fascial structure

Fascia is a fibrous connective tissue whose importance has long been neglected. However, as our body of research has expanded, it is now understood that fascia is critically important to the structure and function of the musculoskeletal system. Indeed, it might not be long before the term *musculoskeletal system* is replaced by the term *myofascioskeletal system*. An understanding of the structure and function of superficial and deep fascia throughout the body yields important implications for manual and movement therapies.

Fascial Web Structure

Fascia is a connective tissue that wraps and envelops our body, providing a pervasive web that interconnects all tissues of the body. Simply put, it is fascia that is responsible for the cohesiveness and unity of our body. Fascia is located superficially and deep within the body. Superficially, it is located directly beneath the skin where it creates a honeycomb structure that contains adipose (fat) tissue. Deeper within the body, fascial planes wrap around musculature. Fascia is also integral to the musculature itself by providing endomysial sleeves that contain individual muscle fibers, perimysial sleeves that contain muscle fascicles, and epimysial sleeves that contain the muscles themselves. The tendons or aponeuroses of a muscle that connect it to its bony attachments are actually continuations and melding of the endomysia, perimysia, and epimysium of a muscle[1].

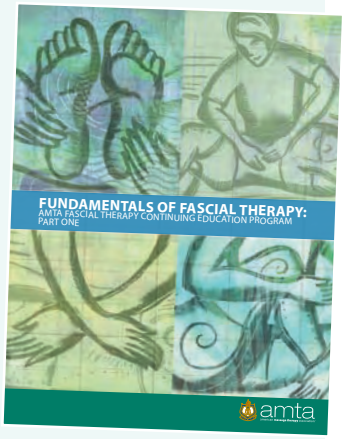
Further, muscles have fascial attachments to adjacent soft tissues, including ligaments, joint capsules, fascial planes, and other muscles. For example, the superficial fibers of the tendons of contiguous muscles that are oriented end to end are usually continuous into each other, forming myokinetic chains, also known as myofascial meridians (Figure 1). Muscles also send out fibrous slips that attach laterally to adjacent musculature and other soft tissues, causing a lateral transmission of force. It is clear that the classic model of a muscle that simply attaches into bones via its tendons needs to be updated: approximately 30% of a muscle's attachments, and therefore its pulling force, is exerted into adjacent soft tissues.

Fascial Web Function

Fascia is certainly the principal anatomic structure of the body. It appears to also be a principal functional structure of the body as well. Due to its strong tensile nature, fascia can mechanically transfer pulling forces throughout the body. Indeed, much of the stability of the body is provided by fascia via what is known as the tensegrity model: tensegrity refers to the tensile (pulling) forces that hold structures in their appropriate postures. Because fibroblastic cells of fascia can adapt to pulling forces and transition into myofibroblasts via the production of the contractile protein actin, fascia can function to not just *passively* transfer mechanical forces, but to also create *active* mechanical contractile forces.

Fascia is embedded with pain and proprioceptive fibers and therefore functions as a major sensory organ of

The terms fascia and fascism share the same Latin word root origin, *fascia*, which means bandage. Fascial tissue is so named because like a bandage, it wraps around and connects structures. The term fascism derives from the Latin word *fasces,* which was a bundle of rods tied (bandaged) around an axe, and was an ancient Roman symbol of authority. The symbolism of the fasces represented strength through unity because whereas a single rod is easily broken, a bundle is difficult to break.



▼ **FIGURE 1.** THE MORE SUPERFICIAL FIBERS OF MUSCLES OFTEN ATTACH INTO EACH OTHER.

