Manual Therapy Strategies To Successfully Treat Complex Patients

November 4, 2023

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Session Learning Objectives

- The participant will understand how to:

1. **See the Big Picture:** Assess the pertinent information in the complex patient's medical history and perform a scan exam in order to see the contributing factors to the patient's symptoms.
2. Develop an appropriate manual therapy treatment plan to address all of these factors in complex patients.
3. **Understand Physiology:** Use manual therapy to successfully treat the complex patient's aberrant physiology.
4. **Layer palpation:** Use to localize and treat the somatic dysfunctions that are present.
5. Determine which manual therapy techniques will be most effective when treating a particular complex patient and what order to apply them.

Speaker Bio

- **Education:**

American University: B.A. in Physical Education in 1981. Graduated Summa Cum Laude.

University of Maryland at College Park: M.A. in Exercise Physiology in 1987.

University of Maryland Baltimore: B.S. in Physical Therapy in 1992. Graduated with Honors.

Continuing Education: Over 100 continuing education courses in manual therapy and an avid reader of the current scientific literature to keep abreast of changing trends and the latest research findings.

Speaker Bio

- **Work History:**

Fitness and Wellness: Spent a decade in the adult fitness field performing exercise prescription, supervision, and wellness counseling. I was recognized as a certified fitness instructor by the American College of Sports Medicine. This training with an emphasis on physiology helped push me towards the manual therapy path.

Physical Therapy: Spent 4 years after UMB graduation working as a staff PT in 2 practices, where I emphasized the use of manual therapy. In 1996, I opened my solo, cash-based manual therapy private practice specializing in all aspects of manual therapy.

Speaker Bio

- **Teaching and Mentoring:**

  Lead a manual therapy study group that began in 2015 and meets 4-6 times per year. In 2017, co-founded the BayGrass Institute to provide licensed or certified healthcare practitioners with continuing education in the many areas of manual therapy through interactive and hands-on sessions.

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Disclosure

No relevant financial relationship exists

Manual Therapy Perspectives

- I **think** good manual therapists can successfully treat more things than they think they can.
- I **know** that good manual therapists can successfully treat more things than others think they can.

- "To be successful as a manual therapist, you need to be able to treat at the cellular level."
- "Pain is a liar!"
- "Never take the first right answer."
- Loren (Bear) Rex, D.O.

- The goal of treatment should be more than treating the symptoms with which the patient is presenting.
- The primary goal of treatment should be to find the true source of the problem and correct the aberrant physiology that is causing it.
- Once the normal physiology is restored, the symptoms usually decrease significantly, and often disappear, with the chances of the symptoms returning being greatly reduced.

- Manual therapy ***can*** successfully treat somatic dysfunctions that are causing aberrant physiology that are present in any tissue layer.
- Manual therapy ***cannot*** treat pathological conditions - i.e. disease.
- Manual therapy ***can*** help to improve aberrant physiology that is present within pathological conditions, but never fully normalize it.

- When treating a patient with a complex medical condition, the process often resembles peeling away layers of the onion.
- While the temptation is to treat as many things as possible during a session, it is best to proceed at a pace the patient's body can handle.
- You can only progress as quickly as their body can adapt to the changes you are making.
- Going too quickly may overwhelm their system and create a potentially dangerous situation. Better safe than sorry.

- When using manual therapy to treat complex patients, common pitfalls include:

1. Not performing an adequate assessment that allows you see the big picture of what is happening and design the most appropriate treatment program.
2. An incomplete understanding of the aberrant physiology that is being caused by the somatic dysfunctions present and how manual therapy can treat it.
3. An inability to perform a good layer palpation in order to localize which specific tissues are dysfunctional and are contributing to the patient's complaints.

- These pitfalls cause the manual therapist to choose less optimal treatment sequences and/or techniques to treat the underlying condition.

- When treating complex patients a good understanding of what is happening, is more important than how you treat it.

- While an ability to perform a variety of techniques is quite helpful when treating this population, at the end of the day you can only use what tools you have.

- Even if the technique you know how to do may not be the most appropriate for the situation, if it is done for the right reason to the right location, then you can give a treatment that has therapeutic value.

Manual Therapy Techniques I Use

- Muscle Energy
- Functional Technique
- Fascial Release
- Tissue Gliding/Passive and Active Stretching
- Cranial MobilizationTechniques
- Visceral Manipulation
- Autonomic Nervous System Balancing Techniques
- Chapman's Neurolymphatic Reflexes
- Specific Home Exercises
- Collaboration with Other Healthcare Practitioners

- Patients with complex conditions usually have dysfunctions that limit the body's ability to heal. The inadequate healing response is due to several factors:

1. The presence of musculoskeletal somatic dysfunctions throughout the body.
2. The presence of visceral dysfunctions with pleural and/or peritoneal/retroperitoneal/infraperitoneal restrictions.
3. Autonomic nervous system imbalance.
4. Poor lymphatic drainage and circulation.

Remember all systems of the body are interconnected!

- So how do we avoid treatment pitfalls in complex patients…

1. See the Big Picture: Perform a Good Assessment

Perform A Good Assessment

- When seeing a patient with a complex medical history for the first time, it is important to be able to see the big picture.
- Only then can an appropriate treatment program be developed for the specific needs of the patient you are seeing.
- This concept applies to the first session, but sets the stage for all the ones that follow as well.
- An appropriate treatment program includes:
  1. Proper treatment sequence.
  2. Proper choice of treatment techniques to use.

Listen-Think-Feel-Treat

- **Stages of Treatment:** Treatment should only begin after the therapist has had a chance to:

  1. **Listen** to the patient's current subjective complaints, past medical history, remaining functional limitations, functional improvements that have resulted from previous treatment sessions and/or their exercise program, medication changes, new medical test results, etc.

  2. **Think** about what this information tells you as it often indicates what the problem. If you allow the patient to talk long enough, they often you how to fix it. Ex. "I always feel better when I ……..". This step also can tell you what specific tests/special tests you will need to include in your evaluation.

Listen-Think-Feel-Treat

3. **Feel** the body tissues during the evaluation process to tell you which body regions are involved, what physiological systems are aberrant, and where tissue restrictions or instabilities are located. Do a good layer palpation!
4. **Treat** the dysfunctional areas that were discovered during the evaluation process.

Listen-Think-Feel-Treat

Remember that in order to have a successful treatment:

- Pain is a liar! True sources of the problem may not be where the pain is located.
- Many problems are not only musculoskeletal. Neurological, autonomic, lymphatic, circulatory, respiratory, digestive, reproductive, hormonal-HPA axis, and immunological processes may also be involved.

Scan Tests - See the big picture!

- Fully evaluate the patient before treatment commences to decide an appropriate treatment sequence. My tests, which take about 3-4 minutes to scan the entire body, include:
- **Standing:**
  1. Gait
  2. Standing Posture: Look for asymmetries and opposite rotations.
  3. Trunk Sideglide Test: Note the (+) segmental levels.
  4. Clavicular Jump Tests: Do the medial clavicles start and/or end uneven. Indicates where primary problems exist. Indicates which regions of the body the primary dysfunctions may lie.
  5. Manubrial Scan Tests: Indicates possible cervical and upper thoracic issues.

Scan Tests - See the big picture!

- **Supine:**
  1. Leg Length: Can indicate pelvic or lower extremity dysfunctions.
  2. Foot Squeeze: Can indicate foot and ankle dysfunctions.
  3. Talar Glide Test: Can indicate talar dysfunctions.
  4. Leg Lift-Hip IR: Can indicate LE congestion and hip dysfunctions.
  5. Squish Test: Can indicate pelvic dysfunctions
  6. Respiratory and Pelvic Diaphragm motion: Can indicate fluid congestion.
  7. Respiratory Scan with Rib Spring along lateral rib margins: Can indicate thoracic cage dysfunctions.
  8. Thoracic Inlet - Drive The Bus: Can indicate upper thoracic dysfunctions.

