

The Role of Connective Tissue in Character

and Armour Development

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Abstract

Reich's concept of muscular armour is re-evaluated whereby holdings in the myofascial system are primarily in connective tissue (CT), not the muscles per se. Throughout a brief presentation on CT's structure, characteristics, and functioning there are explanations as to why and how this revised version of armour is important to body oriented psychotherapy. Emphasis is placed on CT's protective response to stress, and its plastic ability, during certain conditions, to return to the pre-stressed, healthy state. A matrix, that acts as a non-neural, instantaneous communication system throughout the body, is formed because of the semi-conductive quality of connective tissue. All the bio-energies as well as hormonal secretions travel through this matrix informing and instructing the organism.

Keywords: connective tissue, character development, armour development, Reich, body oriented psychotherapy

The Role of Connective Tissue in Character and Armour Development

A unique understanding in body psychotherapy is Reich's concept of muscular armour whereby resistances and blockages are not just in the mind but also in the body. Chronic muscular contractions hold the history of the patient. Tissue manipulation and exercises are intended to loosen these contractions and free the blocked emotions, memories, and expressive movements. However, it is impossible to contract a muscle and hold it tight even for 15 minutes; the nerves desensitise and the muscle releases. So how does the contraction continue? In addition, if our muscular condition represents our “frozen history”, then an injection of muscle relaxants should not only relax the muscle but also free any repressed historical material held in that muscle tissue. But that does not happen. Yet, it is known that during a massage, a Rolfing session, or other physical manipulation techniques it is possible for emotions and memories and spontaneous movements to arise. This is because of the structure and functioning of the other, lesser known, aspect of the myofascial system—connective tissue (CT). The answers to these two questions—how does the contraction continue and how does touch release contraction—are grounded in CT structure and function. I will elaborate these two themes as well as CT's role in character development and character defence.

Theory

The Myofascial System

Bones provide us with support against gravity. A balanced skeletal system resists the static forces of gravity and holds us upright in space. Muscles provide movement either externally through time and space or internally i.e. digestion, respiration, heart rhythms. Muscles contain

fibrous tissue that are highly contractile, innervated, and vascularised. They play an important role in contemporary events. If we touch a hot object, the hand instantly recoils. The same happens in an emotionally dangerous situation; the muscles provide the movement to either flee the situation, or resist it. Under the proper conditions, after the danger has passed, the muscles relax and return to their pre-event state.

On the other hand, CT is more “historical”. It too consists of fibres but not the same type as in muscles. CT fibres are mostly collagen and elastin. Collagen fibres play an important role in stabilising and protecting the organism, as do elastin fibres, but to a lesser extent. They are more elastic and while able to stretch, they are also resilient to stress. CT is less innervated and vascularised. It has a mechano-sensory nature and until recently was not considered sensitive to pain. (Schleip, 2012)

Together, muscles and CT make up the myofascial system. A CT “envelope” surrounds every muscle. CT also weaves its fibres within muscle tissue and is responsible for attaching the muscles to the bone in the form of tendons (See Diagram I). It protects and supports the muscle and helps it to perform its function—movement through contraction and release. When the contraction is not released, the CT tissue comes to the aid of the stressed musculature. What is of interest to us as body psychotherapists is that under chronic physical or emotional stress, new CT fibres will be created in order to help muscles resist stressful events. Physically, CT fibres develop in the stressed area and build up a support system to help the muscle cope. This is muscular armour and is what we try to influence when we use touch techniques, movements or physical exercises in body psychotherapy.

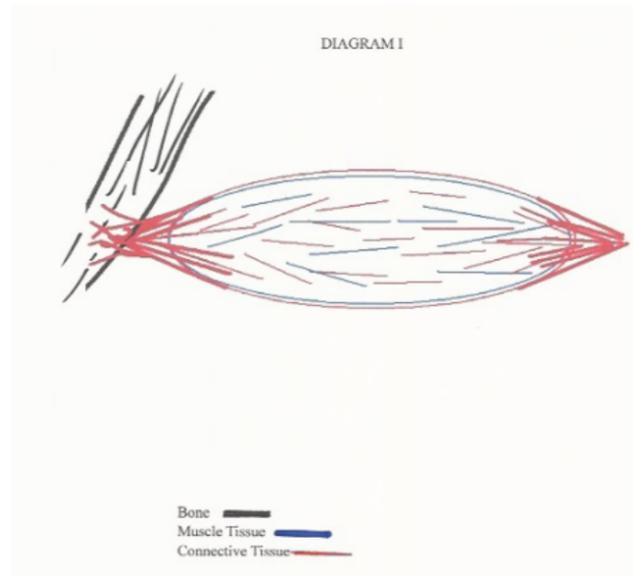


Diagram 1. The composition of the myofascial system.

