



Systemic Lymphatic Balancing

Introduction

With

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AdvCBP, Senior BodyTalk Instructor**

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Proprietary Notice

Systemic Lymphatic Balancing (STLB), the Total Body Screening Examination (TBSE), and the DAI Manual Therapy Program are proprietary systems developed by Dr. Kerry D'Ambrogio.

Clinical Basis

This Study Guide is based on the clinical observations and professional experiences of Dr. Kerry D'Ambrogio, PT, DOM, AP, DO-MTP, AdvCBI, AdvCBP, Senior BodyTalk Instructor.

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PRINCIPLES OF PRACTICE

Patients seek treatment because of **pain and /or lack of function**. Listed below are several **Key Clinical Questions** regarding treatment:

Where do I start treatment? What are the Criteria? (Specific versus Systemic)

- Is this a specific problem at the area of concern? (Specific Lesion)
- Is this a systemic problem (imbalance/tension/congestion) influencing the area of concern? (Systemic Lesion)

If this is a Specific problem, what do I treat? (DAI Specific Approach)

- What is the **primary Specific dysfunction**? Which specific treatment will be most effective?
 - Specific protective muscle spasm (Muscle Balancing)
 - Specific fascial restrictions (Fascial Balancing)
 - Specific joint hypomobility and stiffness (Joint Balancing)
 - Specific tissue swelling and congestion (Lymphatic Balancing)
 - Specific energetic stress patterns (Energetic Balancing)
- How is the **effectiveness** of the treatment determined? **When does the patient no longer meet the criteria for specific treatment?**
- **Once criteria no longer met, how is further treatment determined?**

If this is a systemic problem, what do I treat? (DAI Systemic Approach)

- What is the **primary systemic dysfunction**? Which **systemic treatment** will be most effective?
 - Systemic lines of tension (Systemic Orthopedic Balancing)
 - Systemic lymphatic congestion (Systemic Lymphatic Balancing)
 - Systemic energetic stress patterns (Systemic Energetic Balancing)
- How is the **effectiveness** of the treatment determined? **When does the patient no longer meet the criteria for systemic treatment?**
- **Once criteria no longer met, how is further treatment determined?**

The information in this section will help answer these questions.

HEALTH AND HOMEOSTASIS

In order to maintain health and homeostasis, all body tissues must have unimpaired physiological motion and unrestricted flow (circulation) of vital substances (vascular, lymphatic, nervous, and energetic).

THREE KEY FACTORS FOR HEALTH AND HOMEOSTASIS

- Tissue Motion (Physiological)
- Tissue Supply (Inflow)
- Tissue Drainage (Outflow)

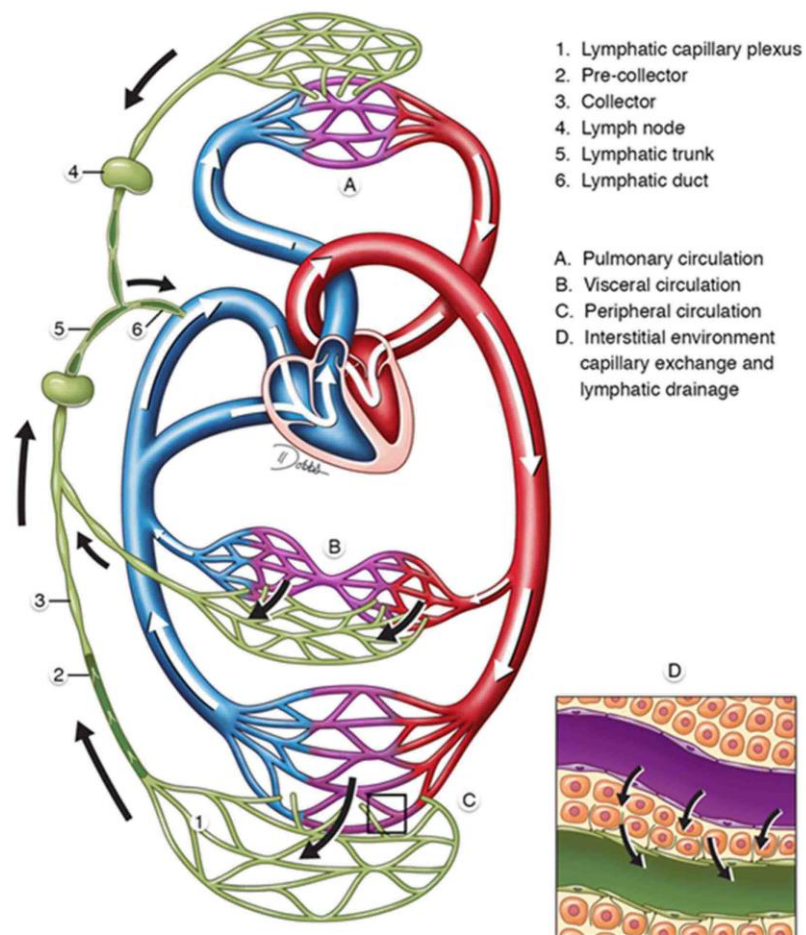
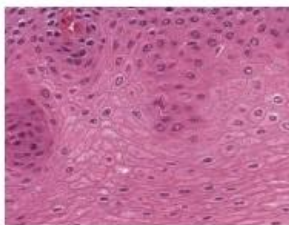


Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm, Upledger Productions, 2016.