Scan Tests - See the big picture!

- **Supine cont:**

9. Manubrial Scan tests: Can indicate sternomanubrial and thoracic cage dysfunctions.
10. Check the abdominal viscera for ease of peritoneal glide: Can indicate visceral restrictions.
11. Cervical Sideglide: Can indicate cervical dysfunctions.
12. Cranial Vault Hold: Can indicate cranial dysfunctions.
13. Cranial Pussyfoot scan using temporal external rotation: Can indicate cranial dysfunctions.
14. Cranial Scan Tests: Can indicate cranial dysfunctions.
15. Autonomic Scan Test: Can indicate autonomic nervous system imbalance. Is the imbalance central or only local.
16. Chapman's Neurolymphatic Scan: Can indicate lymphatic congestion in specific organs. Results from a viscerosomatic reflex.

2. Remember Physiology

Treatment - Remember Physiology

- When developing the treatment plan after completing the assessment of a complex patient, you need to remember basic physiology.
- Where is aberrant physiology likely to be present and how is it contributing to the patient's symptoms:
  1. Lymphatic Drainage - Immune Function
  2. Circulation and Oxygenation of Tissues
  3. Autonomic Function
  4. Organ Function
- Considering these factors will allow you to determine what treatment techniques will best enable you to accomplish your treatment goals.

Basic Concepts to Keep in Mind

1. For cells to function properly, they need enough energy (ATP) so it is able to perform all of its activities without limitation.
2. It is only able to produce adequate amounts of ATP if enough oxygen is available in the mitochondria.
3. Oxygen delivery to the cells comes through the arterial system.
4. The arteries are only able to deliver enough oxygen to the cells from the capillaries if venous drainage is adequate and if sympathetic facilitation is not too high that it is causing the precapillary sphincters to close.

Basic Concepts to Keep in Mind

6. Cellular function is more optimal if a clean environment surrounds the cells, which requires good lymphatic flow.

7. Good lymphatic and venous drainage result from regular proper body motion and appropriate function of the passive pumps of the body - respiratory, pelvic, and cranial diaphragms.

Somatic dysfunctions mess all of these up!

Manual therapy removes the obstacles to healing!

The rest is just details!

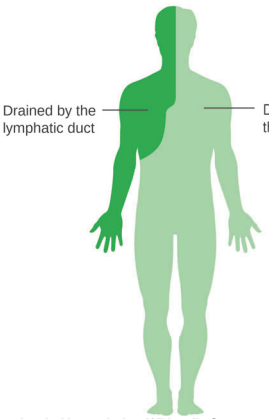
2. Remember Physiology: Lymphatics

Lymphatic Drainage

- **Abstract:**
- The general functions of lymphatic vessels in fluid transport and immunosurveillance are well recognized. However, accumulating evidence indicates that lymphatic vessels play active and versatile roles in a tissue- and organ-specific manner during homeostasis and in multiple disease processes. This review discusses recent advances to understand previously unidentified functions of adult mammalian lymphatic vessels, including immunosurveillance and immunomodulation upon pathogen invasion, transport of dietary fat, drainage of cerebrospinal fluid and aqueous humor, possible contributions toward neurodegenerative and neuroinflammatory diseases, and response to anticancer therapies.

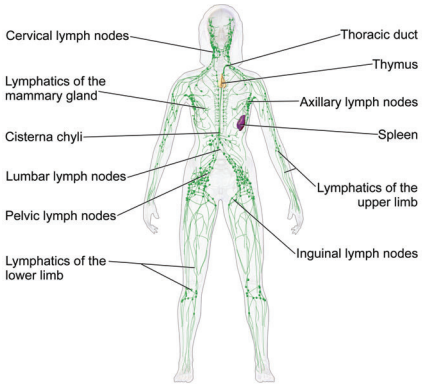
• Petrova TV, Koh GY. Biological functions of lymphatic vessels. Science 2020: 369 (6500): eaax4063.

Lymphatic Drainage



- Due to the liver on the right, 3/4 of the lymphatic fluid drains into the left thoracic inlets.
- Treating dysfunctions in the left clavicle, 1st rib, lower cervical spine, and upper thorax should happen 1st (or very early) in most complex patients!

Lymphatic Drainage



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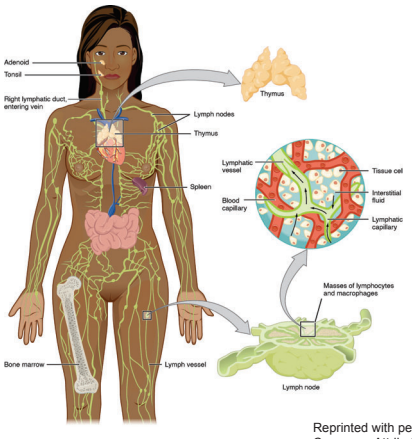
- Lymphatic fluid from the trunk is returned to the thoracic duct from several pathways:

1. From lymphatic collecting vessels to the cisterna chyli and up to the thoracic duct through the respiratory hiatus.
2. Through the GI gutters to reach small openings through the respiratory diaphragm called stomata to the parasternal lymphatic trunks.

- Stagnant lymphatic fluid becomes thick and sticky.

Lymphatic Drainage



- Good lymphatic drainage helps clear the area around the cells of debris and inflammatory products.
- Good lymphatic drainage also helps stimulate an appropriate immune response by presenting pathogens to the lymph nodes or lymphoid tissue.
- Good venous drainage provides the room needed for the arterial supply of oxygen and nutrients.

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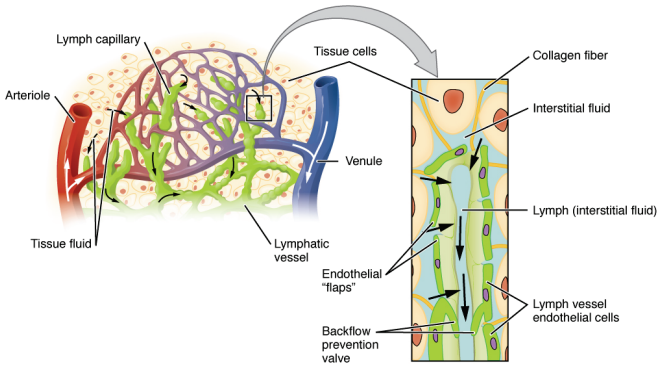
Lymphatic Drainage



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External Lymphatic Pumps

- Lymphatic pumping is caused by intrinsic intermittent contraction of the lymph vessel walls.
- External factors can also intermittently compresses the lymph vessels and enhance flow, including, in order of importance:
  1. Contraction of surrounding skeletal muscles.
  2. Movement of the parts of the body - especially rotation of joints to wring the tissues.
  3. Pulsations of arteries adjacent to the lymphatics.
  4. Compression of the tissues by objects outside the body.
- The lymphatic pump becomes very active during exercise, often increasing lymph flow 10 to 30 times. During periods of rest, lymph flow is almost zero.

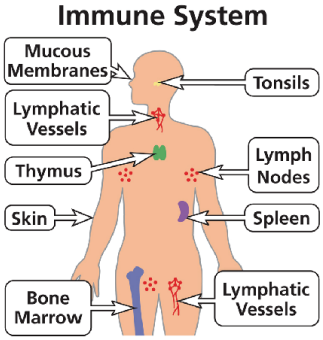
Lymphatic Drainage

- Getting good lymphatic and venous drainage requires:
- **Good biomechanical motion in:**
  - Feet and Ankles
  - Pelvis-Spine
  - Neck-Cranium
  - Hips-Knees
  - Thoracic Cage
  - Shoulders
  - Lateral Thigh
  - Clavicles
  - Elbows-Hands
- Note: With an emphasis on opposite rotation between adjacent segments to wring the tissue.
- **Good pumping motion in:**
  - Deep Compartments of the Calf
  - Respiratory Diaphragm
  - Cranial Reciprocal Tension Membrane
  - Pelvic Diaphragm
  - Thoracic Inlet

Lymphoid Tissue and Immune Function

- Good lymphatic flow is needed so any pathogens that are found in the interstitial fluid surrounding the cells are transported to lymphoid tissue. Lymphoid tissue is well located at the ports of entry into the body to intercept antigens that enter. The lymphoid tissue in the lymph nodes is also exposed to antigens that invade the peripheral tissues of the body, and the lymphoid tissue of the spleen, thymus, and bone marrow. It then plays the role to create specific T cells and B cells to fight these antigens.

