Training Principles for Fascia: Scientific Foundation & Suggested Practical Applications

Authors: Schleip & Mulller

Summary:

Fascia is a body wide network of connective tissue designed to transmit tensional strain and force during movement. If optimally elastic and resilient, it has the ability to offer a high degree of injury prevention (1). This article aims to present some biomechanical and neurophysiological foundations for designing training programs specific for fascia.

Anatomy and Physiology:

Connective tissue is highly adaptive. With increasing physiological strain, fibroblasts increase their remodelling activity in the cellular matrix to allow the tissue architecture to meet the imposed demand. Fibroblasts react to everyday loading and to specific training by remodelling the arrangement of their collagen network. There appears to be an exercise-specific relationship, whereby the magnitude of the load needs to exceed the amount which occurs habitually.

The organisation of contractile elements explains why as humans' age, we lose springiness in our gait; as we get older, the fascial network takes on a more haphazard, multidirectional fibre arrangement, as opposed to the elastic, two-directional, lattice-like arrangement found in younger individuals. This negative change is thought to be mediated by a lack of movement and activity, which leads to additional cross-links among fascial tissues, leading to a decreased in elasticity, a lack of gliding, and adhesions between fascial layers.

Fascial Stretching:

Different types of stretching appear to impart different effects on fascial tissues. Classical weight training loads the muscle within its available ROM which leads to a strengthening of the tissues that are arranged in series with the muscle fibres as well as the fascial fibres that run transversely across the muscular envelope. However, little effect is exerted on extramuscular fascia and intramuscular fibres that are in parallel with the active muscle fibres.

Classic stretching, where muscle fibres are relaxed has little effect on fibres in series with the muscle fibres because the relaxed myofibres are softer than the myofibres found in series with the tendon. The softer myofibres will absorb most of the elongation, decreasing how much tension is impaired on the fascial tissues oriented in series with the musculotendinous junctions. These stretches do, however, stimulate fascial tissues in the extramuscular fascia and intramuscular fascia in parallel to myofibres.

Dynamic or ballistic stretching, when performed correctly, has some merit in fascial health. It positively influences fascial architecture by creating a more elastic environment. This is achieved through the provision of a loading pattern that briefly activates the muscle in its lengthened position and thus, more comprehensively stimulates the fascial structures.

Therefore, long term use of both static and dynamic stretching can improve force, jump height and speed (2).

Fascial Hydration and Renewal:

Approximately ½ of fascial tissue is made up of water. When loaded (stretched or compressed) water is pushed out into the surrounding connective tissue. Application of an external load can result in refreshed hydration of fascial tissues. Especially in those that lack adequate hydration. (Sponge principle)

Proprioceptive refinement:

It is necessary to limit how much the reticular formation in the brain stem filters information from the brain, as it has the ability to restrict the transfer of proprioceptive information to the brain from somatic structures. This is encouraged through the application of shear, gliding and tension through motion and variety in speed and quality of movement.

Clinical Applications:

The benefits of fascial training occur very slowly and are long lasting. Constant and regular training is the key. Fascial training shouldn't be very time demanding. A few minutes, performed a couple of times per week should be sufficient. Complete renewal of fascial structures will take between 6 and 24 months.

Foam rolling/manual myofascial release can be used to increased hydration to tissues. Force should be applied slowly and with finely tuned directional change. Thus, fine-tuning inhibited or desensitising fascial proprioceptors.

High intensity interval training is recommended. This is because prolonged loading forces the fluid out and the fascial tissues begin to function less optimally. Short periods of rest/lesser intensity allows for the tissues to be rehydrated.

Preparatory counter movements/pre-tensioning of fascial tissues will utilise elastic potential (catapult effect) and thus, decrease the energy demand for a given task. The most important quality here is to make sure that the patient is using the kinetic energy stored by the fascial network and not muscular action. The action/movement should be performed as softly and smoothly as possible (Ninja principle). Jerky movements should be avoided. Aim to perform tasks as quietly as possible.

Rapid and fluid stretching is recommended. However, prior to performing any dynamic stretching, performing prolonged stretching along long myofascial chains is suggested. Rather than pausing in these poses, performing multidirectional movements, with slight changes in angle are most applicable. Once this is mastered, mini bounces in the stretched position can be used as soft, low intensity progressions. You can then explore dynamic, fast stretching with preparatory counter movements.

Strengths / Weakness:

Strengths

- High degree of clinical applicability.
- Relevant discussion backed up with info from a number world class research labs

Weaknesses:

- Author bias
- No objective search strategy described.
- More examples of exercises would have increased the clinical utility

Additional References:

1. Kjaer et al. From mechanical loading to collagen synthesis, structural changes and function in human tendon. Scandinavian Journal of Medicine and Science in Sport 2009; 19: 500-510.
2. Shrier I. Does stretching improve performance? A systematic and critical review of the literature. Clinical Journal of Sports Medicine 2004; 14: 267-273