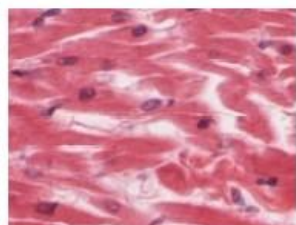
HUMAN TISSUE CLASSIFICATION

Tissues are similarly structured groups of cells working together for a specific function. There are **four main types** of tissues in the human body:

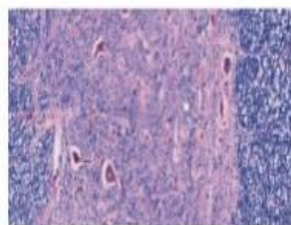
- **Epithelial Tissue** is composed of tightly connected sheets of cells that cover the body, line the cavities, line the vessels, and form the glands.
 - Covering Epithelium: Epidermis (skin)
 - Lining Epithelium: Endothelium (vessels)
 - Glandular Epithelium: Exocrine/Endocrine Epithelia (glands)
- **Muscular Tissue** is composed of specialized contractile microfilaments (actin and myosin) that produce motion.
 - Skeletal Muscle
 - Cardiac Muscle
 - Smooth Muscle
- **Nervous Tissue** is composed of highly specialized and organized cell groups that transmit and receive nerve impulses (electrochemical signals) to monitor and control the body.
 - Neurons
 - Neuroglia
- **Connective Tissue (CT)** is composed of specialized cell types (fibroblasts) embedded in an extracellular matrix (fibers and ground substance) that connect body tissues and provide structural support.
 - Specialized CT: Adipose, Bone, Cartilage, Blood, Lymph
 - Proper CT: Loose and Dense (fasciae)



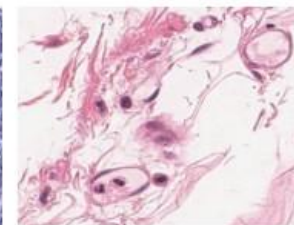
Epithelial Tissue



Muscular Tissue



Nervous Tissue



Connective Tissue

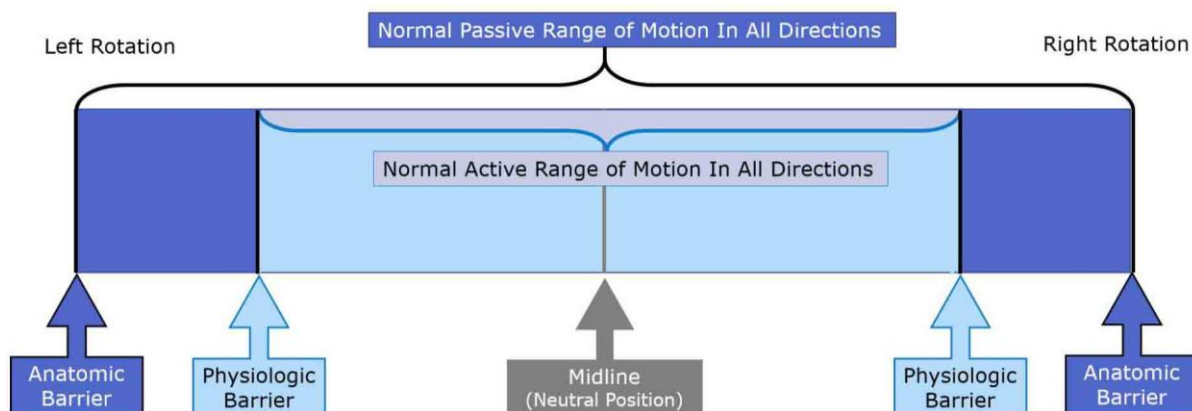
TISSUE MOTION (PHYSIOLOGICAL)

Freedom of movement within and between all tissues of the body is the foundation of healthy tissue function and balanced tissue motion.

TISSUE MOTION

Tissue Motion is the normal physiological motion of the tissues in response to voluntary, involuntary, or diaphragmatic movement. It is dependent on the following tissue characteristics:

- **Tissue Tone** (normal muscle tone)
- **Tissue Glide** (normal fascial glide)
- **Tissue Tension** (normal joint mobility)
- **Tissue Texture** (normal tissue texture)



Osteopathic Techniques, Fig. 2.1,
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Clinical Considerations:

Tissue Motion (physiological) allows for functional musculoskeletal range of motion (ROM) of the cranium, spine, trunk, pelvis, and extremities. **Structure affects Function.**

TISSUE SUPPLY (INFLOW)

All tissues must receive unobstructed arterial flow, balanced nervous system input, and unrestricted energy circulation (inflow).

- **Arterial Blood Supply**
 - Oxygen
 - Nutrition
- **Nerve Supply**
 - CNS (Brain/Spinal Cord)
 - PNS (Somatic/ANS)
- **Energy Supply (Meridians)**
 - Qi Circulation

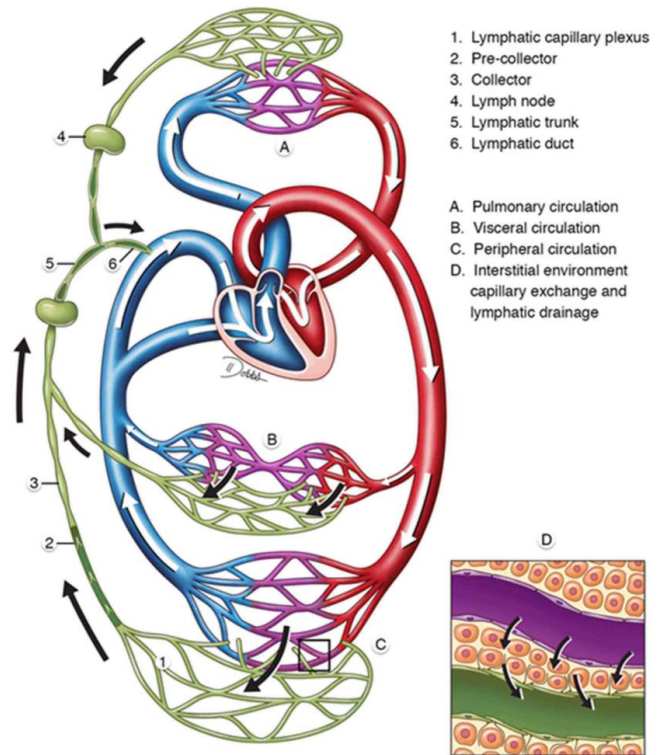


Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm, Upledger Productions, 2016.