Lymphoid Tissue and Immune Function



Primary organs of the immune system:

- Bone Marrow - Long Bones
- Thymus

Secondary organs of the immune system:

- Lymph Nodes
- Spleen
- Mucosal-Associated Lymphoid Tissue (MALT)

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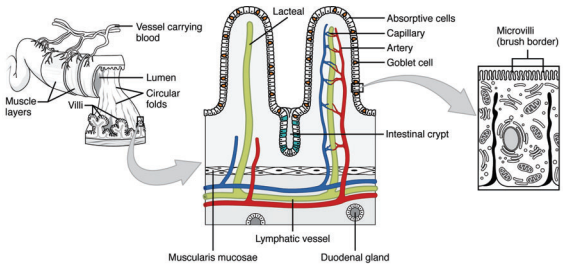
Lymphatics in Fat Transport



- Nearly all dietary lipids are absorbed in the small intestine, packaged in chylomicrons (TGs), and transported to the blood stream via the lymphatics.
- Chylomicrons first enter the lymphatics via the lacteals in the intestinal villi.

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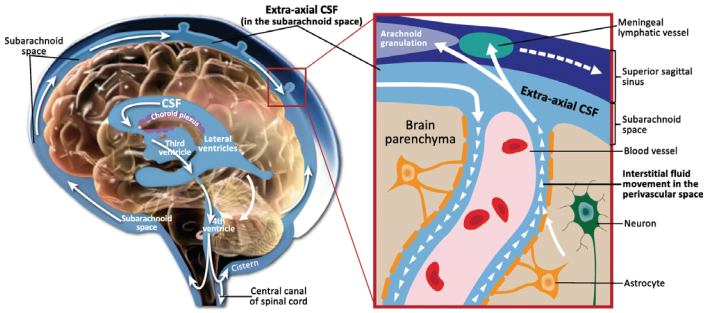
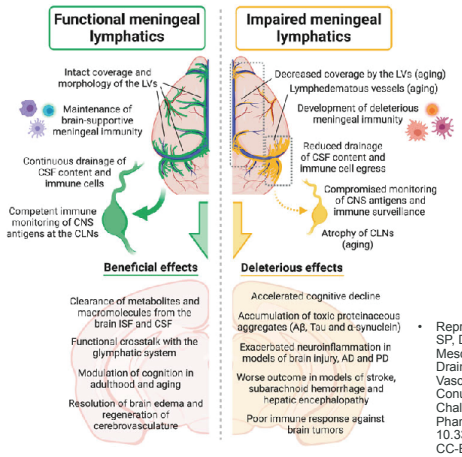
Brain Lymphatics



- In the addition to the body, the brain has its own lymphatic drainage system via meningeal lymphatic vessels and the glymphatic system.

Reprinted from Shen MD. Cerebrospinal fluid and the early brain development of autism. J Neurodev Disord. 2018;10(1):39. Published 2018 Dec 13. https://dx.doi.org/10.1186%2Fs11689-018-9256-7 Creative Commons Attribution 4.0 International license

Brain Lymphatics



- Reprinted from: das Neves SP, Delivanoglou N, Da Mesquita S (2021) CNS-Draining Meningeal Lymphatic Vasculature: Roles, Conundrums and Future Challenges. Front. Pharmacol. 12 (655052). doi: 10.3389/fphar.2021.655052. CC-BY License.

2. Remember Physiology: Circulation

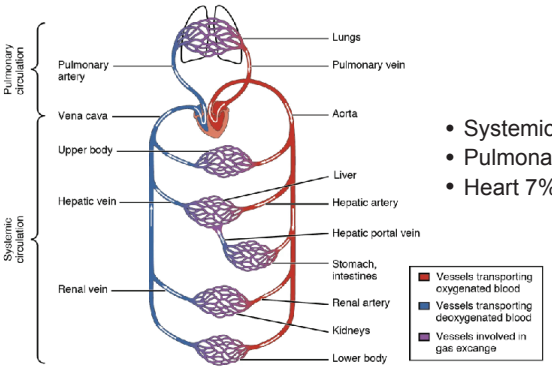
Circulation

- The role of the circulation is to provide the cells of the body, in all tissues, the materials they need to function optimally. These roles include:
  1. Transport nutrients to the body tissues - O_2, glucose, amino acids, and fatty acids.
  2. Transport waste products away from the body tissues - CO_2, H_+, and byproducts of metabolism.
  3. Transport hormones from one part of the body to another.
  4. Maintaining an appropriate environment in and around the cells, including ion concentrations.
  5. Delivery of immune cells when wound repair is needed or to counter internal or external pathogens.

Circulation

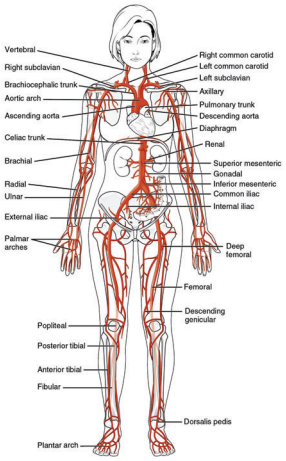
- **The rate of blood flow through these tissues is mainly controlled by their need for nutrients.**
- The heart and blood vessels function to provide the necessary cardiac output and arterial pressure to cause the needed tissue blood flow.

Blood Distribution in the Circulatory System

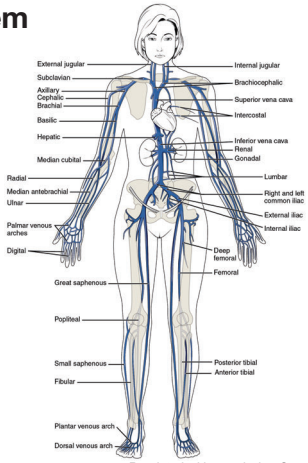


- Systemic Circulation 84%
- Pulmonary Circulation 9%
- Heart 7%

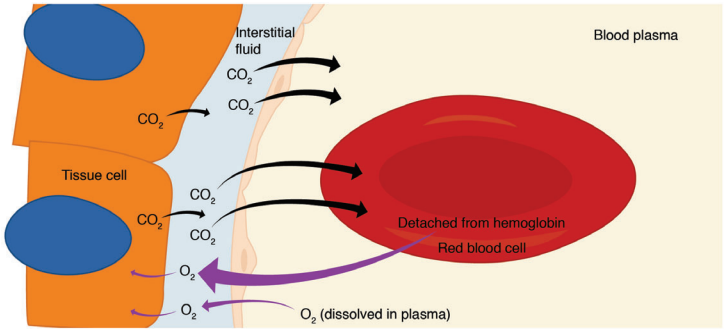
Arterial System



Venous System



Cell and Blood O_2-CO_2 Exchange



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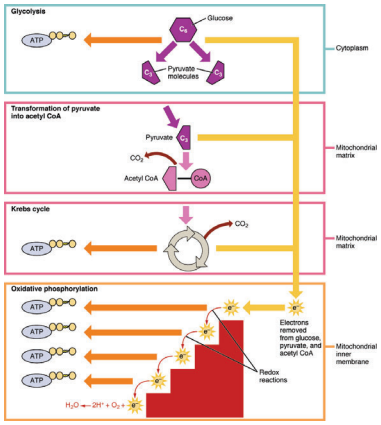
Cellular Respiration