Connective Tissue Types

CT is the largest protein mass in our body and is amazingly varied. Some of its best known forms are: fascia, cartilage, bone, blood plasma, tendons, ligaments, the cornea of the eye, myelin sheaths and synapses, adipose tissue and mucous membranes. The careful reader will notice that CT comes in the form of a solid (bone), a liquid (blood plasma), and various intermediate gelatine states (cartilage, mucous membranes). It can also be transparent (cornea) or in a crystalline state. This incredible plasticity and its ability to change its structure and functions according to local conditions is the quality we work with in body psychotherapy. The Points & Positions Touch Technique in Functional Analysis is specifically designed to take advantage of this plasticity.

These different forms of connective tissue are a variation of three basic elements: plasma, now called ground substance (GS), fibres and cells. Plasma is referred to by many different

names: blood plasma, cytoplasm, interstitial tissue, intercellular tissue. Plasma or GS is best recognized in the white of an egg. This is pure plasma/GS. It is an amorphous, viscous, semi-liquid consisting mostly of protein with some carbohydrates and is very similar throughout the world's vertebrates and probably invertebrates too. It is the medium within which all bodily functions are performed. Hormones move through it, at the synapses, nerve impulses jump through it, all metabolism happens in it and all the bio-energies pass through it. If it is dehydrated, stressed or polluted, all primary bodily functions will be affected down to within the nucleus of every cell.

The cells of CT are the mast cells and the fibroblasts. Whereas mast cells are considered responsible for creating plasma/GS, the fibroblasts are responsible for creating fibres. The two main fibres we are interested in are the collagen and elastin fibres mentioned earlier.

To create a more liquid state such as blood plasma, less fibres and a highly hydrated condition in the plasma/GS is needed. To create a solid state such as bone, the GS contains a low water level, and there are mainly fibres crisscrossing each other forming small enclosed cubical spaces, such as in a garden lattice work for vines to climb up on. These small spaces are later filled in by minerals creating the hardness of bones. Osteoporosis is the dissolving and disappearance of the mineral content leaving a "skeleton" of small, depleted CT cubicles and weakening the bone.

Connective Tissue Functions

In addition to the variety of forms into which CT can metamorphose, it also has myriad functions in the body. CT is involved in growth, healing of wounds, immune system activation and disease prevention. For example, invasive agents in bodily tissues such as viruses and bacteria are "surrounded" and encapsulated by CT fibres preventing them from spreading. As well, the

closing of wounds is done by creating collagen fibres that lie down over the wound transverse to the direction of the injury, closing it, stopping the bleeding and preventing infectious agents from entering. “A scab is collagen deposited by fibroblasts during repair” (Stecco, 2015, p. 7). The resulting scar is also CT.

Fascia is the most prominent form of CT and is involved in protecting the body against intrusions, injuries and insults, both physical and emotional. It also functions as a major support system for the body by creating bands, belts, and cables as well as hydrostatic pressure that aids erectness and creates the three dimensional quality of the body by creating volume. Recent research has shown the importance of fascial nerve endings in proprioception (perception of the body in the external environment) and nociception (pain). But, what is surprising is that the fascial nerve endings are also involved in visceral interoception (an *internal* perception system) (Schleip, 2012).

CT also creates shape and form. The importance of this function cannot be exaggerated. The word plasma comes from ancient Greek (platho or plasso) to fashion or form (from Latin, to mould). It implies kneading, as when one works dough in order to make bread. In a private conversation a teacher of Greek defined plasma (GS) as “...the living creation of a vital force”. CT creates space for every organ and tissue in the body. For example, in the embryo, before organs begin to form, CT creates spaces for each of the organs to inhabit. An empty cavity or capsule is formed called a septa, where the heart will be. Then the cells that will eventually create the heart itself migrate into that capsule and begin to grow the heart. The same is true for the lungs, the stomach, brain, etc. CT function creates a *place* for every organ and tissue to function within. It does the same on the cellular level. By creating hydrostatic pressure between tissue cells, the

cells stay separate and can go about their individual business of metabolism. Without this space created by CT, the cells would collapse onto each other and be unable to take in nutrients or expel wastes. CT is also responsible for the hydrostatic pressure within each cell allowing the cell to stay alive in three dimensional space.

