

Concussed?



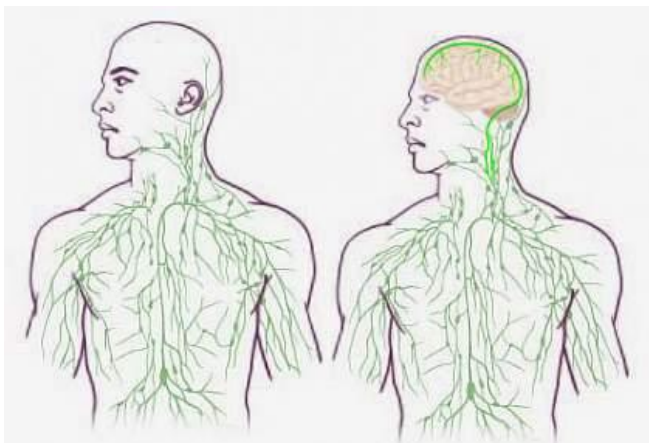
News That You Need to Know

By:
Gary Reinl

Abstract: Maintaining and/or restoring musculoskeletal, vascular, neurological, and lymphatic homeostasis post-concussion may help to prevent degradation of brain tissue and jumpstart the healing process.

We now *know* that there are lymphatic vessels in and around the brain (see illustration below). ^(1,2,3,4,5,6,7,8) A groundbreaking article entitled, “*They’ll Have to Rewrite the Textbooks*” by Josh Barney states the significance of this discovery perfectly! ⁽⁹⁾ Further groundbreaking research has proven that aerobic exercise (sustained muscle activation) stimulates the growth of new brain cells (neurogenesis) ^(10,11,12,13,14,15) and quickens, compared to lying motionless in a dark room, recovery post-brain concussion. ^(16,17,18,19,20,21,22,23)

Thus, when this newfound knowledge of the lymphatic system, how brain cells are regenerated, and how the brain heals is combined with the ever-growing body of evidence that exercise (tissue loading) quickens musculoskeletal and vascular healing post-trauma, ⁽²⁴⁾ it becomes quite clear that they will indeed need to “rewrite the textbooks!”



Maps of the lymphatic system: *old* (left) and *updated (2015)* to reflect the new discovery (University of Virginia Health System).

It is also virtually impossible to sustain a brain concussion without incurring at least some degree of related musculoskeletal and/or vascular damage.

Let’s analyze this one step at a time. Say for example that someone’s head is hit with a hard object causing them to “see stars” before falling to the ground with a damaged temporalis muscle, ruptured local capillaries, and a contused temporal bone. The area in and around the damaged site is painful, bruised, and swollen. If this exact same type of event caused similar damage to the same person’s shin bone instead of their head, how would the related symptoms be treated? *Obviously*, no informed practitioner would suggest mindlessly sitting still for days on end and/or blame any of these symptoms on a brain concussion. This is not to minimize the severity of any potential underlying brain concussion, but the

fact remains that the two similar injuries are almost always treated differently and that is a blatant contradiction of the healing process. This point is made abundantly clear by the fact that there aren’t any nociceptors in the brain (e.g. isolated “brain damage” does not per se “hurt”). Therefore, contrary to the general public’s widespread belief, the degrees of swelling, bruising, and pain are *not* an indication of the severity – or even existence – of a potential brain concussion. It is critical to recognize that these are two *separate maladies* (brain injury and musculoskeletal injury). Fortunately, tissue loading is an integral part of the treatment for both!

Now, let’s put this all together. “Loading” occurs through physical activity – or more specifically “muscle activation.”

Writing in The Journal of the American Academy of Orthopedic Surgeons, J A Buckwalter states: “One of the most important concepts in orthopedics in this century is the understanding that loading accelerates healing of bone, fibrous tissue, and skeletal muscle ... Although new approaches to facilitate bone and fibrous tissue healing have shown promise (e.g., the use of cytokines, cell transplants, and gene therapy), none has been proved to offer beneficial effects comparable to those produced by loading of healing tissues. For these reasons, patients with musculoskeletal injuries and those who have recently undergone surgery are now being treated with controlled physical activity that loads their healing tissues. Evaluation of new approaches to the promotion of healing of bone, fibrous tissue, and muscle should include consideration of the effects of loading on tissue repair and remodeling.” ⁽²⁴⁾

The lymphatic system is basically passive and relies on muscle activation to move waste. Absolute stillness stifles drainage and worsens – NOT improves – congestion in and around the damaged site! Thus, congestion – at a minimum – inhibits the healing process!

Guyton and Hall, write in the Textbook of Medical Physiology (10th Edition) that, “The lymphatic system is a ‘scavenger’ system that removes excess fluid, protein, molecules, debris, and other matter from tissue spaces. When fluid enters the terminal lymphatic capillaries, any motion in the tissues that intermittently compresses the lymphatic capillaries propels the lymph forward through the lymphatic system, eventually emptying the lymph back into the circulation.”

Since we now know that aerobic exercise “quickens” recovery post-concussion and that participation is often limited by related musculoskeletal pain and dysfunction, it is time to incorporate the principles of musculoskeletal healing outlined by Dr. Buckwalter above into nearly all post-concussion protocols.

Protocol Guidelines and Recommendations: As John Leddy eloquently stated in his 2018 article for Current Sports Medicine Reports entitled “*Exercise is Medicine for Concussion.*”⁽¹⁸⁾ Thus, based on the passivity of the lymphatic system – stillness is the enemy! Now, for whichever exercise (or “muscle activation”) method the attendant physician recommends (walking, running, swimming, cycling, etc.), intensity and duration are, generally, limited by symptom magnification (e.g., if the symptoms increase, the intensity and/or duration must be reduced and if the symptoms decrease, the intensity and/or duration may be increased). Further, since the damaged musculoskeletal tissue is generally located above the shoulders and often negatively affects the vestibular system, muscle activation that causes little-to-no head and/or neck movement is best (no moshing). If greater control/specificity is desired (e.g., if there is a requirement for limited movement of the cervical spine during the recovery process), an FDA-cleared electrical muscle stimulation (EMS) device that requires a physician’s written prescription for use, stimulates a non-fatiguing muscle contraction, offers intensity settings beginning at near-zero, and has a history of safe use around the temporomandibular joint (TMJ) and the posterior neck while simultaneously increasing local blood circulation, preventing or retarding disuse atrophy, relaxing muscle spasms, and maintaining or increasing range of motion, is an excellent choice.

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