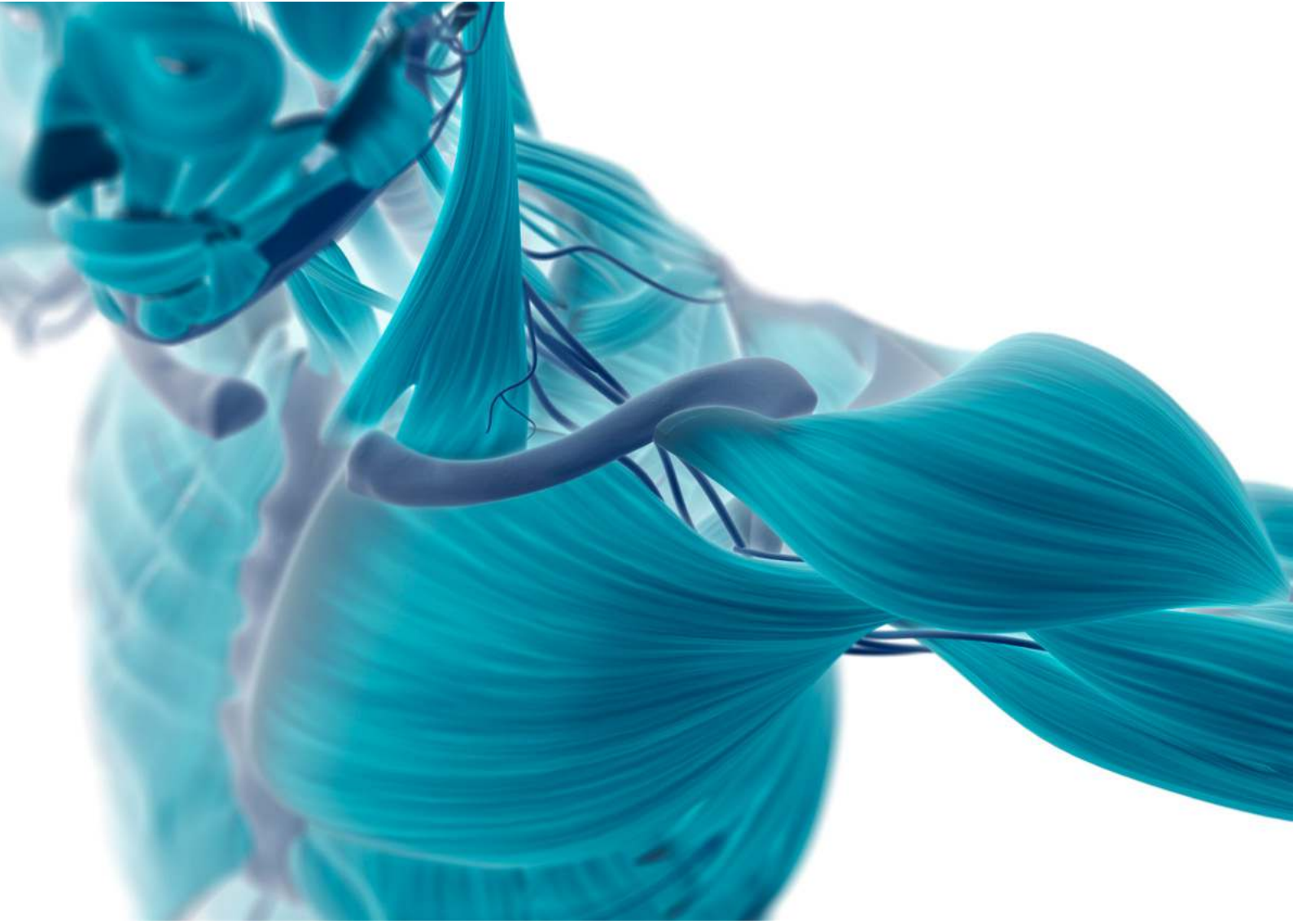

Anatomy of the Myo-fascial System

Emma Gilmore

Myo-fascia is a word that is being used more and more frequently, but do we really understand what it is? Here is a brief explanation of the wonder tissue everyone is talking about.

In brief, Myo means muscle and fascia means band or sheet of connective tissue. Myo-fascia is therefore referring specifically to the fascia that infuses with muscle tissue, as well as surrounding individual muscles. Each individual muscle fibre is surrounded by its own thin, delicate sheet of fascia (like a layer of cling film) this is called Endomysium, individual muscle fibres are then bundled together to form fascicles, a fascicle is then covered in another thin layer of fascia called Perimysium. These fascicles are in turn bundled together to form a complete muscle (e.g. the deltoid). The layer of fascia that surrounds the whole muscle is called the Epimysium (also known as deep fascia). The Epimysium enables healthy muscles to slide over each other in contraction and release to facilitate function. As Schultz & Feitis observed in 1996 "Muscle tissue is enfolded within fascia, the combination is called myofascia."