2 ATP

2 ATP

34 ATP



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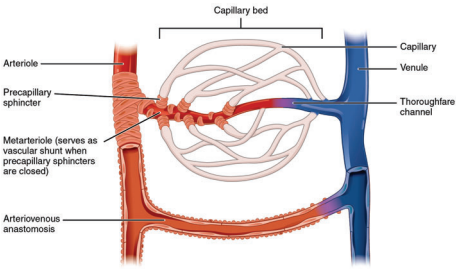
Precapillary Sphincters



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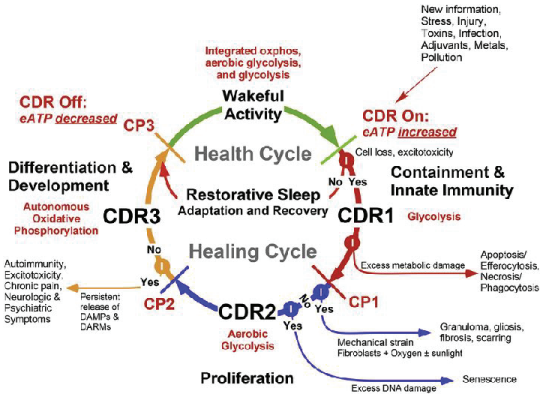
- Blood flow into the capillaries is controlled by the precapillary sphincter.
- Contraction of the precapillary sphincter limits the amount of blood entering the capillary.
- Precapillary sphincter contraction is increased by facilitation of the sympathetic nervous system - T1-L2 spinal nerves.

So how will spinal dysfunctions affect local blood flow and tissue oxygen levels?

Cellular Function

- For a cell to function properly it has to maintain a dynamic equilibrium in and around it by performing various tasks. They include:
  1. Provide structure for the body.
  2. Maintain cellular membranes and provide a barrier.
  3. Regulate the concentration of ions (Ca^{++}, Na^{+}, K^{+}, and Cl^{-}) inside the cell.
  4. Transport substances inside the cell.
  5. Perform metabolic functions - take in nutrients from food and concert them into energy and synthesize needed substances - proteins, lipids.
  6. Grow - Anabolism.
  7. Remove of waste and catabolize worn-out cellular components.
  8. Cellular Death - Apoptosis: when not enough ATP is produced.
  9. Reproduce new cells.
  10. Repair DNA, misfolded proteins.

Healing Cycle-Cell Danger Response



Reprinted from Naviaux, RK. Metabolic features and regulation of the healing cycle—A new model for chronic disease pathogenesis and treatment. Mitochondrion. 2019: 46: 278-297. with permission from Elsevier. CC BY-NC-ND license.

Healing Cycle-Cell Danger Response

Some Robert K. Naviaux, MD, PhD's key points:

- Emerging evidence shows that most chronic illness is caused by the biological reaction to an injury, and not the initial injury, or the agent of injury itself.
- Chronic disease then results when cells are caught in a repeating loop of incomplete recovery and re-injury, unable to fully heal.
- All chronic diseases produce systems abnormalities that either block communication (signaling), or send alarm signals between cells and tissues. Cells that cannot communicate normally with neighboring or distant cells are stranded from the whole, cannot reintegrate back into normal tissue and organ function, and are functionally lost to the tissue, even when they are surrounded by a normal mosaic of differentiated cells.

Healing Cycle-Cell Danger Response

- Blocked communication and miscommunication inhibit progress through the healing cycle, and prevent normal energy-, information-, and resource-coordination with other organ systems.
- Based on real-time chemical signals and mitochondrial function, each cell has a certain probability of entering the next stage of healing. This probability is 0%–100% based on cell-specific metabolism and the net effect of all the metabokines (signaling molecules) in the milieu around the cell. For any given cell, one step in the healing cycle cannot be entered until the previous step has been completed and mitochondrial function in that cell is ready for the next step.

Healing Cycle-Cell Danger Response

Take Home Message

1. To properly heal you need to restore the proper milieu surrounding the cell by re-establishing good lymphatic and venous drainage.
2. To complete the healing cycle, you need to deliver oxygen to the involved cells in order to re-establish oxidative phosphorylation. This is the energy system that produces the greatest amount of ATP so that the cells can perform all of its necessary functions.

Hypoxia Hampers Cellular Function

Abstract: When oxygen delivery is disrupted or reduced, the organisms will develop numerous adaptive mechanisms to facilitate cells survived in the hypoxic condition. Normally, such hypoxic response will cease when oxygen level is restored. However, the situation becomes complicated if hypoxic stress persists (chronic hypoxia) or cyclic normoxia-hypoxia phenomenon occurs (intermittent hypoxia). A series of chain reaction-like gene expression cascade, termed hypoxia-mediated gene regulatory network, will be initiated under such prolonged or intermittent hypoxic conditions and subsequently leads to alteration of cellular function and/or behaviors. As a result, irreversible processes occur that may cause physiological disorder or even pathological consequences."

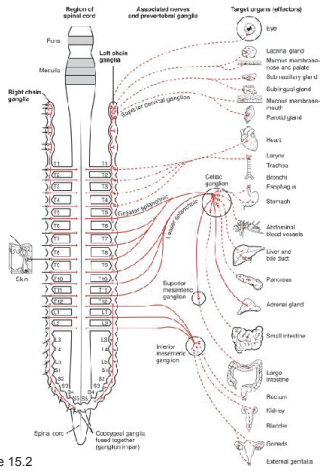
Chen PS, Chiu WT, Hsu PL, et al. Pathophysiological implications of hypoxia in human diseases. Journal of Biomedical Science. 2020: 27:63. https://doi.org/10.1186/s12929-020-00658-7.

2. Remember Physiology: Autonomic NS

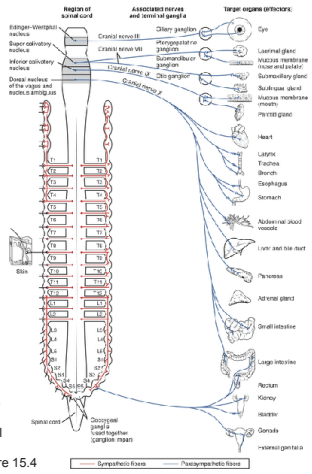
Autonomic Nervous System Overview

- Consists of 2 major divisions:
  1. **Sympathetic:** Originates from T1-L2. Controls fight or flight responses. Decreases systemic blood flow.
  2. **Parasympathetic:** Originates from the cranium and sacrum (S2-4). Controls resting, digestive, and healing responses. Increases systemic blood flow.
- The SNS and PNS are always active to some degree providing a counterbalance to each other. Problems begin when one of these systems begins to predominate beyond the body's current situation.
- The enteric nervous system of the gut is an independent system that is modified by sympathetic or parasympathetic function.

Sympathetic Nervous System



Parasympathetic Nervous System



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Visceral Sensory and Motor Function

- Visceral sensory information needs to be integrated with the visceral motor system.
- Visceral afferent signals serve 2 primary purposes:
  1. It provides feedback to local reflexes that dictate the current visceral motor function in each organ.
  2. It communicates with higher integrative centers in the brain if the on-going situation in the viscera becomes life-threatening and/or require more complex and diverse coordination between the visceral motor, somatic motor, neuroendocrine, and behavioral activities.
- The visceral motor system (smooth muscle fibers in organs, cardiac muscles fibers, and glands) responds as needed to the visceral sensory information that is delivered to the central nervous system telling it what is the current status of the microenvironment of each organ.

