3
Fascia-Organ of Support

3-1 Clothes, through creating an image, create the self-image (and thereby the behavior) of the person.

This book makes no pretense of being an anatomy book. Our goal is to establish a new point of view, a new way for a man to understand himself. His body is not only an instrument of man's self-expression, it is himself. The core of this new understanding is a different and more specific appreciation of the role played by the connective tissues, especially the fasciae, as a very significant working system of the physiological man.

We are in an age of cultural transition. We no longer honor the understanding of body structure developed by our Victorian forebears, with their emphasis on posture, nor have we found a satisfactory substitute. Our conscious understanding of structure is not yet sufficiently developed. As a result, our bodies tend to become physically random and mechanically disordered; the lawlessness of the body then seems to gain ascendance over the individual's life. Order or lack of it begins in the unconscious, the insidious level that is below man's awareness of what's going on. Awareness is impossible, for through his body man has become the dramatization of his unconscious image.

We hope to demonstrate here that the borders of this chaos can be pushed back. By structural organization of the body, specifically of its fasciae, we can lessen disorder at the unconscious level. We have evidence that we can bring the body to at least some degree of conscious order.

An individual in trouble unconsciously modifies his flesh, solidifies his mental attitude into biological concrete. When he does, the here-and-now goal of psychotherapy fails to have meaning for him. Within the physical boundary of his skin, what can account for the creation of this immobility? In the case of the hypermobile body (and psyche), on the other hand, what components are manifested in this lack of stability? Answers to these fundamental questions require a closer examination of the whole biological unit we call a body.

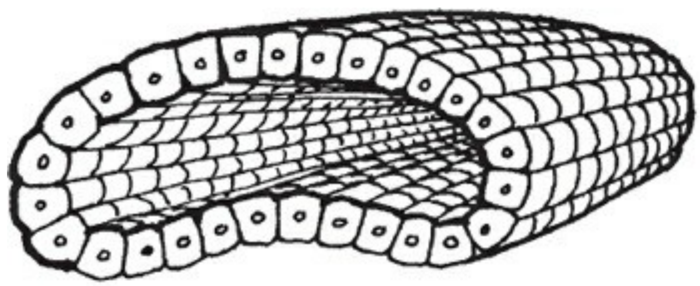
The genesis of each of us, as we all know, is from the fertilized ovum. This seemingly simple unit quickly differentiates into three functional systems—ectoderm, endoderm, and mesoderm—in that order in time (Fig. 3-2). In Structural Integration, our concern is with deviations of structures deriving from the mesoderm. In any human body, position in physical three-dimensional space (in other words, physical structure) is determined by elements deriving from the mesenchyme (a subdivision of the mesoderm), namely bone, muscle, ligament, tendon, and fascia.

The primary elements—bone, ligament, and tendon— develop from cells as nuclei appearing in the mesenchymal substance. As the units take form, less differentiated residue forms casings, sheaths of areolar tissue around the developing centers. The early function of the sheath seems to be protection; later, it develops into support. This is fascia.

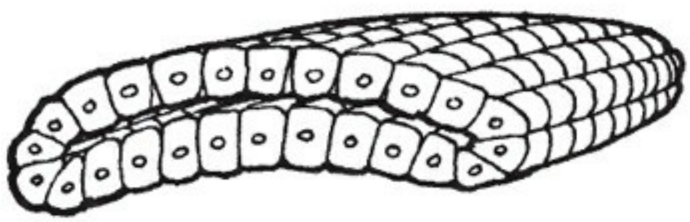
Fascia is one of a multimembered group of connective tissues. The specifications of the word are often unclear, especially to the layman. This is understandable, for compared with other systems, relatively little information of interest to the layman has been published on this very important mechanism of support. In general, the physiological systems that get the most attention from researchers are those that are most subject to disease or other problems. But in spite of the high incidence of collagen disfunctions such as arthritis and the rheumatoid diseases, much exploratory work remains to be done. The tough fascial planes of sheets, colorless (since virtually avascular) and translucent, have not been explored for their very important structural contributions.

Verbally, fascia is often confused with muscle. Muscle is enclosed within the fascia, as the pulp of an orange is contained within its separating cellular walls. Just as it is possible to extract the juice and pulp of an orange and still have a shell that retains its shape, so it would be possible (in theory, at least) to remove the muscular pulp in a body from its fascial envelope, leaving its external form relatively intact. Muscle is a highly contractile and responsive unit; fascia is less so. As a protective layer, it must be more stable. In the myofascial system as a whole, each muscle, each visceral organ, is encased in its own fascial wrapping. These wrappings in turn form part of a ubiquitous web that supports as well as enwraps, connects as well separates, all functional units of the body. Finally, these elastic, sturdy sheets also form a superficial wrapping serving as container and restraining support for the whole body—this is the so-called superficial fascia, lying just under the skin.