How does this translate into body psychotherapy terms? Form follows function. “The manner in which a structure shapes itself and holds its subcomponents together in 3D space; this characteristic is what defines the way the structure will behave” (Ingber, 1998, p. 57). Imagine a cow and a cat both out in a field. We can easily picture the typical behavior of each animal. The cat crouching and alert while the cow is placidly munching grass while moving laboriously through the field. Now imagine these same two animals but switch the consciousness of the cat with the cow and vice versa. It is difficult to imagine a “cow” acting like a “cat” and the other way around. Why a cat is “cat-like” has to do with the shape of its body. The same is true for humans. A patient's behavior—her beliefs, her experience of her emotions, her movements—are greatly influenced by her form and shape. And form and shape are directly a result of CT functioning. Improve the condition of the CT, and its functioning will become more efficient resulting in changes in both physical and psychic behaviors: function = form = behavior = character structure. (See patient photos in the appendix for a visual representation of form changing due to functioning changing whereby shape appears in the contours of the body. These physical alterations are simultaneously reflected in the psychic realm.)

Another way to represent the relation of form and shape to behavior is to imagine two garden hoses lying on the ground. One has a large diameter, while the other is narrow. When the large hose is attached to the faucet and the water is turned on, the hose continues to lie on the

ground with the water flowing out. When the narrow hose is attached and the faucet is opened, even though the same amount of water and pressure is applied, the response is totally different; the hose moves rapidly in an excited snake-like fashion. The only thing that is different is the shape. The same emotion passing through a body —and this involves the energetic qualities of CT which will be discussed later— will be experienced differently in different character structures due to their shape. Anger in the peripheral flaccidity of a hysteric's body has no similarity on the *experiential* level with anger experienced in the contracted, tube-like schizoid's body. It is a matter of quality not quantity. It is the context, the character structure's experience, not the content, the emotion/memory, that is important to focus on in therapy. And this experience is largely determined by the structure and conditions of CT.

As would be expected, connective tissue's main function is that it connects all parts of the body to all other parts. This results in a unity; a wholeness throughout when the CT functions are not interfered with. In the physical realm this connectedness allows for coordinated, graceful movements, both internal and external. Psychically, this unity is represented as integrated, reality based thoughts and well functioning borders and emotions. The segmentalizations, splittings and disembodiment that patients report, and that are visible in the body, are often grounded in this lack of unity due to CT dysfunction. A unified state creates a network system or “matrix” throughout the entire body that acts as an instantaneous communication system without involving any of the nervous systems. I will elaborate this theme later.

Paradoxically, another major function of connective tissue is that it separates, encapsulates, and contains. As mentioned earlier, CT is responsible for the creation of separate spaces in order to encapsulate each organ and organ tissue functions on the cellular level. Another example

of this separation/encapsulation/containing function is on the intercellular level. When infectious bacteria, viruses, and toxins enter the body, the plasmatic/GS between cells will thicken up and surround these noxious substances and isolate them preventing them from spreading. The same is true with the fibrous capsules surrounding cancer cells preventing the cancer from growing.

Toxins are also trapped/filtered within the GS of cells and the intercellular GS (interstitial tissue). An interesting phenomenon is that when CT re-structures itself during therapy, it is common for patients to spontaneously detoxify. They reduce or stop cigarettes and/or drugs, change their diet to fresher and lighter foods, have bouts of diarrheas and sweats at night from functional fevers often with an acrid smell. One hypochondriacal patient reported after a feverish flu he wasn't afraid of the illness and felt "...cleaned out".

CT also produces heparin, phagocytes and activates glandular secretions.

Characteristics of Connective Tissue

By describing some of CT's characteristics we can become more specific as to how to use CT in our body oriented therapies. Two main themes are important to us on the applied level: CT's response to somatic and psychic stress and utilizing its plasticity in treatment.