Clinical Considerations:

Inflow provides oxygen, nutrition, innervation, and Qi to the tissues of the body. *The Rule of the Artery is Supreme.*

TISSUE DRAINAGE (OUTFLOW)

All tissues must have an unobstructed venous return, open lymphatic drainage pathway, and unrestricted energy circulation (outflow).

- **Venous Drainage**
 - Deoxygenated blood
 - Interstitial waste products
- **Lymphatic Drainage**
 - Fluid
 - Interstitial waste products
- **Energy Drainage (Meridians)**
 - Qi Circulation

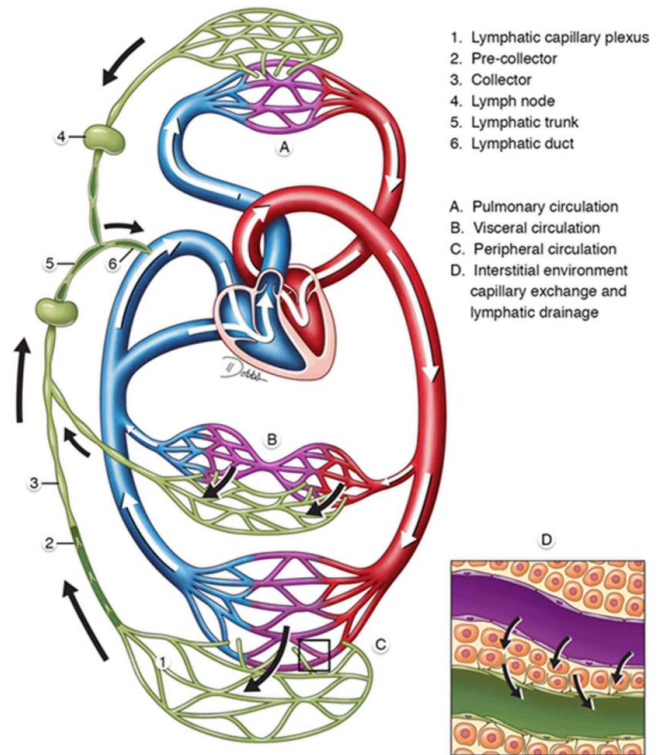


Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm, Upledger Productions, 2016.

Clinical Considerations:

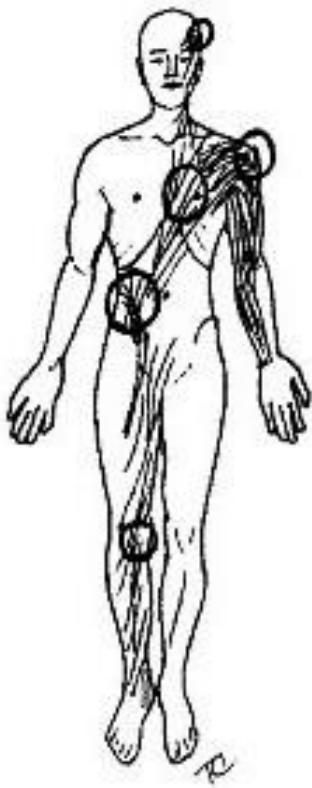
Outflow removes metabolic and energetic waste products from the tissues of the body. **Drainage precedes Supply.**

BARRIERS TO HEALTH AND HOMEOSTASIS

Barriers to health and homeostasis include lesions (specific and systemic) that impair tissue motion (physiological), tissue supply (inflow), and tissue drainage (outflow).

TWO KEY BARRIERS TO HEALTH AND HOMEOSTASIS

- **Specific Lesions**
- **Systemic Lesions**



Clinical Considerations:

For tissue healing to occur, there must be unimpaired tissue motion
Specifically at the site of the lesion and along the pathway of healing
throughout the Systemic.

LESIONS

Lesions are impairments in structure and function that do the following:

- Alter physiology of tissue and organ systems
- Cause disease and dysfunction
- Create barriers to health and homeostasis
- Prevent optimal balance and function

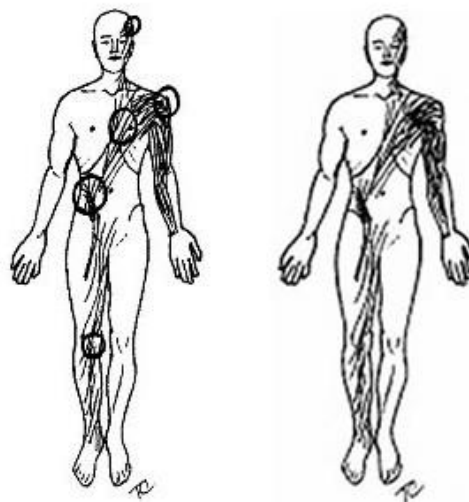
Lesions can be found by identifying asymmetry, limited range of motion, tenderness, tension, tissue texture changes, and specialized tissue impairments in the patient. (ARTS)

- **Asymmetry:** Postural and Specific landmark triplanar asymmetry
- **Range of Motion (ROM):** Abnormal movement patterns and end-feels
- **Tissue Tenderness:** Abnormal muscle tone
- **Tissue Tension:** Abnormal joint mobility
- **Tissue Texture:** Abnormal swelling or congestion
- **Special Tests:** Specialized tissue impairments **

TYPES OF LESIONS

There are **two (2)** types of **Lesions**:

- **Specific Lesions**
- **Systemic Lesions**



Note: Specialized tissue impairments can be found in the muscles, fasciae, joints, bones, lymphatics, nervous tissue, viscera, and energetics.

TYPES OF LESIONS

SPECIFIC LESIONS

- Specific imbalances or dysfunctions in the area of complaint
- Specific lesions in the Specific muscles, fasciae, joints, bones, lymphatics, nervous tissue, viscera, or energetics
- Located in/near the Specific area of complaint

Note: For example, a shoulder dysfunction may be due to Specific tissue tension in the shoulder region.