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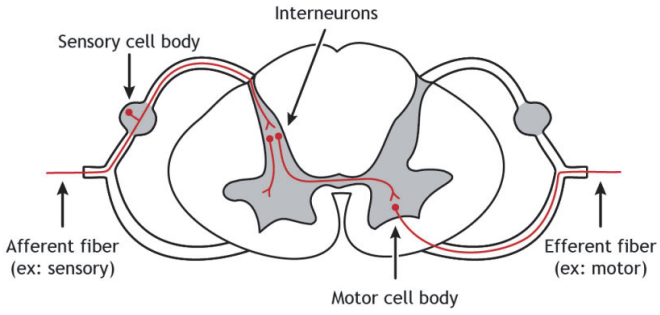
Visceral Sensory and Motor Function



Good Information In = Good Information Out

Henley, C. *Foundations of Neuroscience*. Open Edition. East Lansing, MI: Michigan State University Libraries; 2021. Creative Commons Attribution-NonCommercial-ShareAlike 4.0 (CC BY-NC-SA) International License. Figure 19.7

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Function of the Principal Organs

- **Cardiorespiratory:** Supply the blood with the oxygen needed to produce the energy necessary for proper cellular function and deliver this oxygen to all parts of the body. The respiratory system works with the circulatory system to provide this oxygen, remove the waste products of metabolism, and help to regulate pH of the blood.
- **GI Tract:** Digest and absorb ingested nutrients and excrete the waste products of digestion.
- **Urinary:** Removes waste from the blood, helps regulate blood volume and pressure, and controls the cellular and blood level of electrolytes.
- **Reproductive:** Produce egg and sperm cells, transport and sustain these cells, nurture the developing fetus, and produce hormones.

Somatic Dysfunction and Visceral Function

- Somatic dysfunction at a particular spinal level can generate different types of reflexes:

1. **Somatosomatic Reflex:** When somatic stimuli produce patterns of reflex activity in segmentally related somatic structures. Ex. C5 dysfunction causing elbow pain.
2. **Somatovisceral Reflex:** When somatic stimuli produce patterns of reflex activity in segmentally related visceral structures. Ex. T6 dysfunction causing stomach pain.
3. **Viscerosomatic Reflex:** When localized visceral stimuli produce patterns of reflex activity in segmentally related somatic structures. Ex. Intestinal irritation causing abdominal muscle pain/stiffness, T10 hypomobility, Chapman's reflexes.
4. **Viscerovisceral Reflex:** When localized visceral stimuli produce patterns of reflex activity in segmentally related visceral structures. Ex. Lung irritation causing abdominal symptoms via T5.

3. Layer Palpation

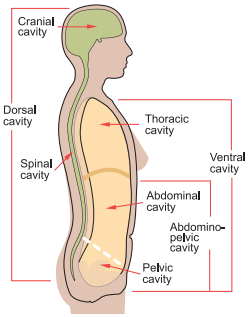
Layer Palpation

- At this point of the process, the completed assessment will have determined what areas of the body possess some level of somatic dysfunction and what physiological systems may have aberrant physiology present that are contributing to the patient's symptoms.
- These findings should enable to determine an appropriate order of treatment for the session as well a probable path forward for future sessions.
- The final treatment decision is to determine which dysfunctions/ restrictions are the most severe and in which tissue layer they are located.
- This is where knowing how to feel all of the tissue layers in the body is really helpful.

Fascia

- Fascia is a pervasive tissue that surrounds all structures in the body. Think of the body as having a continuous fibroelastic suit with all of the layers interconnected.
- By surrounding all structures it provides supports, a pathway for blood vessels and nerves, and a way for all structures and the layers within each structure to communicate with each other.
- Fascial restrictions affect the local physiology of the involved cells and can affect the physiology of distant structures if the restrictions are severe or present long enough.

Why Layer Palpation is So Vital!
4 Primary Fascial Layers: Form a Series of Tubes



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1. **Pannicular Layer**: Covers whole body. Superficial fascia.
2. **Axial Layer**: Covers the torso, but **does not** extend to the head. Becomes appendicular fascia that covers the extremities.
3. **Visceral Layer**: Extends from the naso-oro-pharyngeal region to the anal region.
4. **Meningeal Layer**: Surrounds the brain and spinal cord.

- **Notochord**: An embryological organizing structure separates the meningeal fascia from visceral fascia.

Types of Fascia

- Fascia can be divided into several main types depending on their histology and anatomical relationships:

1. **Superficial fascia:** Found directly under the skin and superficial adipose layer. Described as being made up of membranous layers with loosely packed interwoven collagen and elastic fibers.
2. **Deep/muscular fascia:** 2 main types of deep/muscular fascia:

- **Aponeurotic fascia:** Well-defined fibrous sheaths that cover and keep in place a group of muscles or serve for the insertion of a broad muscle (ex. deep fascia of the limbs - plantar and palmar aponeuroses, thoracolumbar fascia, abdominal rectus sheath).

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2. **Deep/muscular fascia** (cont.)**:** 2 main types of deep/muscular fascia:

- **Epimysial fascia:** Connective tissue sheath surrounding skeletal muscle and, in some cases, directly connected to the periosteum of the bones (deep fascia of the trunk and the epimysium of the limb muscles).

3. **Visceral fascia:** All the fascia closely connected to individual organs and giving shape to them, support the parenchyma as well as all the fibrous sheets forming the compartments for the organs and connect them to the musculoskeletal system.
4. **Neural fascia:** All the meningeal layers that cover the brain and spinal cord and the connective tissues that envelop the peripheral nerves.

Adapted from Fede C, Pirri C, Fan C, et al. A Closer Look at the Cellular and Molecular Components of the Deep/Muscular Fasciae. International Journal of Molecular Sciences. 2021; 22(3):1411. https://doi.org/10.3390/ijms22031411 CC-BY License.

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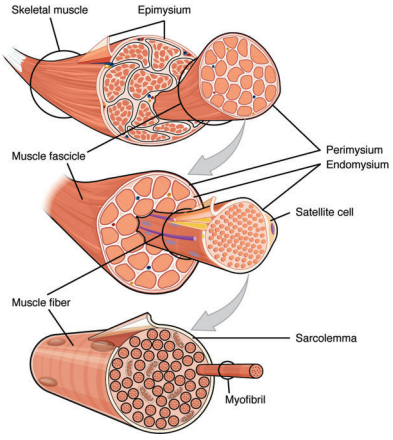

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Layer Palpation

- Providing good manual treatments requires you to understand several factors:

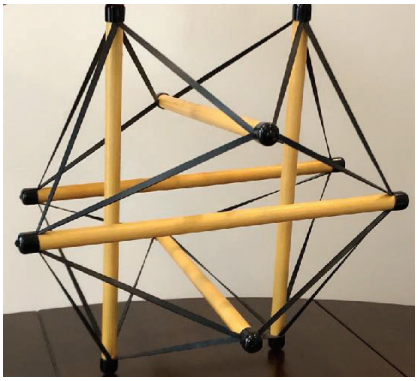
  1. Being specific with your touch so that you are engaging the dysfunctional tissue.

  2. Your specificity of touch allows you to release the tissue without using much force, which is more comfortable to the patient and does not overwork your hands.

  3. Releasing the dysfunctional tissue re-establishes the ability of the structure to glide, which improves lymphatic drainage, blood flow, and autonomic nervous system balance.

- To get good results, it helps to understand the principles of tissue layers and tensegrity.

Tensegrity Model



- The hallmark of the the tensegrity model is that the shape and function of all structures in the body is based on an arranged of cables and struts that provide:
- Continuous Tension
- Discontinuous Compression
- Light-weight, energy efficient, synergistic, and strong.

Biotensegrity (Steve Levin, M.D.)

- In biotensegrity:
- **Tension Elements:** Muscles, tendons, and ligaments.
- **Compression-resistant struts:** Bones.
- The fascial system can function both as a compression-resistant element and as a tension-generating element.
- The complete musculoskeletal system then becomes a prestressed biotensegrity system.