Bones are to deal with gravity and muscles are for movement. When either or both of these two systems are out of balance, CT adds another function to its already long list of activities; it takes the stress on itself. Therefore, our concept of muscular armour is in reality the build up of new additional connective tissue in the stressed area. As mentioned earlier, a simple example is a wound being closed and a scab forming. The wound is stress to the body and the CT cells and fibres migrate there immediately to close the wound.

Of all the cells in our body, fibroblasts are the only cells which retain throughout our lives the unique property to migrate to anywhere in the body and change chemically in response to local conditions and produce fibres appropriate for that place and those conditions (Juhan, 1987, p. 66).

Concerning body psychotherapy, when a muscle is stressed, either from a physical or a psychic injury or the combination of the two, the envelope surrounding that muscle will thicken, the number of fibres woven through the muscle will increase, and the tendons that form at each end of the muscle, which is a combined extension of the envelope and the intra-muscular CT fibres, will also thicken. In addition, if the stress is strong and chronic involving other muscles in that region of the body, adjacent muscle envelopes will “glue” to each other resulting in a loss of mobility and function as typically seen in men and women who do “body building”. It is also possible that where the stressed tendon is attached the bone will enlarge itself which creates more surface area for the additional fibres of the tendon to anchor. This is muscular armour: chronically stressed areas of the body that thicken to resist external and internal physical, emotional and psychic stress. The good news is that due to CT's plasticity, we can slowly and safely address these conditions. This is the hope of body psychotherapy.

There are two terms I need to introduce. The first is anisotropy (Greek: *aniso* - unequal, unsymmetrical, a dissimilar condition and *tropy* – turning towards, having an affinity for) which manifests as responding differently to the same external stimulus in different parts of the body. This phenomenon is important in our touch techniques as well as the exercises we use in our therapy models and can be utilized through the properties of connective tissue. In other words, input to the system through touch or movement, varies according to the condition of the tissue.

Different patients respond differently – individually – to the same input. The patient's body “decides” how to utilize the “information” experienced through the touch or movement. Different character structures will have different experiences of the same type of touch.

The second term is thixotropy (Greek *thixis* – a touching plus *-tropy*). Thixotropy describes the quality of a gelatine, such as plasma/GS, to become more fluid when pressured or heated and more solid when at rest. This is the plasticity of CT. It is in constant re-organization, responding to both the local and systemic needs of the body. It re-reorganizes in response to positive and negative, internal and external as well as physical and psychic stimuli. As pointed out earlier, CT can change viscosity from a liquid to a gelatine to a solid and even to a crystalline state, whereby dehydrated collagen takes on the energetic properties of crystals. Due to the plasticity of the CT, all these changes can be reversed.

This plasticity can be activated by electricity, magnetism, heat, sound and pressure. One of the main changes that occur when these energies are applied is re-hydration of the CT to its healthy level. During stress the GS in the tissue dehydrates interfering with the proper functions of that tissue in that location. Once re-hydrated, the tissue restructures itself to fulfil the purpose it was intended to do. All the touch techniques, exercises, and movements that we use in body psychotherapy put pressure on CT and help to re-organize it. In Functional Analysis we work directly on the tissue with a precise, light touch using simple pressure and no manipulation of the tissue by the practitioner. The principle is to let the tissue re-organize itself – anisotropy. A good analogy is a sponge. If you put a weight on it, and the next day you lift the weight, the sponge will be dried out and flattened, having lost its shape. When it is put back in water, it will re-organize itself and resume its original form.

Stecco describes this developmental and repair process through the fibre producing fibroblasts:

Tissue damage induces fibroblastic mitosis. Fibroblastic proliferation and degradation is a normal occurrence in everyday mechanical loading such as walking, running and most movements. Even mechanical loading in rest and sleep stimulates CT function. Collagen synthesis in the patellar tendon increases by nearly 100% as a result of just a single bout of acute exercise, and the effect is still evident three days later. In the initial training period, collagen turnover in tendons (i.e. the balance between synthesis and degradation) is increased and there is a net loss of collagen. This enables a tendon to restructure and adapt to an increasing loading pattern. It is not until training continues that there is a net gain in collagen synthesis (Stecco, 2015, p. 6).