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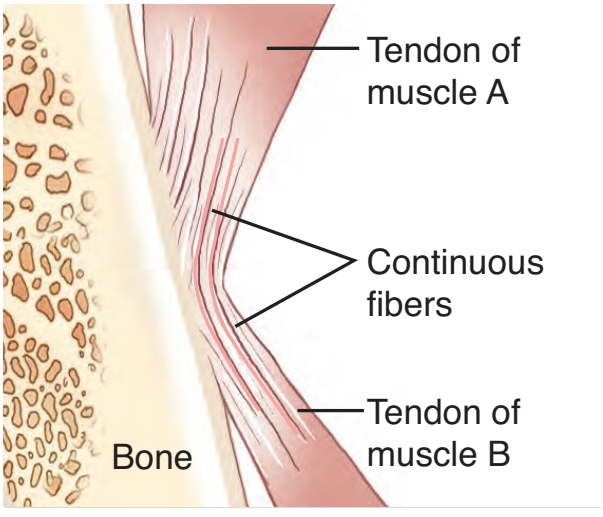
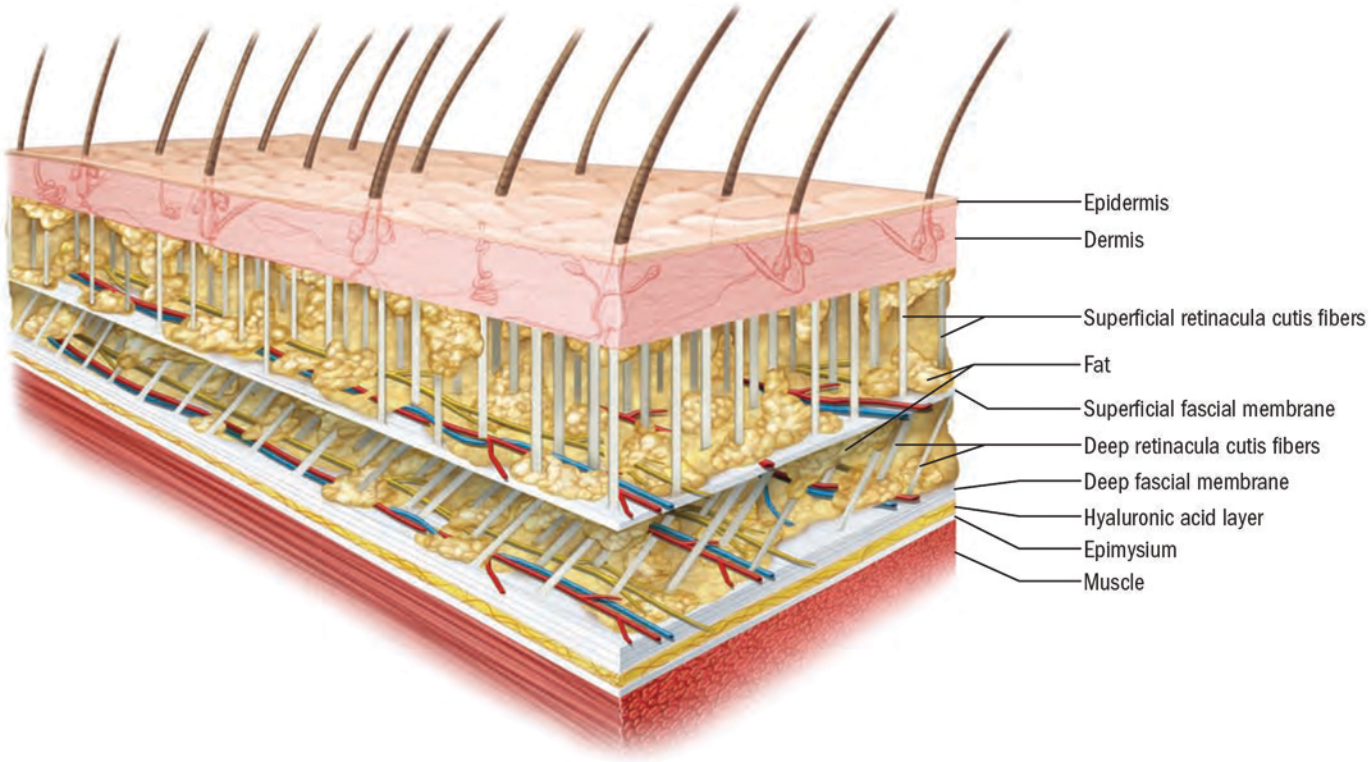


1 For more on the structure of muscular fascia, see the *body mechanics* column "*reversing anatomy: from muscles to myofascial meridians*" in the Summer 2010 mtj.



▲ **FIGURE 2.** CROSS-SECTION FROM THE SKIN TO THE MUSCULATURE, SHOWING FASCIAL MEMBRANES AND RETINACULA CUTIS FIBERS.

ILLUSTRATED BY GIOVANNI RIMASTI. (MODELED FROM AN ILLUSTRATION BY STECCO.)

the body as well. Interestingly, fascia is also embedded with sympathetic autonomic motor fibers. And when we consider that pressure applied into fascia can create a piezoelectric effect, and that this electric charge can then be conducted along the fascial web, fascia may prove to be the missing link between the physical structure of the body and the meridians of energy flow that are the basis of acupuncture and acupressure.

Superficial Fascia

Superficial fascia, also known as subcutaneous fascia because it is located immediately beneath the skin, is defined differently by various sources. Some sources define it narrowly as just the fibrous membrane that is located between the skin and the initial deep fibrous fascia layer that envelops the musculature. Other sources include the superficial and deep retinacula cutis fibers that connect to the superficial fascial membrane as

Examining the fibrous superficial fascia, we see that it is composed of a fibrous membrane that runs parallel to the skin. Even though this membrane is given different names in different regions of the body, for example, Scarpa's fascia in the abdomen and cribriform fascia in the proximal thigh, it is continuous throughout the entire body (Figure 3). The superficial fascial membrane is important because it provides channels and passageways for nerves and blood and lymphatic vessels to travel throughout the body. These neurovascular vessels send perforating branches through the superficial fascial membrane to feed the tissues of the region. An implication for health is that if the membrane is placed under tension and consequently stiffens, it could potentially pinch off and restrict flow within these vessels; impinged nerves could cause sensory abnormalities including numbness, tingling or pain; impinged veins and