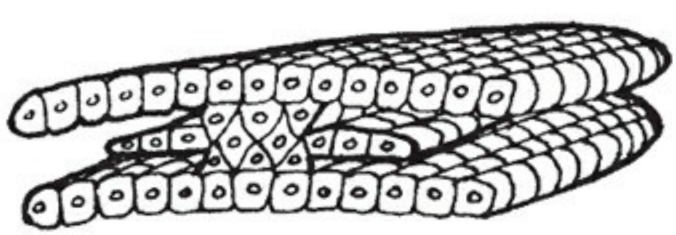
The superficial fascia is very elastic, thanks to its crisscross network of fibers. It is clear that the tone of this tissue is a basic factor in well-being. It may be modified in many ways: the damage of an accident or surgical interference is often significant, for fascial tissue tends to become denser and shorter as it heals, as all of us can verify from old or new scars. As we shall see, this fascial web connects and communicates throughout the body; thickened areas transmit strain in many directions and make their influence felt at distant points, much as a snag in a sweater distorts the entire sweater (Fig. 3-4).



ECTODERM

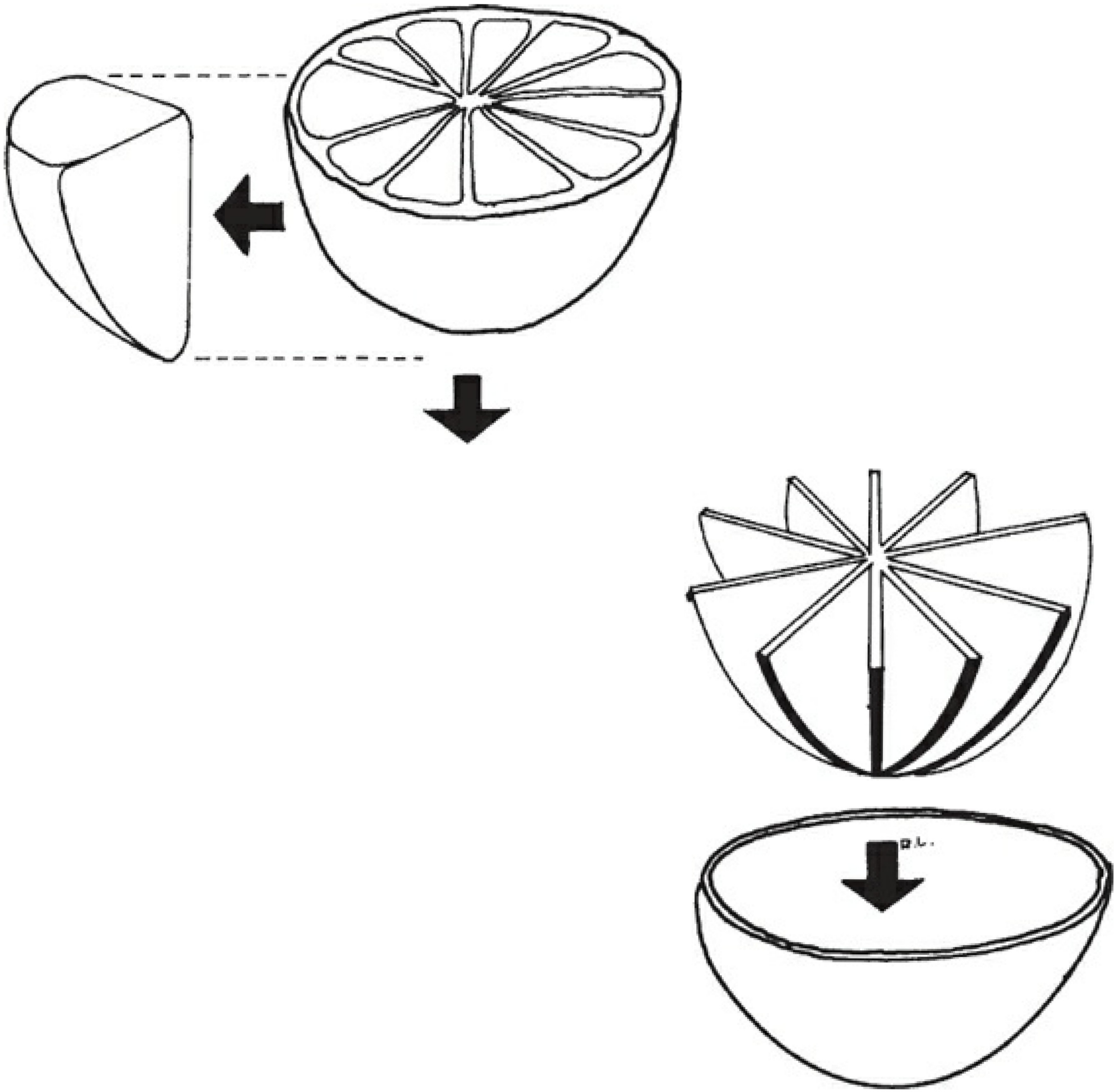


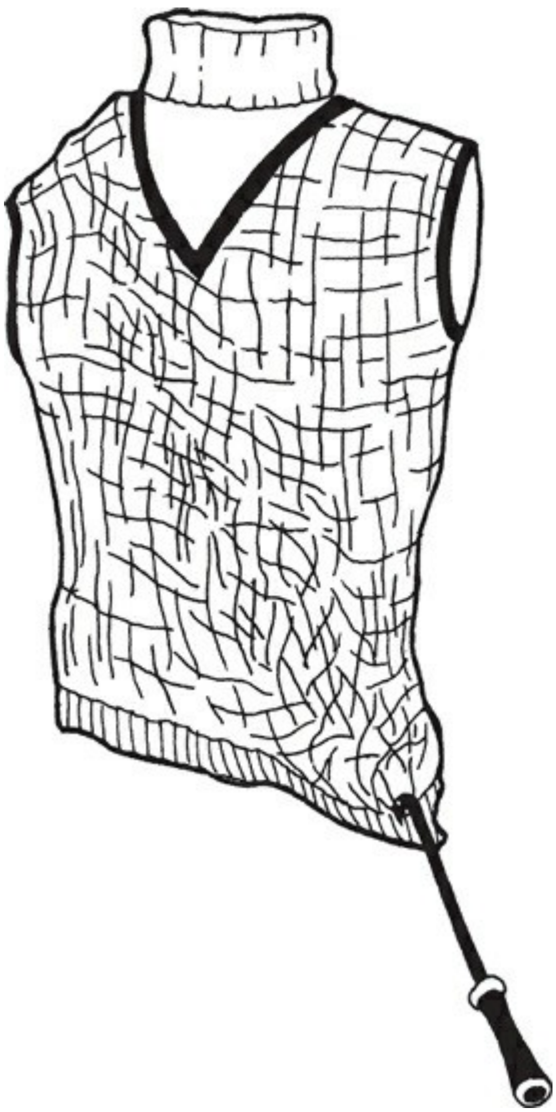
ENDODERM



MESODERM

(After Kahn, Man in Structure and Function, Fig.13)





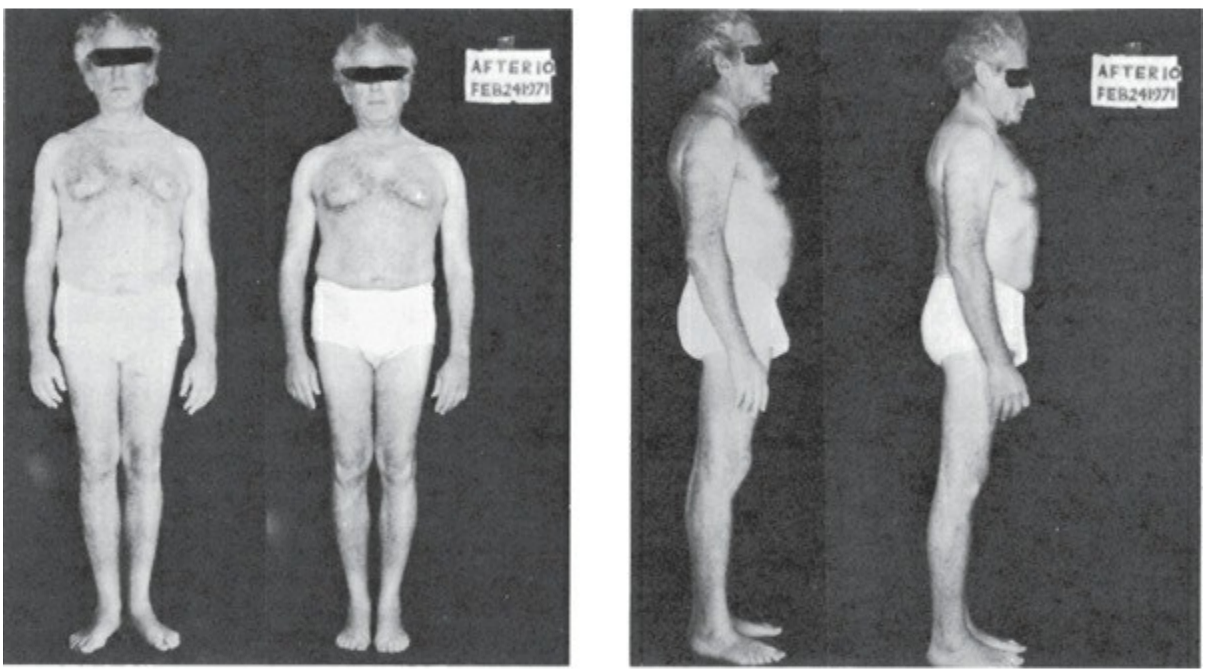
3-4 An elastic fabric, subjected to pull of any sort, transmits the strain in many directions over a wide area. If the displacement exceeds the elastic limits, an aberrant pattern remains.