SYSTEMIC LESIONS

- Sum of all imbalances and dysfunctions found in the mind, body, and spirit at a given moment in time
- Accumulation of tension from every car accident, traumatic injury, fall, surgery, repetitive motion, and stress event
- Located throughout the body

Note: For example, shoulder dysfunction may be due to lines of tension coming from outside the shoulder.



SPECIFIC LESIONS

Specific Lesions are tissue impairments located in or near the Specific area of complaint. Types of Specific tissue impairments include the following:

- Specific protective muscle spasm
- Specific fascial restrictions
- Specific joint hypomobility or stiffness
- Specific swelling or congestion
- Specific energetic stress patterns



Clinical Considerations:

Specific Lesions can cause Specific asymmetry, limited ROM, tissue tenderness, tissue tension, tissue texture changes (swelling), fascial restrictions, and other specialized tissue impairments that can compromise cellular metabolism and create barriers to Specific tissue repair (healing).

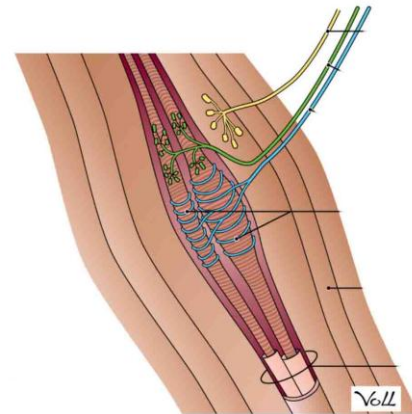
TYPES OF SPECIFIC LESIONS

Specific Lesions are tissue impairments located in or near the Specific area of complaint and are classified based on the involved tissues. **Lesion Types** include the following:

MUSCLE LESIONS

Specific protective muscle spasm can be caused by muscle spindle over-activation that creates involuntary muscle tissue contraction. Impairments include the following:

- Hypertonic Muscle
- Facilitated Segment
- Tender Points



Muscle spindle

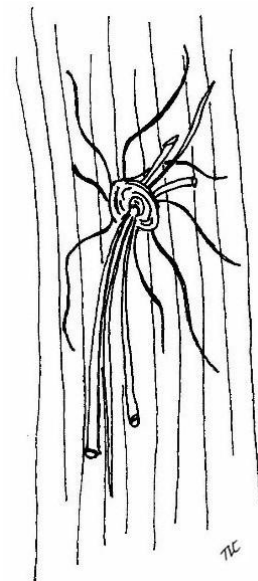
Physiology: An Illustrated Review, Fig. 6.1.
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Note: See **Muscle Balancing** for additional information.

FASCIAL LESIONS

Specific fascial restrictions can be caused by pathological connective tissue changes that affect the properties and mobility of the fascial tissue. Impairments include the following:

- Fascial Adhesions
- Fascial Fibrosis



Note: See **Fascial Balancing** for additional information.

JOINT LESIONS

Specific joint hypomobility (stiffness) can be caused by dysfunctions in the joint tissues that affect normal joint biomechanics (motion). Impairments include the following:

- Specific Asymmetry
- Motion Restrictions
- Tissue Tension

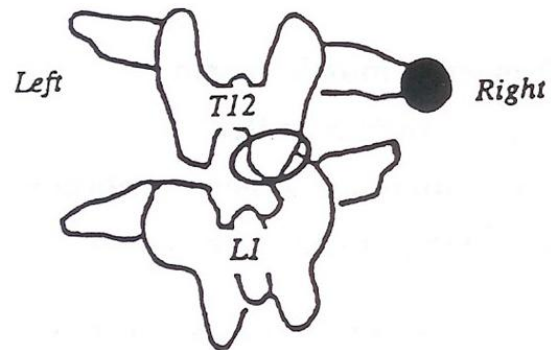


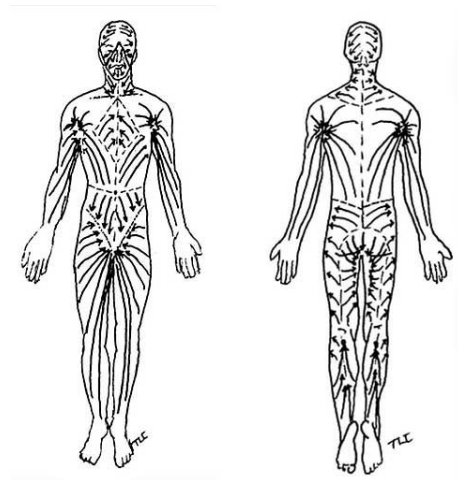
Image Credit: D'Ambrogio Institute Images, 2021

Note: See **Joint Balancing** for additional information.

LYMPHATIC LESIONS

Specific swelling or congestion can be caused by impairments in the superficial lymphatics that compromise cellular metabolism and tissue healing. Superficial lymphatic drainage pathways include the following:

- Upper Quadrant
- Lower Quadrant
- Cranium/Cervical
- Viscera

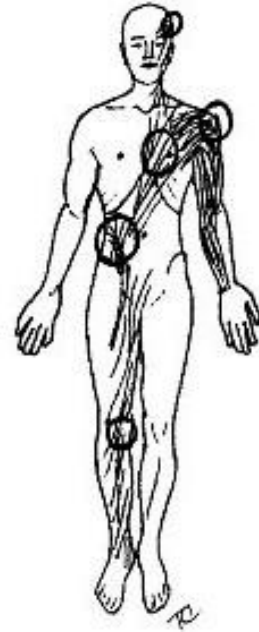


Note: See **Lymphatic Balancing** for additional information.

ENERGETIC LESIONS

Specific energetic stress patterns can be caused by unresolved energetically charged tension that creates Specific structural and functional limitations. Specific stress patterns include the following:

- Musculoskeletal Stress Patterns
 - Muscle
 - Fascia
 - Bone/Joint/Suture
- Visceral Stress Patterns
 - Organ
 - Gland
- Vital Structure Stress Patterns
 - Nerves
 - Vessels (arteries, veins, lymphatics)
 - Energy Systems (dantians, meridians, chakras)



Note: See **Energetic Balancing** for additional information.