The Matrix – A Network System

Reich pointed out that an amoeba, which is mostly plasma/GS, experiences sensation without a nervous system. It has embodied subjectivity. Sensation is the different sensory experiences of the bio-energies passing through the plasma ubiquitously.

At about the same time Reich was writing, Szent-Györgyi, who received the Nobel Prize in 1937 for his discovery of Vitamin C, suggested that proteins in the body are semiconductors (Szent-Györgyi, 1941). This was proven to be correct in 1969. The result of this property of CT is a matrix, a network system that he called an “...energy continua, throughout the body that functions as an information/communication system outside all nervous pathways.”

If a great number of atoms can be arranged with regularity in close proximity for example in a crystal lattice, the single electrons cease to belong to one or two atoms only, and belong instead to the whole system. A great number of molecules may join to form an ener-

gy continua, along which energy, namely excited electrons, may travel a certain distance (Szent-Györgyi, 1941, p. 610).

The energy continua includes: heat, sound, light, magnetism and electricity. Some of us would also include a non-materiel form of energy, a life force. These waves of energy pass through the tissues like a wind blowing over a grassy field, giving rise to sensation within the organism. The condition of the conducting medium, plasma/GS in particular but also all forms of CT, determine the *quality* of the experience. Energy moving through the body is information to the body, instructions for organizing, defending and functioning. If that energy flow is distorted then the “information” will be distorted as in the garden hose analogy. A therapist can touch different patients in the same manner, but each patient will experience their version of the *quality* of that touch differently. One could feel the touch as reassuring or caring, another as seductive and a third as invasive. This is anisotropy in action. Due to the condition of the tissue and the energies passing through them, what is transmitted is not necessarily what is received!

CT receives, transmits, transports and even amplifies energetic impulses spontaneously, instantaneously throughout all parts of the body down to and into the nucleus of every cell. It is non-linear; an un-folding quality in all three dimensions at the same time. There is a direct, physically connected system of CT from underneath the skin directly into the cell nucleus: from the superficial fascia, to the deep fascia around the organs, to the organ capsules (septa), into the organs, into the organ tissues, through the cell membrane, into the cell, through the nuclear membrane and into the nucleus. All cells, including the nucleus of each cell, have a tubular “skeleton” made of connective tissue (Ingber, 1998).

The CT system connects with itself and everything else. It has the capacity to conduct protons and electrons, which gives a flow of energy, an energy continua, that provides information that controls form and tissue properties. It is a semi-conducting communication network that conveys bio-energetic signals among all the parts of the body. Bio-electric, bio-magnetic, bio-luminescent, bio-acoustic and heat signals move through collagen fibres, ground substance and water molecules. All bodily functions happen within and through this matrix. A 10-20% decrease in hydration of collagen slows the flow of protons by 5000 fold. According to Oschman, Szent-Györgyi resolved that a photon moves along a protein in a series of “hops” each involving a certain distances i.e. 20 Å. (Å is one billionth of a meter, a measurement used for atoms, molecules and microbiology). Wet, a proton moves at the speed of 1 tenth of a millionth of a second over this minute distance. When dry the movement slows to 1 million seconds (Oschman, 1981, p. 23).

This dehydration within the stressed CT system, disorganizes, slows, and distorts the energy information flow. The better the organization of the system, the better the energy flow. The better the energy flow, the better the organization within that system. A good flow results in information. A poor flow results in dis-information. The physicist Fritz Popp said, “The problem is not the quantity of the energy. There is always enough energy. Reich showed us that the issue is how the energy is organized” (European Association of Body Psychotherapy, Travemünde 1997). His research has also shown, contrary to expectations, that when “free energy” becomes organized and structuralized into a system, communication within that system increases. CT functioning determines energetic organization – therefore communication - within the organism resulting in character structure. The character structure is the context within which the content is

experienced. *Content without context is meaningless.* It is the context – the character structure – that determines the qualitative experience, not the content.

Energetics and Touch

Michael Heller pointed out that to touch is to be touched (European Association of Body Psychotherapy, Lisbon, September, 2014). This is certainly true and there is much to say about this aspect of energetics, touch, connective tissue and therapy. But due to limited space I will only focus on the therapeutic touch towards the patient.