This is probably the mechanism through which reflex or pressure points become manifest. Here, congestion or malfunction of an internal organ will be felt as a limited spot of pain, sometimes quite intense under surface pressure, at a point very distant from its origin. For example, many women at certain times in the menstrual cycle report pain elicited by pressure on a circular area (perhaps an inch in diameter) at the very crown of the head. In other words, the uterine congestion of the menses sets up strain as far away as the top of the head.

Many people are aware that reflex points can be found on the sole of the foot. When individual visceral organs become congested, pressure on a specific point in the sole elicits pain, sometimes intense in quality. This happens in both chronic and acute congestions. In such reflex situations, fascial planes may be the route of mechanical transmission.

In the view of Structural Integration, fascia forms an intricate web coextensive with the body, central to the body, central to its well-being, central to its performance. Clearly, fascial tone, fascial span, is a basic contributing factor to bodily well-being. The more usual definition of tone refers to muscular readiness to respond to nervous stimuli. J. V. Basmajian[1] calls attention to the factor of tissue resilience as a significant part of tone: "The general tone of a muscle is determined most by the passive elasticity or turgor of muscular (and fibrous) tissues and by the active (though not continuous) contraction of muscles in response to the reaction of the nervous system to stimuli. Thus, at complete rest, muscle has not lost its tone even though there is no neuromuscular activity in it."

To some people, the words *tone* or *span* give rise to a feeling of ignorance. What is tone, what is span? Experientially, they know. Every adult human has felt the tension characteristic of hypertoned fascia. This is frequently a sign of high blood pressure, either temporary or chronic. On the other hand, at one time or another everyone has been aware of the listless apathy of both flesh and spirit when fascia is hypotoned. The hypotoned are apt to have a low blood pressure. Poor tone is apparent in gross external contour as well as in subjective internal perception. Certain parts of the body are especially likely victims. The abdomen, for example, will tell the tale (Fig. 3-5). Do its contents sag into the pelvis? Are the pelvic contents restrained only by a toneless pelvic floor? This may keep them from spilling but adds nothing to the vital lift of a healthy individual. Tonelessness is never merely local. Since in these cases no additional floor or support is available for the upper half of the body, the gravity drag spreads upward. No help comes from the diaphragm either; through its involvement with the recti abdominis and the obliques, the diaphragm is sagging too.