Clinical Considerations:

When found, Specific treatment follows the primary area of dysfunction identified by the Specific Evaluation (SPEV).

SYSTEMIC LESIONS

Systemic Lesions are impairments found throughout the body that can contribute to the Specific area of complaint. Types of Systemic impairments include the following:

- Extraneous lines of fascial tension
- Abnormal intracavity pressure changes
- Restrictions in the transverse diaphragms (TD)
- Dysregulation in the autonomic nervous system (ANS)
- Unresolved energetically charged tension



Clinical Considerations:

Systemic Lesions can cause postural asymmetry, abnormal movement patterns, lines of tension, Systemic congestion, TD/ANS imbalances, and Systemic stress patterns that can influence Specific tissue repair (healing) and create barriers to overall health and homeostasis.

TYPES OF SYSTEMIC LESIONS

Systemic Lesions are tissue impairments found throughout the body that can contribute to the Specific area of complaint. **Lesion Types** include the following:

LINES OF TENSION

Extraneous lines of fascial tension can limit physiological motion and affect circulation, nerve conduction, and energy supply. Lines of tension can be found in the following locations:

- Lower Extremities
- Upper Extremities
- Head/Neck/Torso



INTRACAVITY CONGESTION

Abnormal intracavity pressures can affect venous drainage, lymphatic drainage, and energy flow throughout the body. Normal pressures include the following:

- Head (+10 cmH2O)
- Thorax (-5 cmH2O)
- Abdomen (+5 cmH2O)
- Pelvis (+20-30 cmH2O)

INTRACAVITY PRESSURES

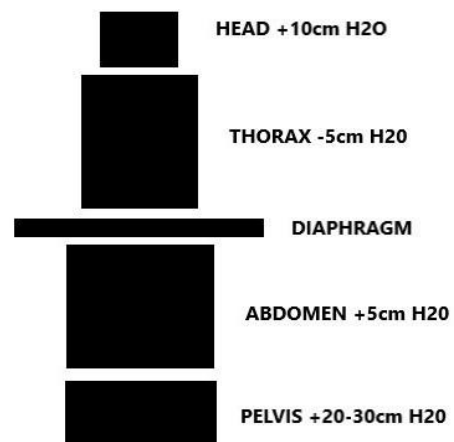
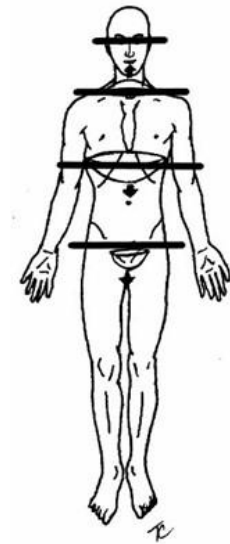


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TRANSVERSE DIAPHRAGM (TD) IMBALANCES

Transverse Diaphragm restrictions can limit physiological motion, create barriers, and alter intracavity pressure gradients impeding the vertical flow of vital substances (blood, lymph, nerve impulses, and energy). Transverse Diaphragms include the following:

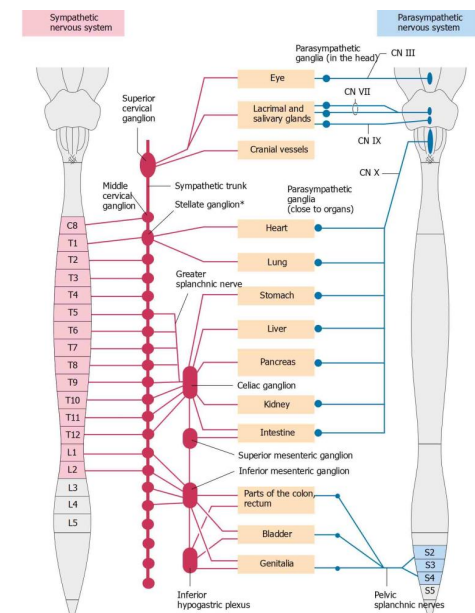
- Tentorium Cerebelli
- Thoracic Inlet
- Respiratory Diaphragm
- Pelvic Floor



AUTONOMIC NERVOUS SYSTEM (ANS) IMBALANCES

Dysregulation of the ANS can increase the vasomotor tone of vessels (arteries, veins, and lymphatics), decreasing tissue fluid flow (inflow/outflow) and microcirculation (tissue perfusion). ANS includes the following:

- Sympathetic Nervous System
 - Thoracolumbar (T1–L2)
- Parasympathetic Nervous System
 - Cranial (CN X Vagus Nerve)
 - Sacral (S2–S4)



Schuenke, Atlas of Anatomy Vol. 3, 2nd Ed., Fig. 10.286 A, Illustrator: Karl Wesker/ Markus Vo
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ENERGETIC STRESS PATTERNS

Unresolved energetically charged tension can create stress patterns throughout the physical body that cause pain, asymmetry, restricted motion, altered function, and abnormal physiology. Causal factors (internal/external) include the following:

- Mental Stress
- Emotional Stress
- Behavioral Stress
- Consciousness/Spiritual Stress
- Environmental (Env) Stress

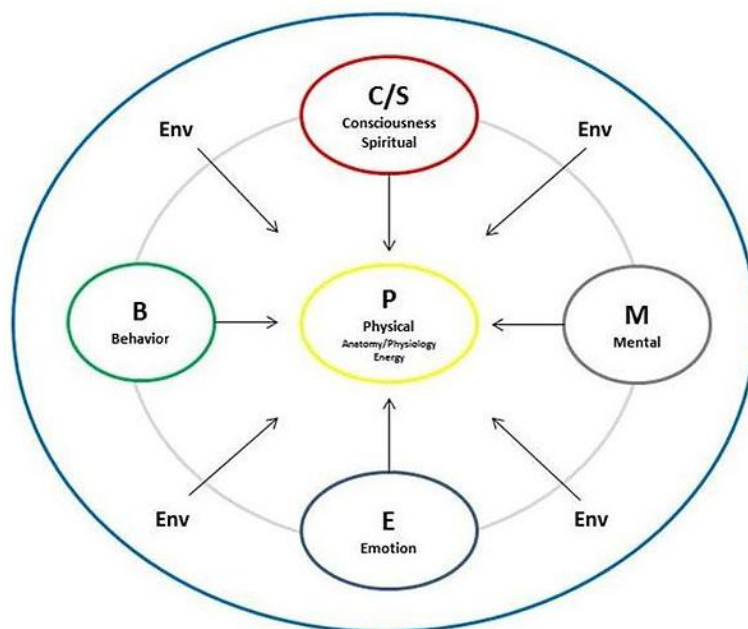


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Clinical Considerations:

If identified, Systemic lesions must be removed prior to Specific treatment.