Biotensegrity

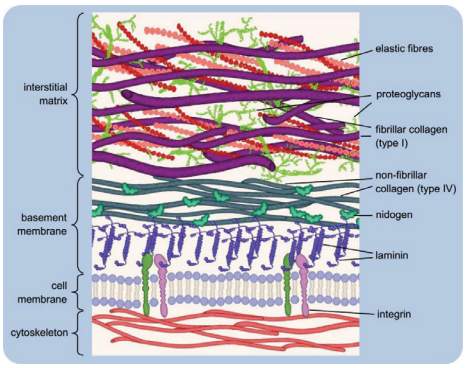
- "Tensegrity models are made from just two basic components, cables and struts, and are surprisingly strong and light in weight for their size - and they become even stronger when loaded! The struts "float" within the tensioned network of cables and are coupled into a mechanical unit that can change shape with the minimum of effort and automatically return to it original form. Tensioned cables always try to reduce their length to a minimum (like an elastic band), and the rigid struts limit how much they can do this, and it is the interactions between these two factors (shortening and its constraint) that allows a tensegrity system to balance itself in the most stable position of equilibrium (minimal energy)."

Scarr, G.Biotensegrity: The Structural Basis of Life. 1st ed. London, United Kingdom: Handspring Publishing Limited. 2014.

Biotensegrity

- Movement causes muscles to instantly increase tension locally, which is then transferred to the surrounding tissues. The larger the motion, the greater number of component parts of the whole system become involved.
- But what happens when somatic dysfunctions are present:
  - In the foot and ankle.
  - Lumbopelvis and hips.
  - Thoracic cage.
  - Abdominal viscera.
  - Clavicles.
  - Cranial base.
  - Cranium

Cytoskeleton and ECM



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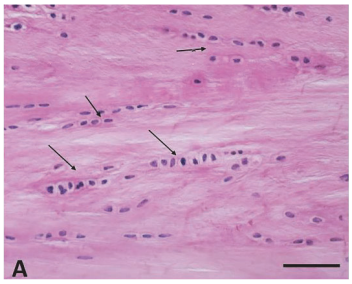
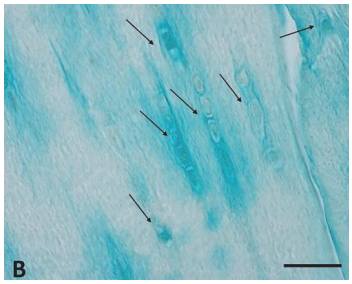
- The tissue tension coming into the extracellular matrix has to equal the tissue tension in the intracellular cytoskeleton.
- If tissue strain is not present, all the fascial layers can glide easily.
- If tissue strain is present from biomechanical dysfunction or visceral irritation, restrictions begin.

Fibroblasts and Fasciacytes





- Fibroblasts produce the fibrous component (collagen and elastic fibers) and play a role in regulating force transmission at a distance. The fasciacytes instead produce hyaluronan, which allows fascial gliding between adjacent fascial sublayers.

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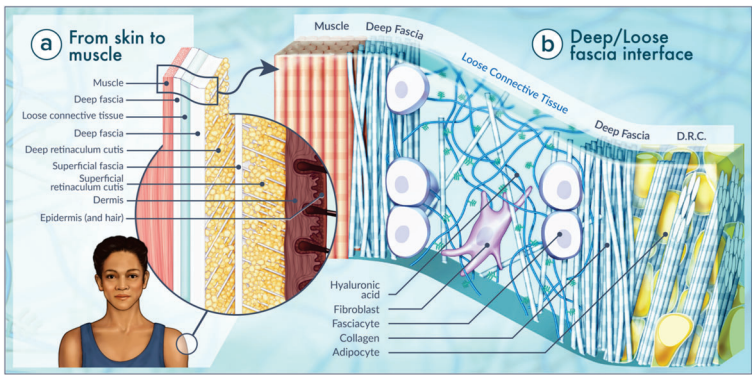
Feeling the Layers



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General Principles of Layer Palpation

1. Engage the tissue with palm of your hand and your fingertips.
2. Keep these parts quiet when feeling the tissue as they are the most sensitive parts of the hand.
3. When palpating deeper layers, apply pressure with the arm, shoulder, or shifting your body weight, but ALWAYS keep your hands and fingers relaxed.
4. Do not squeeze the tissue with the thumbs and fingers beyond the point of engaging the desired tissues. Increasing pressure will lessen the sensitivity of your touch and greatly increase the strain within your hands.
5. The nail beds of your fingertips should never change from pink to white. If they do, you are pressing too hard.
6. Keep the palm of your hand flat and do not curl your fingers more than a few degrees.

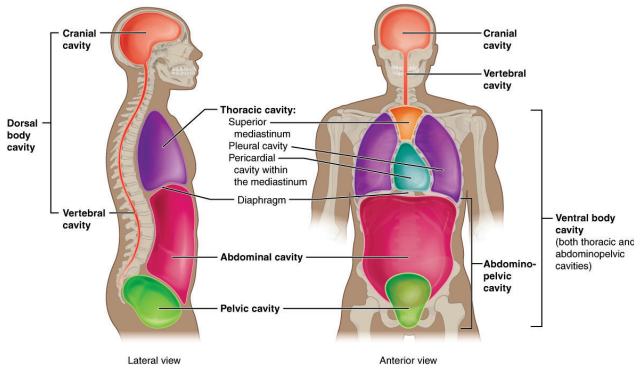
General Principles of Layer Palpation

7. Whenever possible, use both hands to palpate the desired area in a way that will allow you get a 3D image of the tissue underneath.
8. When possible, place your hands on opposite sides of the area being examined to allow you to engage the tissue in all directions. At times your hand placement may be above and below, or on both sides. It is important to be able engage the desired tissue in all directions.
9. Slowly compress the tissues as you go through the various tissue layers - skin, superficial fascia, deep fascia-muscle-tendon, bone-ligament, and visceral fascia.
10. At each layer stop and test the mobility of the tissue in all directions using both hands, although 1 hand may be engaging the tissue to a greater degree.
11. If you feel a restriction in the tissue, slowly move your hands and test all directions in order to find the position in which the tissue begins to soften.

General Principles of Layer Palpation

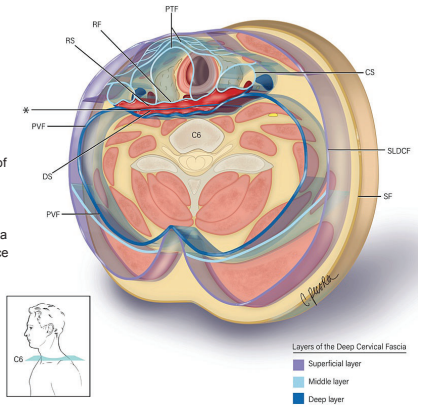
12. Feel for a pulse to return in the restricted tissue.
13. When you feel the pulse, apply a slight shear stress across the restriction until you feel an increase in the electrical activity of the tissue. The tissue will more alive.
14. At this point hold your hands until you feel the tissue release.
15. What you have been doing is engaging the Extracellular Matrix (ECM) and cell interface and allowing the tissue to reset its electrochemical gradient and normalize the composition of the ECM and the cellular cytoskeleton via appropriate mechanotransduction.
16. When performing a tissue release, also watch for changes in respiration rate and listen for patient's or your sighs and/or bowel sounds. All indicate that you are making needed physiological changes and the body is switching from a sympathetically-dominated state to a more parasympathetic one.