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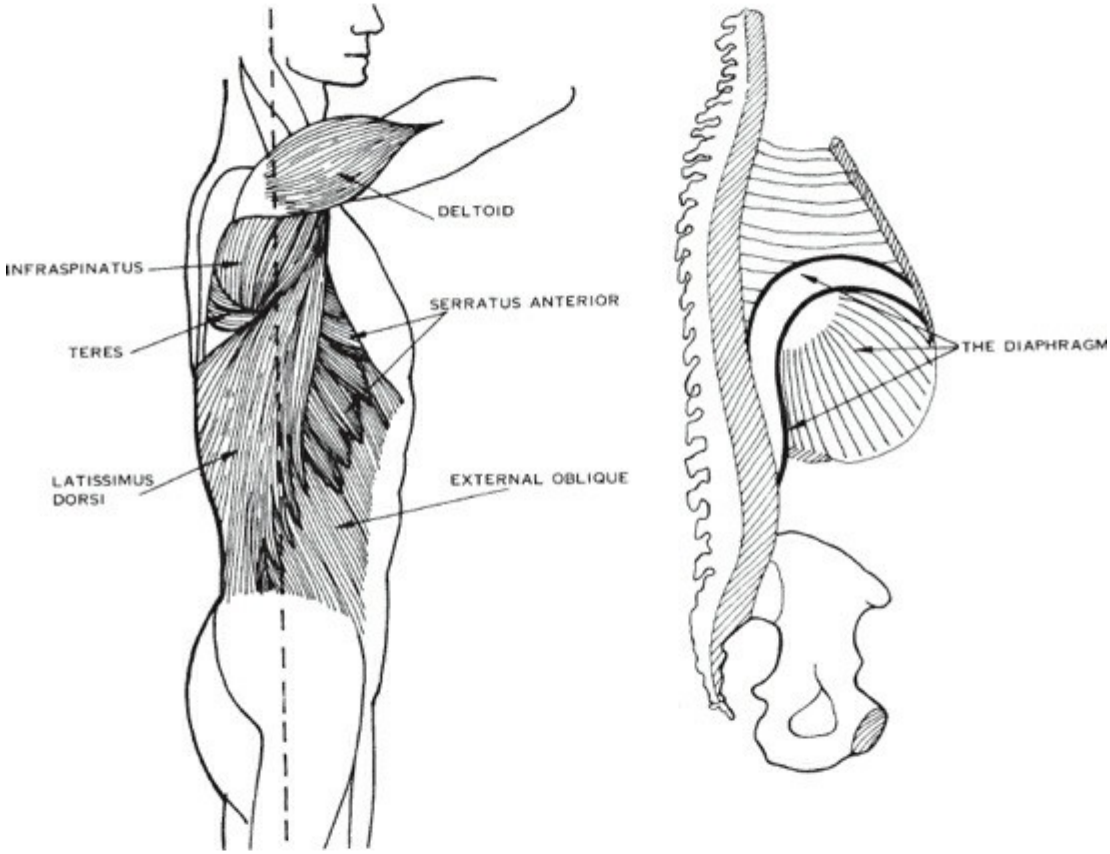