SPECIFIC BARRIERS TO HEALTH AND HOMEOSTASIS

Specific Lesions cause Specific structural and functional limitations that can compromise cellular metabolism and create barriers to Specific tissue repair (delays healing).

- **Muscle Lesions** (abnormal muscle tension)
- **Fascial Lesions** (abnormal fascial mobility)
- **Joint Lesions** (abnormal tissue tension)
- **Lymphatic Lesions** (abnormal tissue texture/congestion)
- **Energetic Lesions** (abnormal energetic stress patterns)

SYSTEMIC BARRIERS TO HEALTH AND HOMEOSTASIS

Systemic Lesions cause structural and functional limitations throughout the body that can influence Specific tissue repair (healing) and create barriers to overall health and homeostasis.

- **Lines of Tension** (extraneous lines of fascial tension)
- **Intracavity Congestion** (abnormal intracavity pressure changes)
- **Transverse Diaphragm Imbalances** (transverse diaphragm restrictions)
- **ANS Imbalances** (ANS dysregulation)
- **Energetic Stress Patterns** (unresolved energetically charged tension)

PATHWAY TO HEALING

Depending on the nature of the lesion, the indicated **DAI Treatment Approach** can remove these Specific and Systemic barriers creating pathways to Specific tissue healing and overall health and homeostasis.

CAUSES OF LESIONS

Lesions can be classified by their causal nature and include the following:

- **Mechanical Lesions**
- **Non-mechanical Lesions**
- **Energetic Lesions**
- **Combination Lesion**

MECHANICAL LESIONS

The following **two factors** can cause **Mechanical Lesions**:

Congenital Factors

- Genetic Disorders
- Cystic Fibrosis
- Down Syndrome
- Cleft Palate
- Club Foot
- Cerebral Palsy
- In Utero Toxin Exposure
- Primary Lymphedema

Acquired Factors

- Physical Trauma (Acute/Chronic)
- Surgical Trauma
- Illness/Inflammation
- Muscle Spasm/Weakness
- Fascial Restrictions/Laxity
- Joint Hypermobility/Hypomobility
- Swelling/Edema/Secondary Lymphedema
- Nervous System Impairments (central/peripheral)
- Visceral/Cranial Restrictions
- Poor Posture/Body Mechanics/Ergonomics

NON – MECHANICAL LESIONS

The following processes and factors can cause **Non-mechanical Lesions**:

- Infections (bacteria/virus/fungus/parasites)
- Inflammation
- Metabolic/Hormonal Factors (diabetes/thyroid/adrenals)
- Allergies/Intolerances (ingested, injected, inhaled, skin contact)
- Toxins (inhaled, ingested, injected, skin contact, radiation)
- Rheumatologic Factors (autoimmune)
- Tumors (Primary/Secondary/Metastasis)
- Vascular Factors (aneurism)
- Visceral (organ/gland) Dysfunction

ENERGETIC LESIONS

The following **two factors** can cause **Energetic Lesions**:

Internal Factors

- Psychogenic (mental, emotional, and behavioral stress)
- Energy Flow (excess, deficiency, stagnation)
- Consciousness/Spiritual (Individual, Universal)

External Factors

- Environment (person, place, object, activity, other)
- Climate (hot, cold, damp, dry, wind, altitude)
- Electromagnetic (computer, cell phone, microwave, fluorescence)

COMBINATION LESIONS

A combination of mechanical, non-mechanical, and energetic lesions can cause **Combination Lesions**.

Clinical Indications:

Evaluating and identifying the nature and type of lesion determines the treatment approach.

OSTEOPATHIC CONCEPTS

There is a lively and vigorous debate between manual therapy providers on how best to treat lesions. This debate originated from the earliest days of osteopathy and is currently ongoing between the following two treatment approaches:

SPECIFIC versus SYSTEMIC APPROACH DEBATE

Specific Approach:

- Treatment at the Specific area of complaint
- Follows the principle of the Specification
- Evaluate/Treat the primary Specific lesion

“Find it,” “Fix it,” and “Leave It Alone” – AT Still



Systemic Approach:

- Treatment of the body as a whole (holistically)
- Follows the principle of holism
- Evaluate/Treat the Systemic lesion

“You cannot adjust the abnormal to the normal.” – JM Littlejohn



Note: The D’Ambrogio Institute (DAI) Philosophy was developed to help settle this debate.

DAI PHILOSOPHY

The **D'Ambrogio Institute (DAI) Philosophy** consists of **three** fundamental principles:

- **Evaluation**
- **Principle-based Treatment**
- **Re-Evaluation**

EVALUATION

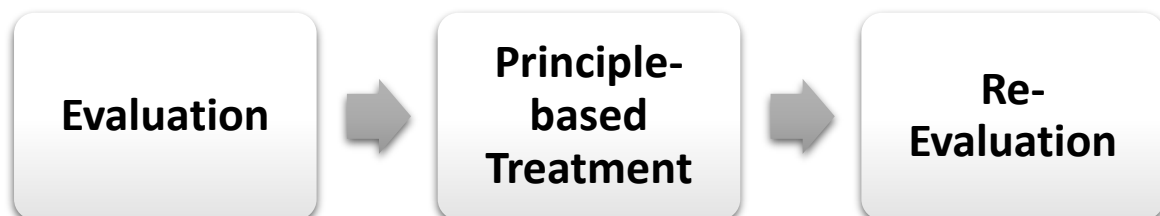
- Evaluation identifies the Lesion Type.
- Evaluation identifies the Treatment Approach (Systemic or Specific).
- Evaluation determines which Systemic Approach.
- Evaluation determines which Specific Approach.
- Evaluation determines the appropriate Principle-based Treatment.

