on the teachings of Jean-Pierre Barral, D.O. and Alain Croibier, and their books (*Trauma, Manual Therapy for the Peripheral Nerves*, and *Manual Therapy for the Cranial Nerves*, all published by Churchill Livingstone - Elsevier) and more than thirteen years of my personal experience with these tissues. The following examples are meant to awaken your curiosity for further studies in the realm of manual therapy for nerves. Just as the Rolf Institute® is regarded as the leader in the field of structural integration, the Barral Institute is recommended for further differentiated studies in the realm of manual therapy for the nerves.

The Second Session - the Medial and Lateral Plantar Nerves

Each sole of the foot contains about 8,000 peripheral (sensory and motor) nerve endings with the function to perceive the "ground" and inform our "Triangle of Perception" about where we stand. A structural aim within the second session is a competent foot with balanced arches, good

tibio-talar glide, and differentiation between the short and long flexors of the toes.

The medial and lateral plantar nerve (see Figures 5 and 6) and sections of the tibial nerve (a split of the sciatic nerve) are well covered by the plantar aponeurosis and the m. flexor digitorum brevis.

Practical Recommendations: When working the plantar fascia, focus on the medial aspect, while considering the medial to lateral direction to which the nerves orient.

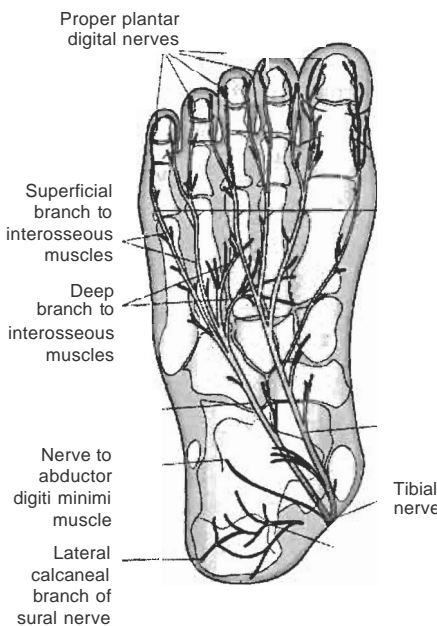


Figure 5: The medial and lateral plantar nerve innervating the plantar surface with about 8,000 nerve endings.



Figure 6: Work on the plantar fascia and the medial and lateral plantar nerve. You work distally and can use active or passive toe extension.

The Third Session - The Axillary and Radial Nerve

The axillary nerve originates at the spinal nerve roots of CS/C6 and is a mixed motor and sensory nerve. It innervates the posterior aspect of the shoulder joint, the deltoid and teres muscles, and the skin of the shoulder (see Figure 7).

Practical Recommendations: When working with a client in a sidelying position to access the posterior aspect of the shoulder, consider the inferior border of the teres minor muscle to be a possible entrapment site for the axillary nerve. Working the tissues in the direction of a medially rotated humerus will help to free a possible nerve entrapment.

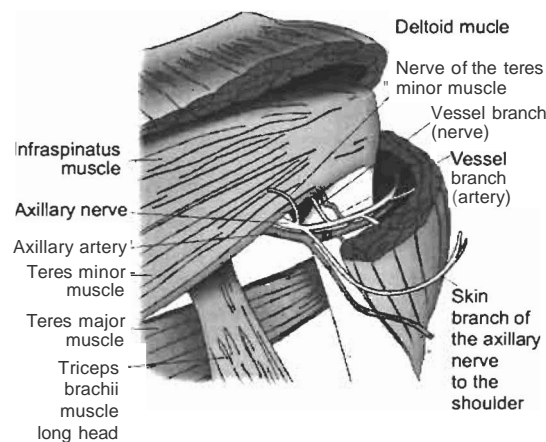


Figure 7: The axillary nerve innervating the posterior shoulder joint capsule and the deltoid muscle.