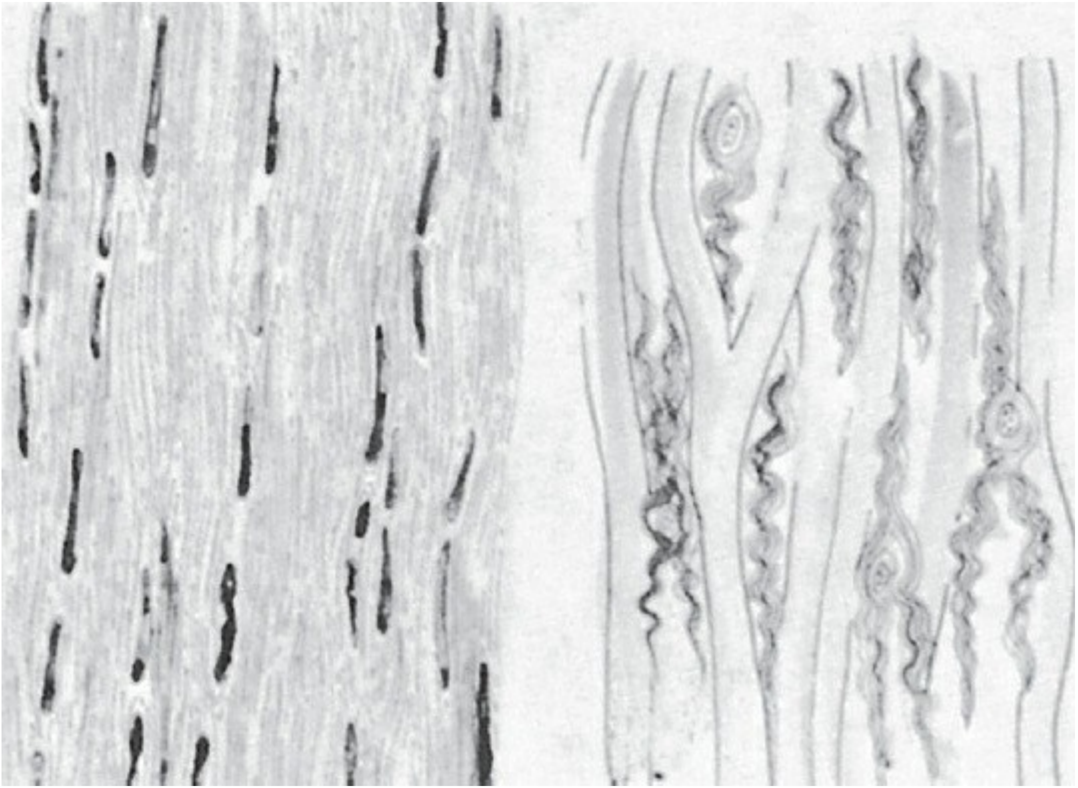
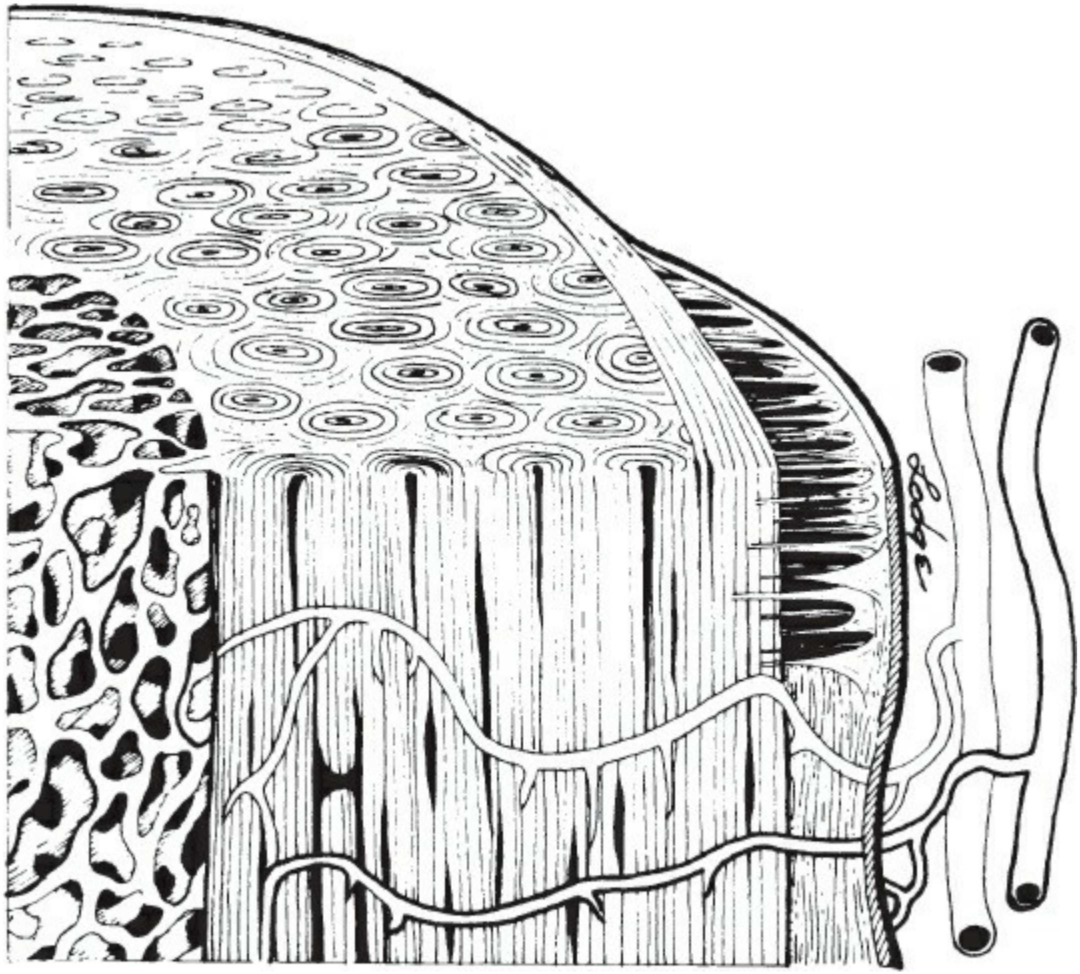