PRINCIPLE-BASED TREATMENT

- Specific Techniques (manual therapy)
- Supportive Techniques (exercise therapy, supportive devices)

RE-EVALUATION

- Re-evaluation marks change.
- Re-evaluation determines effectiveness.
- Re-evaluation determines progression.



Clinical Indications:

Treatment always begins and ends with **Evaluation**.

DAI GUIDING PRINCIPLES

The **DAI Philosophy** is based on the following **Guiding Principles**. These principles are a combination of **Osteopathic** and **Traditional Chinese Medical (TCM)** philosophies.

1. The body is a dynamic unit of function. The Mind, Body, and Spirit function as one and cannot be differentiated or delineated.

- The **Fascial System** connects all cells via a continuous network of fascial tissue.
- The **Circulatory System** supplies blood flow to every cell in the body.
- The **Endocrine System** secretes hormones that regulate the activity of every cell in the body.
- The **Nervous System** connects and integrates information between every cell of the body.
- The **Energetic System** carries Qi (energy) and nourishes all tissues of the body.



Image Credit: D'Ambrogio Institute

2. Unimpaired physiological motion and unrestricted flow (circulation) of vital substances (vascular, lymphatic, nervous, and energetic) are essential to maintaining health and homeostasis. *The Rule of the Artery is Supreme.*

- **Freedom of movement** within and between all body tissues is the foundation of healthy tissue function and balanced tissue motion.
- **Health** is determined by the movement of body fluids within arteries, veins, and lymphatic vessels.
- **Arterial Blood** must carry oxygen and nutrition and flow to every cell in the body to help the body grow and repair.
- **Venous Blood** and **Lymph** must remove interstitial waste products. *Drainage precedes Supply* in the hierarchy of healing.
- **Life Force of Energy (Qi)** must flow unimpeded through the body meridians (system of channels) to have harmony, balance, and good health. (TCM)
- **Barriers** to physiological tissue motion and the flow of vital substances created by Specific and Systemic Lesions can lead to disease and dysfunction.

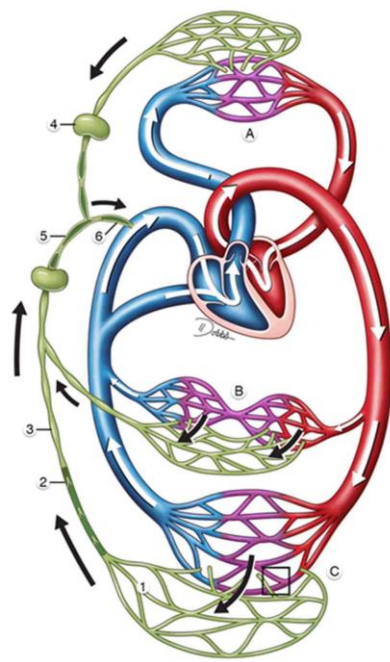


Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm, Updger Productions, 2016.

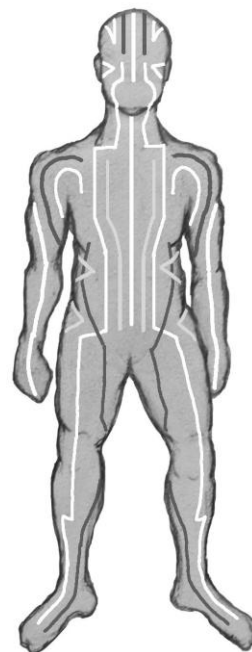
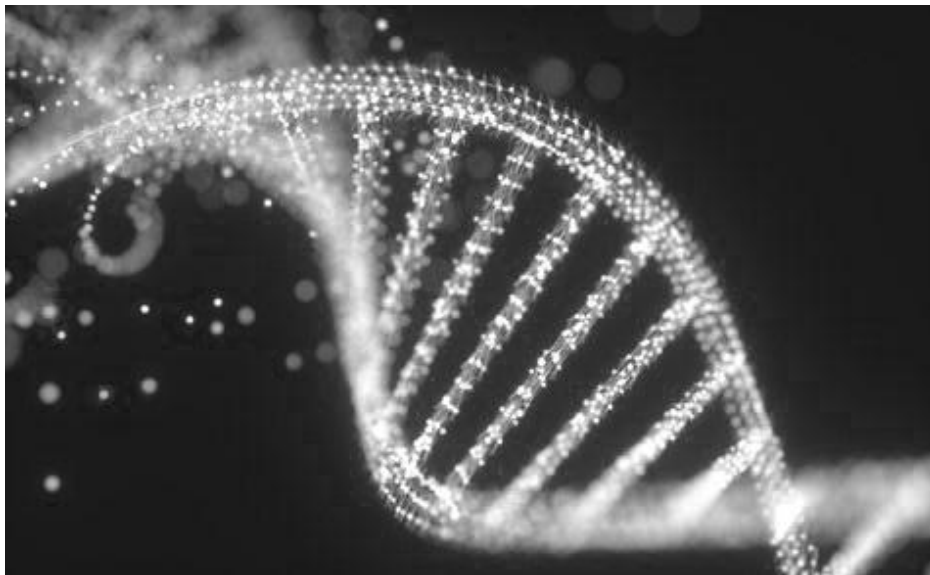


Image Credit: D'Ambrogio, Blake. *D'Ambrogio Institute*, 2020.

