Dynamic Chiropractic

SOFT TISSUE / TRIGGER POINTS

Hyaluronan: A Reason for Soft-Tissue Release

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For years, we have read about and experienced the reduction in tissue viscosity that occurs when we create pressure on tissues, whether by hand, instrumentation or the use of modalities. Many thoughts have been expressed about tissue release regarding temperature, the effect of pressure, the change in fascia from a gel to a solid, intercellular matrix changes, etc. The problem is that no one has expressed the underlying possible histological reason for tissue change based on evidence.

This past weekend, I spent some time with Antonio Stecco, MD, who you will recall from a previous article ["Fascial Manipulation," Jan. 29, 2010 issue] is a world-class authority on soft tissue, especially the fascial system. He will be in the U.S. until April 2011 lecturing and doing fascial research in New Jersey. Dr. Stecco brought up the subject of hyaluronan (HYA), also known as hyaluronic acid or hyaluronate. It is very possible that this may be a principal substance causing the restriction and the substance responding to mechanical load that allows a decrease in viscosity and thereby a normalization of adhesion-like tissue. It is also possible that this glycosaminoglycan (GAG) is maintaining the tissue restriction and when pressure and heat is created, it dissolves and allows the resumption of normal tissue gliding.

HYA is a substance that is present to lubricate and facilitate the movements between the muscle fibers.[1] It permits movement of muscles on fascia and layers of fascia on itself without friction. It is an anionic, nonsulfated glycosaminoglycan distributed widely throughout connective, epithelial and neural tissues, and is one of the chief components of the extracellular matrix,[2] involved in maintaining osmotic balance and reducing friction in many types of tissues.[3]

In order for planes of fascia to move during movement, HYA is necessary to provide lubrication and gliding of the tissues. Fascia forms a gliding interface with the underlying muscle, allowing the free excursion of the muscle.[4] Hyaluronan also is known to provide lubrication, water homeostasis, filtering effects and regulation of plasma protein distribution.

When we examine the muscle regarding its immediate fascial surroundings, usually there are three distinct layers from the outside in: the deep fascia, the loose areolar tissue layer and the epimysium. The epimysium is a thin layer of dense connective tissue lying directly over the muscle fascicle and is continuous with the interfascicular septa of the underlying muscle.[4] Hyaluronan is located mainly on the deep surface of the deep fascia and also in the loose areolar and epimysium. The deep fascial layer also reveals a uniform population of mature fibroblasts.

With overuse and trauma, HYA becomes fragmented and accumulates under inflammatory conditions. HYA degradation products are purported to contribute to scar formation.[5] By increasing the concentration, HLA chains begin to entangle, conferring to the solution distinctive hydrodynamic properties and dramatically increasing the viscoelasticity.[3] Increased stable links of HYA develop.

In a study in which the epimysium was disrupted, there was dense, irregular connective tissue that

also contained increased numbers of fibroblasts. The distinction between the tissue planes of fascia, aroelar tissue and epimysium was obliterated and the hyaluronic acid was distributed throughout the scar tissue.[4]

Finally, it is recognized that the chain-to-chain interactions of the HYA are reversibly disaggregated by an increase in temperature or by alkalinization.[3] HYA was shown to break down progressively when the temperature was increased to 35-40º C (99-104º F). Therefore, it is possible that abnormal chains of HYA results in a binding of the tissue and a decrease in fluidity, thereby decreasing the ability of tissues (myofascia) to glide on each other. This may be a reason pressure creating local inflammation and increased temperature restores the gel to a fluid-like medium and restores function to the fascia.

References

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