3-6 Lateral view: These diagrams show the lateral muscle structures affecting respiration and arm movement and the very powerful, dome-shaped muscle, the diaphragm, connecting the upper and lower torso. It determines the position and tension of the rib structure. In turn, rib structure defines and supports the space occupied by the diaphragm. Abdominal muscles and fascia support such a balance. Their myofascial sheaths encase the overlay of muscles and thus support the deeper core. Movement of the individual components of this overlay is determined by the direction and the freedom of individual fascial sheaths. Balance in the underlying structure is necessary to assure the grace and beauty of equipoise in the overlying wrappings.

The body economy requires the use of several types of connective tissue. All are basically structured from collagen and are constructed from the same units, but in different proportions. Of these, areolar (or loose) connective tissue is the most extensible, the most elastic, and the most widely distributed. Its fibers interlace in all directions. Body fat is deposited and stored in this kind of tissue. It is a fundamental part of the body's water metabolism and the mechanism through which the body guides and distributes fluids. It may even be used as packing material between organs.



3-7 **Left: Flattened nuclell are enwrapped within closely packed fibers of a tendon. Right: Bundles of collagen fibers.**



3-8 **Bone structure seems unitary although it is a patterned aggregate whose elements are unified only by their collective derivation from connective tissue. This is impregnated with deposits of calcareous salts that qualitatively and quantitatively vary according to age, mobility, exercise, etc.**

White fibrous tissue develops where situations involve tensile strain. Therefore it is necessarily more rigid, less extensible. The greater rigidity develops from the arrangement of fibers, which in this tissue lie in parallel bundles. When it binds bones together and limits movements, we call it ligament; when it connects muscle to bone or cartilage, it is named aponeurosis or tendon. White fibrous tissue may also form heavy fascial sheets such as the fascia lata. Aponeurosis differs from tendon in being thin. All these are connective tissues, derivatives of the mesoderm.

Whenever greater stability is required, as in the sclerous tissues (bone or cartilage), the organic collagenous matrix becomes impregnated with other substances that can contribute to this purpose. In cartilage, the matrix is modified by chondroatin sulfate; in bone, it is modified by mineral salts, predominantly calcium phosphate, though magnesium and many other trace minerals are also present (Fig. 3-8). For proper development of a sturdy bone matrix, the presence of vitamins C and D is also necessary. It is of practical interest here to note that adequate vitamin C (ascorbic acid) in the diet is very important to the health of all connective tissue. Serious absence of vitamin C causes scurvy, a connective-tissue disease. A wide range of chemical compounds may affect the health of connective tissues. For example, cortisone has an inhibiting effect, depressing the formation of both ground substance and fibers; somatotropin stimulates and favors their growth. Many hormones affect connective tissues, as do diverse other agents such as heat and cold, toxins and traumas, which change the tissues' chemistry and can give rise to disease.