Body Cavities



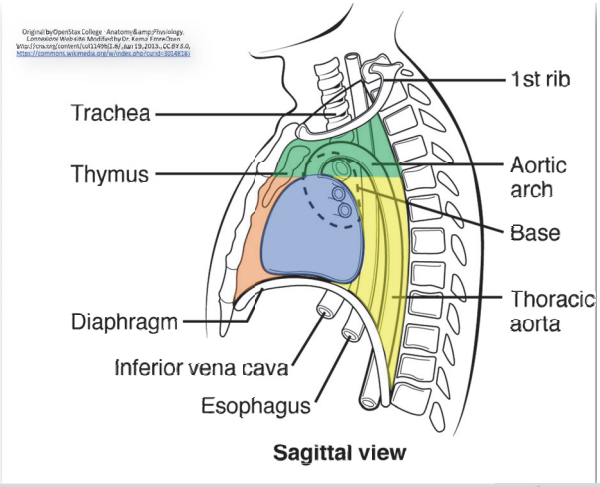
Fascial Layers in the Neck

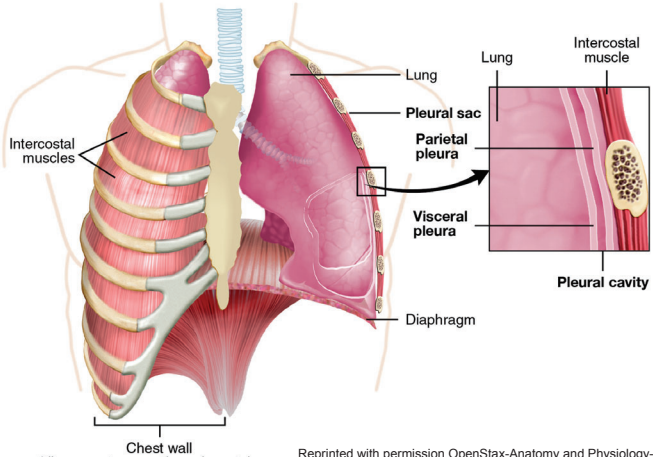
Legend:
SF: Superficial fascia
PTF: Pretracheal fascia
CS: Carotid sheath
SLDCF: Superficial layer of the deep cervical fascia
PVF: Prevertebral fascia
*: Alar Fascia
RF: Retropharyngeal fascia
RS: Retropharyngeal space
DS: danger space (DS)



Reprinted with permission Phan T, Lay J, Scali F. The Alar Fascia and Danger Space: A Modern Review. Cureus 2022:14(12): e32871. doi:10.7759/cureus.32871. Illustrated by Christina Pecora, MSMI. Creative Commons Attribution License CC-BY 4.0

Fascial Layers in the Mediastinum





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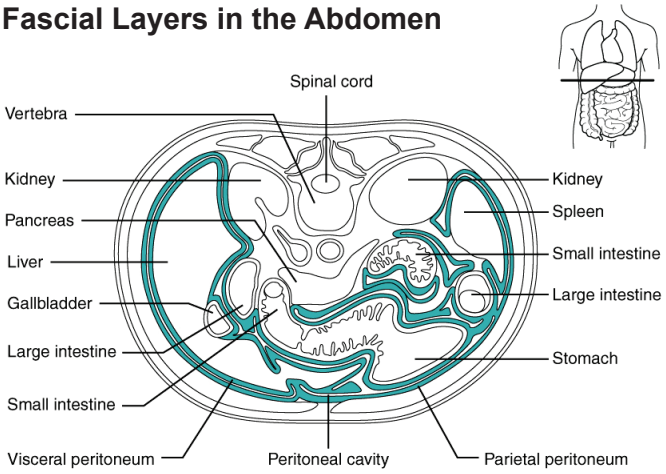
Fascial Layers in the Abdomen



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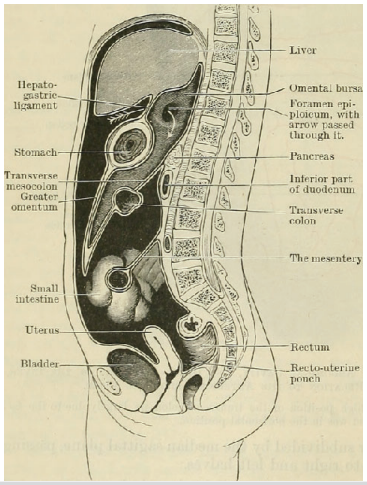
Fascial Layers in the Abdomen and Pelvis



Robinson, A., Ed. Cunningham's Text-Book of Anatomy, 4th Ed. William Wood and Company. 1914. https://commons.wikimedia.org/wiki/File:Cunningham's_Text-book_of_anatomy_(1914)_(20630653269).jpg
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Treatment Principles

Common Treatment Sequence I Use

- **Phase 1: Maximize Lymphatic Drainage and Circulation**
  1. Open up the L>R thoracic inlets - clavicles, 1st ribs, chest.
  2. Treat any dysfunctions in the lumbopelvis and ribs.
  3. Remove restrictions limiting motion in the respiratory and pelvic diaphragms.
  4. Treat dysfunctions in the B feet, hips, and cranial base that are limiting opposite rotation of adjacent segments.
  5. Treat cranial dysfunctions.
  6. Treat upper extremity dysfunctions.
- **Phase 1 Techniques:** muscle energy, functional technique, myofascial release, cranial techniques.

Common Treatment Sequence I Use

- **Phase 2: Remove Visceral Restrictions and Re-establish Good Pleural, Peritoneal, and Anterior Neck Gliding**
  1. Treat restrictions around the involved viscera.
  2. Remove restrictions in the pleura, peritoneum, and anterior neck that are limiting spinal motion.
- **Phase 2 Techniques:** visceral manipulation, myofascial release.

Common Treatment Sequence I Use

- **Phase 3: Re-establish autonomic nervous system balance**
  1. Treat any sympathetic and parasympathetic nervous system reflex issues found during the autonomic scan test involving the higher centers in the brain.
  2. Treat any sympathetic and parasympathetic nervous system reflex issues found during the autonomic scan test involving the local segmental spinal levels.
  3. Treat Chapman's neurolymphatic reflexes in specific organs.
- **Phase 3 Techniques:** autonomic nervous system balance, Chapman's reflexes.

Autonomic Nervous System Scan Test

PURPOSE: To assess if the autonomic nervous system is balanced, and if not, where the imbalance is occurring and does the imbalance involve the brain central command centers or just the local reflexes.

PROCEDURE:

1. Palpate the **brain's central command centers.**
   a. Occipitomastoid Sutures (Parasympathetic-Vagus CNX)
   b. Trigeminal Centers (Parasympathetic CNV)
   c. Superior Cervical Ganglia (and if +, MCG and ICG/stellate as well - Sympathetic)
2. Palpate the prevertebral ganglia (good regional information) and plexuses (fine local control).

   Ganglia: Celiac, Aorticorenal Ganglia, Superior Mesenteric, Inferior Mesenteric, Impar

   Plexuses: Superior Hypogastric, Inferior Hypogastric, Pubovesicle, Pelvic Splanchnic Nerves (S2-4)

Autonomic Nervous System Scan Test cont.

3. Palpate the paravertebral ganglia of the bilateral Sympathetic Chain Ganglia from T1-L5 for tenderness or tissue tension to see what segmental levels might be a source of irritation.
4. If present, balance the autonomic nervous system between the brain's central command centers and the involved prevertebral ganglia/plexuses found in steps 1 and 2 using the protocol described below.
5. Now balance the involved prevertebral ganglia/plexuses with the involved local segmental levels of the sympathetic chain that innervate those ganglia/plexuses found in steps 2 and 3 using the protocol described below.