At the junction where the muscle becomes a tendon, the fibres of the endomysium, the perimysium and the epimysium become

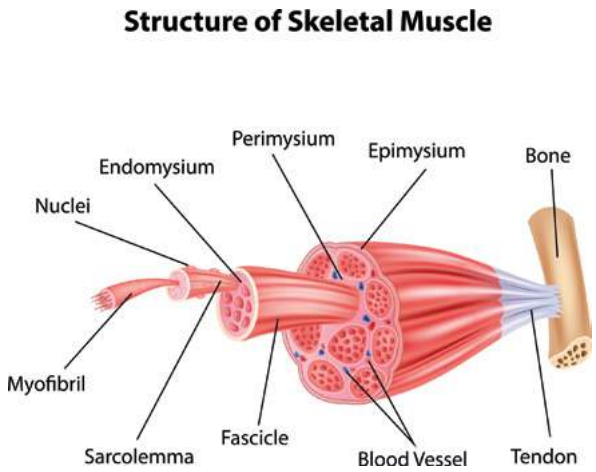

Figure 1: Fascial wrappings

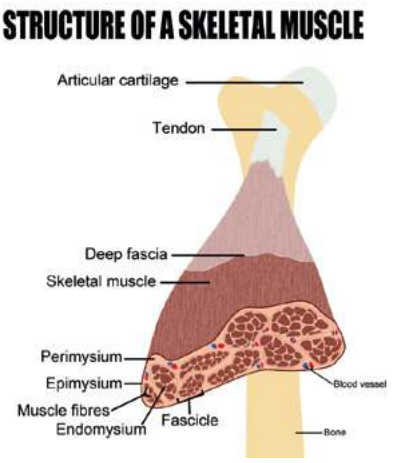

Figure 2: Fascial wrappings detail

continuous with the fibres of the tendon and merge onto the periosteum (the outer covering of bone). This begins to illustrate the continuous, dynamic web of fascia that infuses throughout our body, linking system to system, in fact way beyond the myo-fascial system. Once the muscles, fascia and bone have connected we are referring to the inevitably connected myo-fascial-skeletal system.

As a bodywork therapist dealing with chronic injuries I frequently have clients who came to me explaining that the pain they were experiencing was right in the middle of a joint, and that nothing was bringing them pain relief. Once I understood and visualized the myo-fascial, interconnected with the skeletal system and how the epimysium merges with the tendon and periosteum it made perfect sense that client could be experiencing pain deep in the joint seemingly between the bones. Through observation and palpation, a skilled bodywork therapist with a knowledge of myofascial release will be able to bring relief to this sort of pathology with relative ease.

There are approximately 650 skeletal muscles in the human body, but it is perhaps more accurate to think about the continuous fascia forming 650 myo-fascial pockets, creating compartments, into which the muscle tissue is poured. This more accurate understanding of the continuous myo-fascial tissue will give you a deeper understanding of the connections throughout the body.

This seamless connection of muscle to muscle and muscle to bone throughout the myo-fascial-skeletal system, begins to demonstrate how our body functions as one unified whole. It begins to show how a restriction in one area of the body can lead to other restrictions and compensatory patterns throughout the entire body, as the dynamic fascial system tightens, becomes bound down and hardens. Take for example the image below; let's assume the initial restriction came from the anterior of the body, the tight pectorals and associated fascia draw the arms forward, the knock on affect could be reduced mobility in the gleno-humeral joint. The tight pectorals and associated fascia could also restrict movements of the chest cavity, affecting the ribs, the lungs and breathing capacity. Restrictions in the pectorals could then affect the neck flexors (scalene and sternocleidomastoid) – possibly leading to anxiety. The tight pectorals and associated fascia could also cause this man to stoop - his eyes facing towards the ground. So, in an attempt to maintain health as well as keep us upright. The body will start making compensations throughout the myo-fascial-skeletal system. Here the neck extensors may have tightened to keep this man upright.

These compensations which may seem obvious through the myo-fascial-skeletal system, have a knock on affect to other systems, in this case potentially affecting lungs and breathing capacity, perhaps causing anxiety and affecting both the nervous and endocrine system. As well as obvious compensation like this, a myriad of smaller compensations are taking place throughout the body affecting all systems, in an attempt to maintain health.

These restrictions and compensatory patterns are frequently held within the fascial system, as it is the fascial system that is a totally integrated system and is the immediate environment of every cell in the body.
So let's unpick this a little further, what makes up the myo-fascia itself?