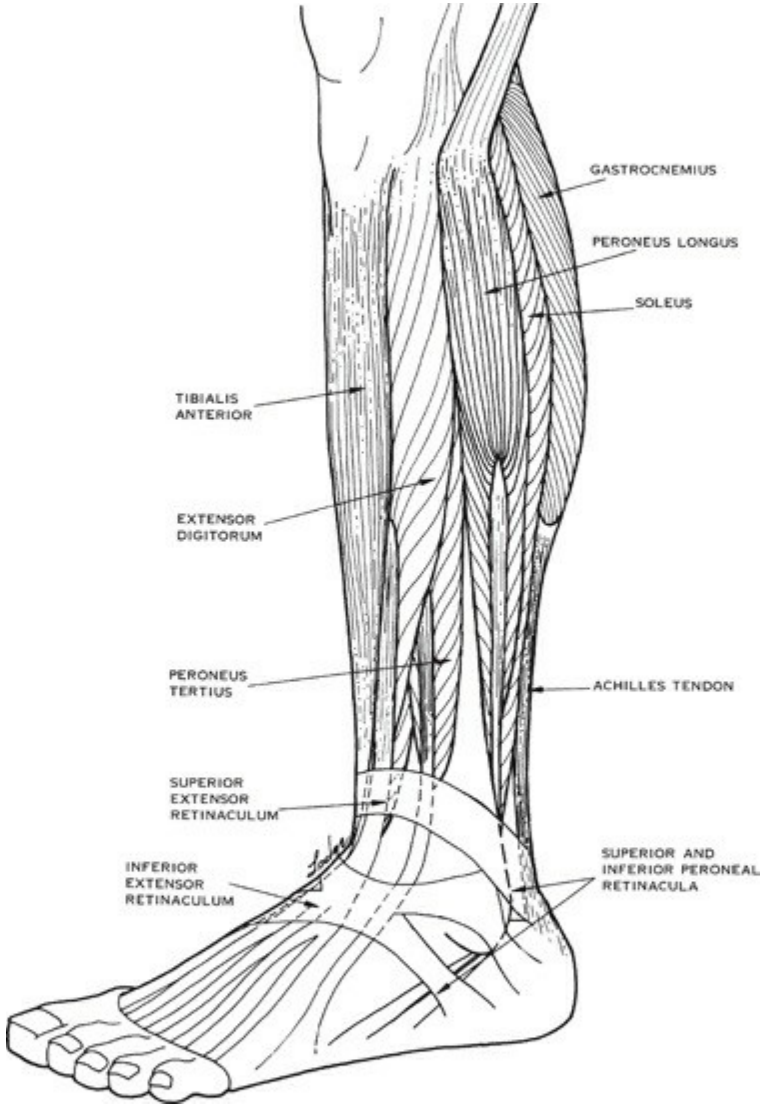
Connective tissues, particularly the fasciae, are in a never-ending state of reorganization. The continuous metabolic interchange made possible through the intimate relation of fascia with water metabolism allows structural reorganization. While fascia is characteristically a tissue of collagen fibers, these must be visualized as embedded in ground substance. For the most part, the latter is an amorphous semifluid gel. The collagen fibers are demonstrably slow to change and are a definite chemical entity. Therefore, the speed so clearly apparent in fascial change must be a property of its complex ground substance. The universal distribution of connective tissue calls attention to the likelihood that this colloidal gel is the universal internal environment. Every living cell seems to be in contact with it, and its modification under changes of pressure would account for the wide spectrum of effects seen in Structural Integration. The observable speed of the changes that are induced supports this hypothesis in the light of what we know about the action of colloids and the physical laws governing them. The application of pressure is, in fact, the addition of energy to the tissue colloid. (It is well known in physics that the addition of energy can turn colloid gel into sol.) It is probably this more energized colloid that accounts for the different physical properties of the body undergoing Structural Integration.

There are different kinds of fascial layers. The superficial fascia is a fibroareolar tissue that houses much of the body fats (said to be about 30 per cent of body weight in women). It can stretch in any direction and adjust quickly to strains of all kinds. The deep fascia is a denser layer. In the healthy body, its smooth coating permits neighboring structures to slide over one another. However, following inflammatory illnesses or traumatic injury, layers adhere one to another —they seem to be “glued” together.[2] They no longer slide, but cause adjacent structures to tug on each other, thus contributing to general weariness and tension.

The collagen of deep fascia forms bundles of parallel fibers, since this is the form best suited to resist tensile strain. For example, there is great tensile strain on the retinacula, which are bands of thicker fascia that restrain tendons or form pulleys against which muscles can pull. They occur above and below major joints—ankles, knees, wrists, and elbows.

Deep fascia has become identified with muscle in the lay person's mind. Indeed, while fascial sheaths can be split apart from other fascial sheaths very easily, it is not so easy to separate them from the enclosed muscle. This was probably the origin of the confusion between the two. Muscle is a colloquial term for a multidimensional unit that is difficult to separate into its component parts. In general, our use of the word is colloquial. However, most of our discussions here focus on the fascial component, the fascial envelope of the muscle. At this point, we would like to add a quote from Nobel Laureate Albert Szent- Gyorgyi, the head of the Institute for Muscle Research in Woods Hole, Massachusetts, and the greatest living authority on muscles:

> A muscle is one of these everyday things which seem simple unless looked at closely. The closer the look, the more complex muscle and its function become. There is no other tissue whose functions involve such sweeping changes in chemistry, physical state, energy and dimensions. In their contractions and relaxations, muscles control the very pulse of life in man and animal. As a rule, new knowledge leads to better understanding. With muscles, things go in the opposite direction.[3]


GASTROCNEMIUS
PERONEUS LONGUS
SOLEUS
TIBIALIS ANTERIOR
EXTENSOR DIGITORUM
PERONEUS TERTIUS
ACHILLES TENDON
SUPERIOR EXTENSOR RETINACULUM
INFERIOR EXTENSOR RETINACULUM
SUPERIOR AND INFERIOR PERONEAL RETINACULA

3-9 Lateral views: Connective tissue. Protean in manifestation, it develops patterns according to the physiological function it is expected to perform, but it always defines and supports its structure. As long muscles cross the major joints, they are restrained and held in place by bands of tough, fibrous connective tissue called retinacula. The schema shows those at the ankle.