The Fourth and Fifth Sessions - The Saphenous and Obturator Nerves

The obturator nerve originates at L2-L4. The nerve's anterior branch travels in the medial aspect of the psoas major muscle, surfaces at the level of the promontory and traverses the small pelvis. It exits through the obturator foramen and innervates the adductors (motor), the anterior hip joint, the posteromedial knee joint and the skin on the lower medial thigh (sensory).

The saphenous branch of the femoral nerve also originates from L2-L4, travels through the central part of psoas major and surfaces on the lateral side where the iliacus and psoas muscles meet. It exits the pelvis next to the femoral artery, under the inguinal ligament, to travel distally within the intermuscular septum

of the quadriceps femoris and the adductor compartment, which is covered by the sartorius. The sensory and vasomotor saphenous nerve innervates the medial aspect of the knee joint and has anastomosis with the obturator nerve at the level of the adductor canal (see Figure 8).

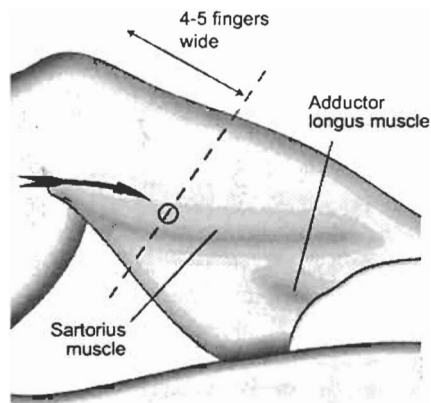
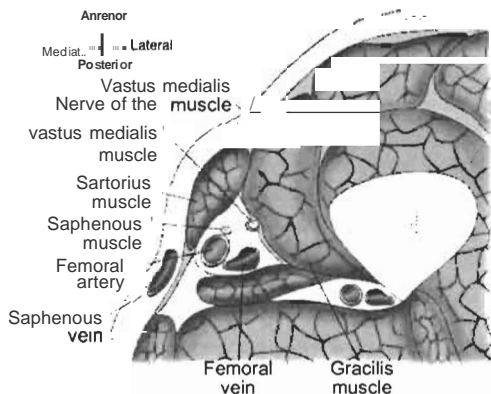


Figure 8: The best access to the nervus saphenus above the knee .

Practical Recommendations: Working below the inguinal ligament, slowly contact the tissues with your finger pads and induce the tissue changes in a distal direction (see Figures 9, 10 and 11).



Figure 9: In the fifth session, working the intermuscular septum under the sartorius in a distal direction you will have an effect on the femoral nerve.

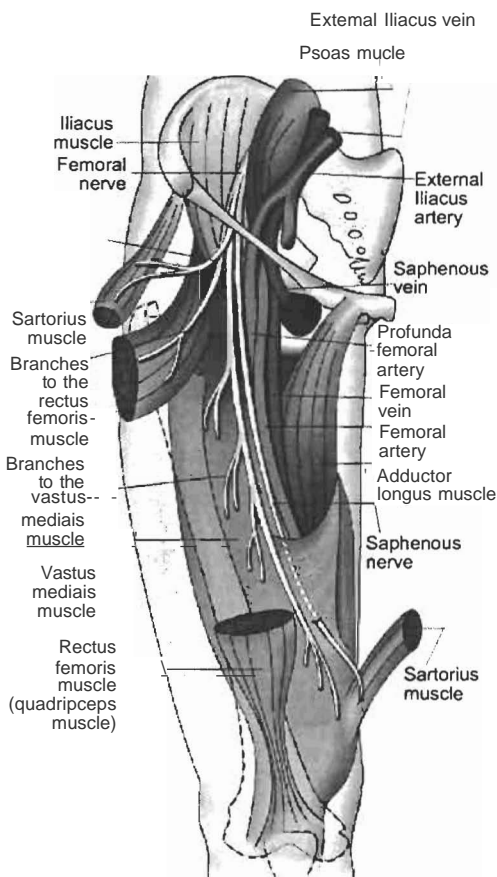


Figure 10: The femoral nerve between the fascia of psoas and iliacus muscle as well as in the space covered by the sartorius.