Many questions arise through the act of touching. Are we adding energy to the system of the patient? Or, is our touch a catalyst for an existent energy system within the patient. Or both? Are they feeling the therapist's energy or their own, or a combination of the two as is suggested in resonance and relational psychotherapy approaches whereby an emergent, “third” is created? There is also the issue that CT has the ability to amplify energies. More comes out of the other side of the tissue than what is put into it. Whose energy is being amplified? Is the organism auto-poetic, self-starting, and self-regulating? In that case are we simply facilitating a healing process that the body is trying to do anyway? As Popp pointed out, there is always enough energy.

There is also the phenomenon of the piezoelectric effect. An electric current is created in the tissue when touched; mechanical vibrations moving through the tissue matrix produces bio-electrical fields.

Another consideration is that if one practices a movement over time, they will generate a stronger and stronger bio-electric output from that region of the brain. Do we become more “powerful” as therapists as we get older? The more experienced, the more powerful the touch? Research in quantum psychics also offers us the possibility that with the concept of quantum resonance there is no energy transmission or transformation. In the therapeutic relationship, two energy system's

oscillations come into resonance but there is no exchange between the two resonating systems; there is unity and diversity, relationship and individuality at the same time.

Summary

The relevance of connective tissue's structures and functions to body oriented psychotherapies is evident. Its role in all metabolic functions, in creating space, shape and contour, its ability to receive, transmit, transport and amplify energies determining the quality of subjective experiences, its role in protecting us physically and psychically by re-enforcing over stressed muscles, and its plasticity all make it indispensable for in-depth body psychotherapy approaches.

Will Davis has over 40 year's experience practicing and training in America, Japan & Europe. He is a member of editorial boards of two journals, the Italian Society of Psychologists and Psychiatrists, the EABP, AETOS and teaches as a guest trainer.

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Additional Sources

Deane Juhan's third chapter of *Job's Body* remains a simple, rich description of connective tissue.

Jean-Claude Guimberteau's *The Architecture of Living Fascia: The Extra Cellular Matrix and Cells Revealed Through Endoscopy* (2015) with its beautiful photographs is an in depth study on a micro level of fascial structure. A disc is included showing videos of living tissue. I believe he is the first to make videos of living fascia and they are posted on Youtube. I know this book is also in German.

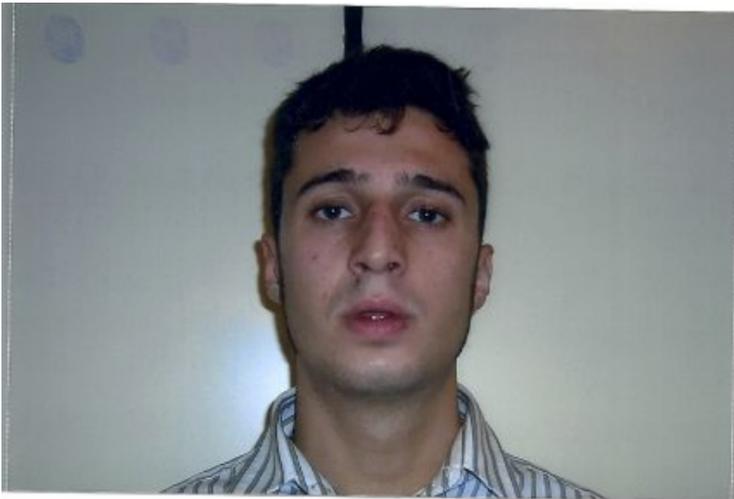
Carla and her husband Luigi Stecco, a psychiatrist, from Padua University in Italy are both involved in CT study. Her book, *Functional Atlas of the Human Fascial System*, is an up to date research source.

Robert Schleip's group in Ulm, Germany has a website that is a treasure trove of information for somatic practitioners: www.somatics.de

Ingber's classic article discusses the “architecture” of connective tissue and how its tensegrity creates form and determines function.

Oschman's writings offers more than just a physical and mechanical presentation about CT. His information on the energetic and plastic characteristics is unique in this field. www.energyresearch.us

Appendix





In the 6 months between these photos- the patient's behavior changed along the same lines as his body; more contours. He got more training for his job, stopped smoking marijuana and was drinking less. Over the course of the next 6 months he moved out of his parents' house and got into a relationship.