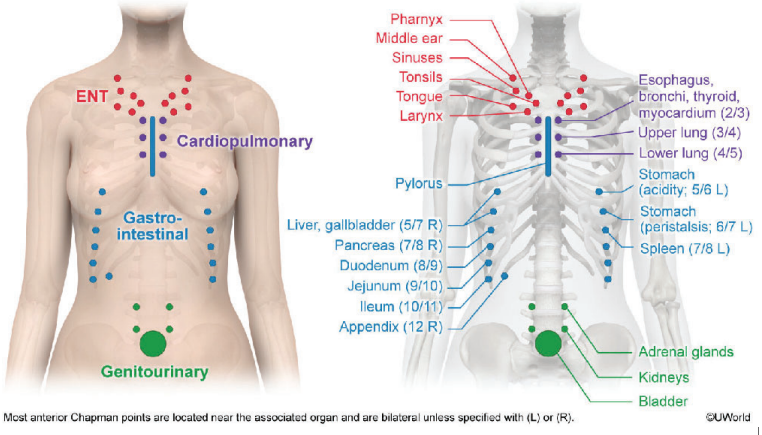
ANS Balancing Protocol Steps

1. Have the patient in supine.
2. Place the fingers of 1 of your hands on 1 of the contact points and the fingers of your other hand on the other contact point.
3. Gently begin to apply equal pressure to each of the points simultaneously and gradually increase the pressure until you feel your fingers connect and the 2 points beginning to talk to each other. Usually the tissues under your fingers begin to soften.
4. Maintain your pressure until the tissues fully relax.

NOTES:

- Deep Touch = Inhibits - Dampens.
- Light Touch = Facilitates - Turns Higher

Anterior Chapman points



Most anterior Chapman points are located near the associated organ and are bilateral unless specified with (L) or (R). ©UWorld

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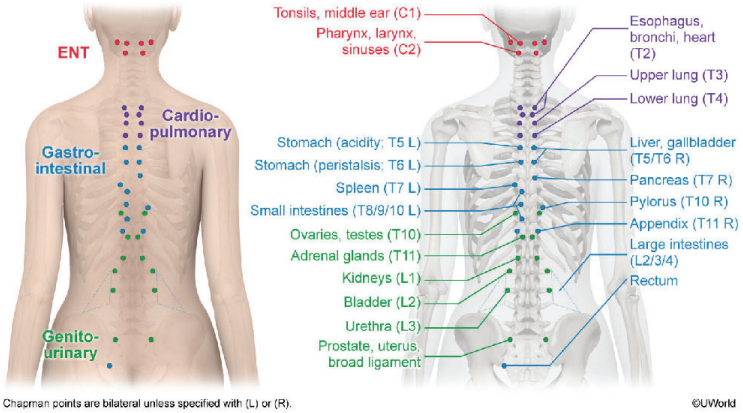
Posterior Chapman points



Chapman points are bilateral unless specified with (L) or (R). ©UWorld

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So In Summary…

1. Do a thorough assessment so you can see the big picture and develop an appropriate treatment plan.
2. Make good clinical decisions by choosing techniques that will best resolve the problems that you find.
3. Treat the existing musculoskeletal and visceral dysfunctions in order to enhance lymphatic drainage and circulation to the involved tissues and restore autonomic nervous system balance.
4. Be specific with your palpation so that you treat the dysfunctions in the right tissue layer.

Do These Concepts Work? Case Studies

So Do These Concepts Work?

- **Case Study #1:** 57 y.o. man present with lower back pain and sciatica that had been present for 6 months. Limited his exercise, ability to stand > 40 min, and tolerance to lift more than light objects.
- MRI findings: Multi-level spondylotic disease with a large broad midline disk herniation and extrusion at L4-5 that had worsened from previous MRI. Severe foraminal encroachment most significant at this level. Considering surgery.
- 6'9" played college basketball and sprained both ankles multiple times.
- Significant Evaluation Findings: Lumbopelvic and multiple bilateral foot and ankle dysfunctions. Neg slump and SLR tests. Able to toe and heel walk.
- Treatment focus was on the foot and ankle dysfunctions and the fascial restrictions that extended from there to his sciatic notch and LB that fully resolved his symptoms in a few months.

So Do These Concepts Work?

- **Case Study #2:** 14 y.o. Female with POTS (Postural Orthostatic Tachycardia Syndrome). HR increased >40 BPM upon standing.

1. **PMH:** Surgery on 5/3/21 to correct a vascular ring formed by the right aortic arch with an aberrant left subclavian artery, and a left-sided ligamentum arteriosum.
   - **Left subclavian artery:** Appeared to be tethering the aorta to the patient's left and causing a posterior indentation on the esophagus. The left subclavian artery was released and brought to the mid-portion of the left common carotid artery.
   - **Ligamentum arteriosum:** Created a fairly significant tension on the esophagus. Surgery released the tension.
   - **Kommerell's diverticulum:** Prominent where the left aberrant subclavian artery originated causing additional external posterior compression of the esophagus. The Kommerell's diverticulum was resected for several millimeters. There was still a minor "knob" of the Kommerell's diverticulum, which was tacked to the spinal fascia.

So Do These Concepts Work?

2. POTS did not develop until after surgery. 12/2020 had tonsillectomy. Feet issues in the past.
3. **Symptoms:** Fatigue, nausea, pain when breathing during exercise with wheezing during inhalation, orthostatic intolerance (blood pulling), headaches, brain fog at times, tinnitus. No cardiac problems. Not depressed.
4. **Symptoms worse:** Exercise, sometimes nothing, standing for too long, eating too much.
5. **Symptoms better:** Rest, hydration, and small meals.
6. **Give up to be well:** Playing sports and being active, socializing with friends.

So Do These Concepts Work?

7. **Hard activities:** Sports (which she used to play a lot) and having the energy to do more activities after school. She was so tired it was hard for her to do schoolwork and socialize. Some days her father had to carry her from the car.
8. **Current exercise:** Play tennis twice a week. Go for walks in the neighborhood and get around 8,000 steps a day. Do the elliptical for 20 minutes a day. Starting a personal trainer once a week.
9. **Hydration:** Drink at least 80 ounces a day.

So Do These Concepts Work?

10. **Medications:**
    - **Pyridostigmine bromide:** Inhibits the destruction of acetylcholine improving nerve signal transmission junction.
    - **Mododrine**: For orthostatic hypotension. Sympathomimetic.
    - **Amitriptylin**: Used as an antidepressant and pain modulator.
    - **Iron Supplements:** Promotes hemoglobin formation.
    - **Tylenol and Motrin** as needed for pain.

11. Some significant hypermobility of large joints, but has not had any dislocations or subluxations. She does not appear to have Ehlers Danlos Syndrome.

12. She has a history of plantar fasciitis and understands that her arches collapse on standing. Abnormal B sural and L peroneal findings on NCV.

POTS: Treatment

- **Main Treatment Goals:**

1. Maximize venous return.
2. Re-establish normal sympathetic tone.
3. Re-establish normal vagal tone.
4. Decrease Restriction/Compression in the Dorsal Vagal Complex in the brain stem.

POTS: Treatment

- **Treatment (over the course of 6 sessions, 1 every 3-4 weeks):**

1. Correct mechanical dysfunction in the clavicles, feet and ankles, lumbopelvis and hips, thoracic cage, neck - especially the anterior fascia, cranial base and cranium, diaphragms - respiratory, pelvic, and cranial.

2. Minimize visceral restrictions in:
- Mediastinum, pericardium, and pleura
- Esophagus in the mediastinum and neck

3. Autonomic nervous system balancing

4. Chapman's neurolymphatic reflex balancing

POTS: Treatment Results

- **Results:**

1. Performing well in school without struggle.
2. Enjoying normal social activities with friends.
3. Resumed playing sports - soccer, softball, tennis
4. Significantly less headache frequency and intensity, nausea, and POTS symptoms.
5. Was able to go on a trip to Paris this summer and tolerated sightseeing and eating French cuisine.

- **Remaining Symptoms**

1. While improved, she still cannot take full inhalation without some discomfort and tissue pulling - mostly esophagus.
2. About 1 headache a week - usually around the L eye.

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Thank you for listening!

Any questions?