1. Muscle: Myo or muscle, a quick recap, muscle cells made of bunches of elongated rod-shaped cells packed full of thinner fibres called myofibrils containing actin and myosin filaments which slide past each other until they completely overlap to create a muscle contraction in response to nerve impulse.

2. Fascia "Fascia is a connective tissue, the most abundant tissue in the body, fascia forms the largest system in the body, as it is the system that touches all other systems" Dr. James Oschman PhD

Fascia is also considered a fluid loving system and is primarily made up of three substances: collagen, elastin and ground substance.

Collagen is the most abundant protein in the human body, found in the bones, muscles, skin, and tendons. It is a hard, insoluble, tough and fibrous, formed into tubules. As Thomas Myers explains "Chronic mechanical stress through an area results in increased laying down of collagen fibre and decreased hydration of the ECMs ground substance, both of which result in decreased nourishment in certain cells caused by the increase matrix". It is this "increased matrix "that forms the basis of fascial restrictions that we as bodywork therapist can learn to treat through myofascial release.

anatomy of the myofascial system

Figure 3: cross section illustrating myo-fascial compartments in the upper leg

Elastin is a protein that coils and recoils like a spring within the elastic fibres of connective tissue and accounts for the elasticity of structures such the skin, blood vessels, heart, lungs, intestines, tendons, and ligaments. Elastin and collagen function together in connective tissue.

Ground substance is part of extracellular matrix, it is the fluid component of fascia, and it is an amorphous gelatinous material, transparent & colourless. It fills the spaces between fibres and cells; surrounds & separates cells, providing important structural & nutritional support to them. In healthy fascia it is liquid to gel-like, in bound down, injured fascia the ground substance becomes solid and crystalline.

Fibroblasts are the most common cells of connective tissue, they are responsible for synthesising the extracellular matrix and collagen, producing the structural framework (stroma) for tissues, and playing a critical role in wound healing. Fibroblasts synthesize, organize and remodel collagen, depending on the tension between the cell and the extracellular matrix.

As mentioned earlier fascia is a fluid loving system, but as Leon Chaitow, Helene Langevin & Robert Schleip have identified. "Fascia can harden, de-hydrate, inflame and thicken." When working with clients it is this bound down, hardened, de-hydrated, inflamed and thickened fascia that in superficial areas is visible to the eye and deeper into the body be palpated with a trained hand. It is these hardened areas of thickened fascia that cause restrictions; these restrictions can effectively be released, allowing the fascia to re-hydrate when a skilled therapist works with myofascial release techniques.

Dr Mae Wan Ho

Dr Mae Wan Ho: geneticist and bio-chemist also identified "Fascia is a liquid crystalline matrix, functioning between a fluid and a solid state." The "solid state" is fascia that has been compromised through repetitive movements, postural compensations, impact injury, surgeries or an inflammatory response. As the restricted, hardened bound down fascia is released through myofascial treatment it rehydrates and become more functional, reducing pain, improving function and posture, facilitating recovery in patients.

We have now looked briefly at the myofascia, however it is important to note that the fascial system goes way beyond the muscular system, as Dr James Oschman notes "fascia is the system that touches all other systems…….. the insides of cells are connected to the outside via the fascial matrix". It is partly this interconnectedness of the fascia that makes it such an effective "communication system" as researched by Dr Mae Wan Ho, Frizt Popp, Dr James Oschman & Helena Langvin. We must also note that "Fascia possesses ten times more sensory nerve receptors than its muscular counterpart" Van der Wal 2007, and has been upheld as a "mechano-sensitive" (pressure sensitive) signalling system with an integrated function akin to that of the nervous system" Langevin 2006

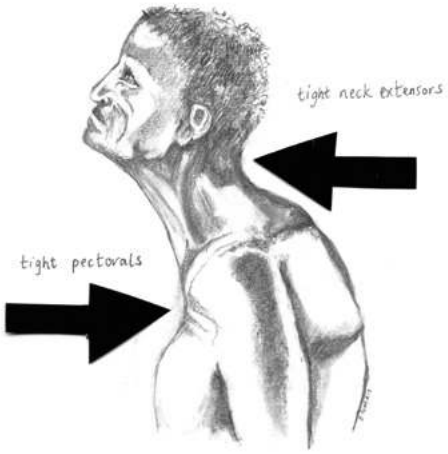

Figure 4: compensations in the myo-facsial system

So I am excited to be sharing more about fascia with you in the next edition. If you would like to find out more about myofascial release techniques to benefit your clients please get in touch:

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Pauline Baxter ~~A 10 year background in Health & Fitness Club Management laid the foundations for Pauline's venture into the world of complementary ther which began in 1994. A year out to travel in 1996 provided an amazing range of challenges and experiences before settling back in the UK to begin her full time~~