Working at the level of the adductor canal, make sure you contact the canal four to five fingers above the knee joint on the medial aspect of the vastus medialis, deep to the sartorius. Slacken the muscle tone by flexing the knee and stay light-handed when working on the medial condyles of the tibia and femur. Working on the psoas major and iliacus, remember that the major nerves of the lumbar plexus run within or on the anterior surface of the muscle belly. After having considered all other precautions, work in a distal direction using soft finger pads.



Figure 11: While working in the connective tissue between the psoas and iliacus muscle, maintain contact with your cranial thumb and work respectfully in a distal direction with the inferior hand. This may affect the lumbar plexus nerves.

The Seventh Session - Brachial Plexus and Phrenic Nerve

In this article, I am not going to highlight any of the cranial nerves that are within the territory of the neurocranium or viscerocranium. I want to focus instead on the anterior and medial scalenes, which surround the proximal section of the brachial plexus. In addition, the medial part of the anterior scalene is traversed by the phrenic nerve, which innervates the diaphragm.

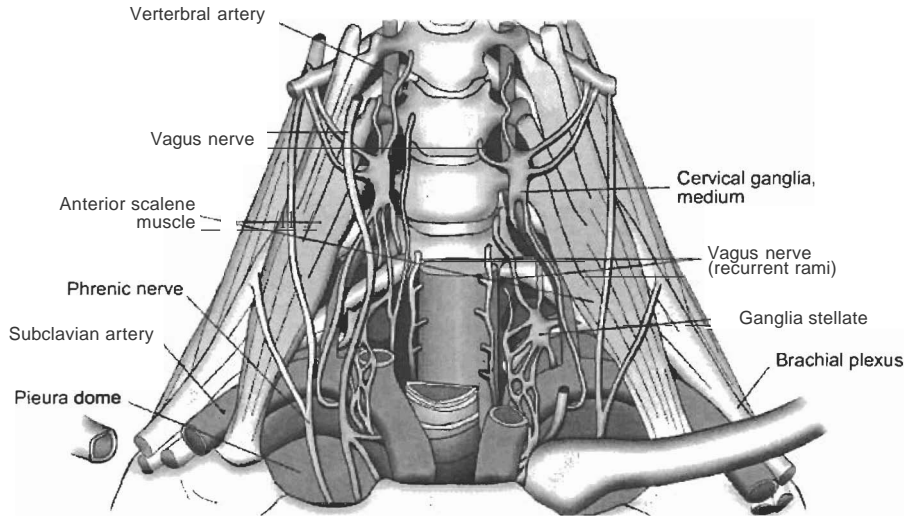


Figure 12: When working on the scalenius anterior consider the phrenic nerve. When working on the brachial plexus (superior part) consider possible entrapments between anterior and medial scalene muscles.

Practical Recommendations: When working the anterior scalenes, keep in mind that the phrenic nerve travels on the anterior surface from the cranial to caudal aspect and from lateral to medial (see Figure 12). If you can adjust to these angles while working and use soft, melting finger pads, you will be able to influence the effects of the phrenic nerve and see a change in your client's breathing.

Between the anterior and medial scalenes, the superior part of the brachial plexus is girded and can be entrapped, affecting all the brachial nerves and causing the arm and cervical spine to go into compensational patterns. When working with the scalenes, pay attention to the embedded brachial plexus, contact it with a light touch with your finger pads, and help the nerve plexus

to regain some distal gliding. The scalene will readjust its tone once the plexus is freely gliding under the clavicle and pectoralis minor.

Conclusion

These are just a few practical suggestions of how to enhance results in structural work by including manual perception of the peripheral nerves. There are many more details to learn, as there are many compression sites for nerve tissue that lead to different structural and symptomatic phenomena. Studying the nerves and the best entries for treatment is a worthwhile enterprise. By doing so, it will help to differentiate and evolve your palpatory skills and allow yet another level of manual communication between you and your client.

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Note: Illustrations courtesy of Churchill Livingstone - Elsevier, Barral Institute USA; photos courtesy of the author.