3. The body is self-regulating and self-healing.

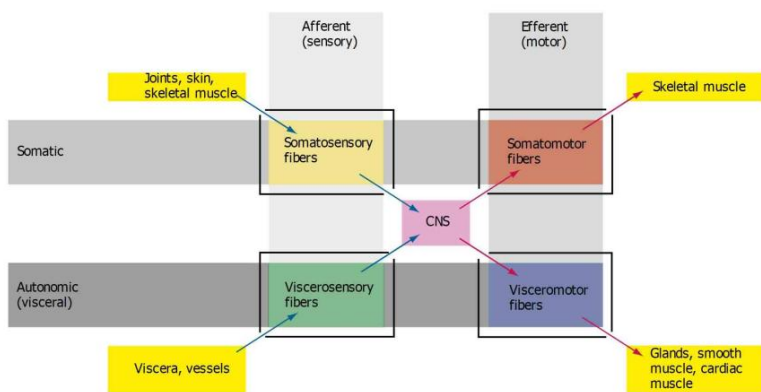
- The body is an **intelligent body** that knows how to self-heal and self-regulate to seek homeostasis.
- The **goal of manual therapy** is to remove barriers created by Specific and Systemic Lesions that interfere with the self-healing and self-regulating processes.
- The **role of manual therapy** is to create a better environment for health and healing (improve physiology).

“Osteopathy is a system of healing that uses the natural resources of the body as a curative means. The adjustment of the body prepares the tissues to allow proper distribution of fluids, neural flow, and energy flow to promote harmony within the body.” – JM Littlejohn

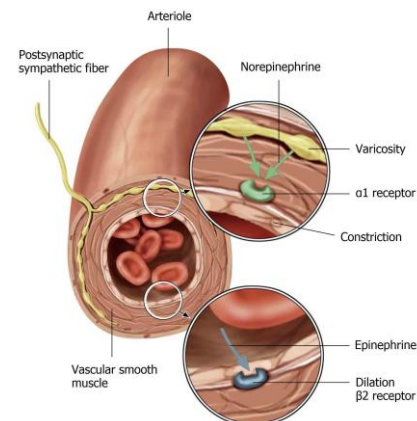


4. The nervous system plays a crucial role in controlling the body.

- The human **Nervous System** is a complex network of nerves and specialized cells that act as the communication network of the body.
- The **three** divisions, **Central (CNS)**, **Peripheral (PNS)**, and **Enteric (ENS)**, control all body functions. The **CNS** (brain/spinal cord) controls central function. The **PNS** (cranial, spinal, and peripheral nerves) controls peripheral function and transmits information. The **ENS** controls digestive function.
- **PNS Afferent (sensory) Nerves** transmit sensory information from the periphery to the CNS for integration. **PNS Efferent (motor) Nerves** transmit motor impulses from the CNS to an effector (muscles, glands) for action.
- The **Somatic Nervous System (SNS)** is responsible for voluntary motor responses, and the **Autonomic Nervous System (ANS)** is responsible for involuntary motor responses.
- The **ANS** divisions, **Sympathetic (SNS)** and **Parasympathetic (PNS)**, regulate the visceral system. The SNS and PNS act on the same organs but with differing and opposing functions. **Homeostasis** is achieved by maintaining a **balance** between the two systems.
- Through smooth muscle control, **ANS Visceromotor Fibers** regulate vessel vasomotion (arterial, venous, and lymphatic) and tissue microcirculation. **Imbalances** in the ANS can affect the movement of fluids throughout the body.



Anatomy for Dental Medicine, Fig. 4.2, Illustrator: Karl Wesker,
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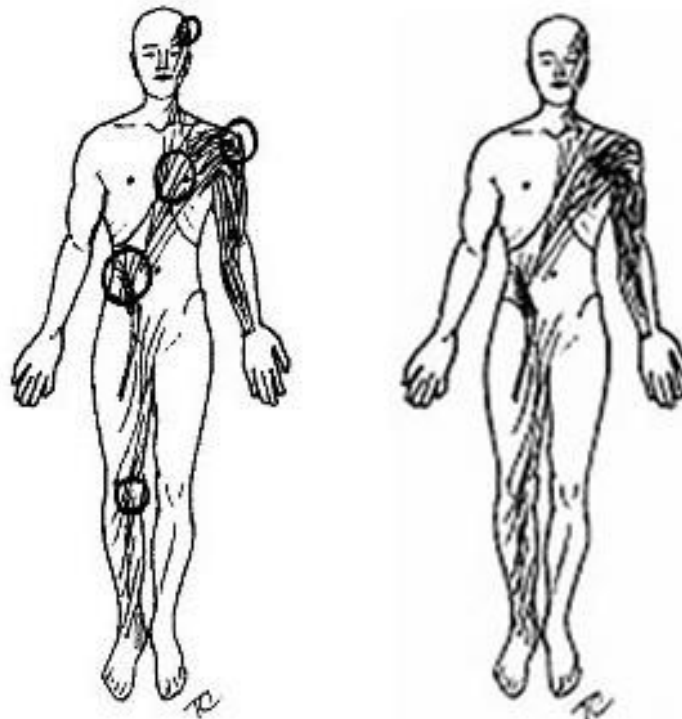


Schumaker, Atlas of Anatomy Vol. 3, 2nd Ed., Fig. 10.265 D, Illustration: Karl Wesker/Markus Volz,
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5. Structure and Function are reciprocally interrelated. *Structure affects Function.*

- **Structural Tissue Impairments** (muscles, fasciae, joints, bones) can affect the surrounding functional pathways (arteries, veins, lymphatics, nerves, meridians), impacting the flow of vital substances and creating barriers to self-healing and self-regulation.
- **Functional Pathway Impairments** (arteries, veins, lymphatics, nerves, meridians) can affect the surrounding tissue structure (muscles, fasciae, joints, bones), compromising cellular metabolism and creating barriers to self-healing and self-regulation.

“Neither in acute nor chronic conditions nor when chronic conditions have become sub-acute does nature jump from the abnormal back to the normal; step by step, she retracts her course back to normal. Both patient and the physician assist or retard her according to the way they obey or disobey her laws.” – Dr. Gravett

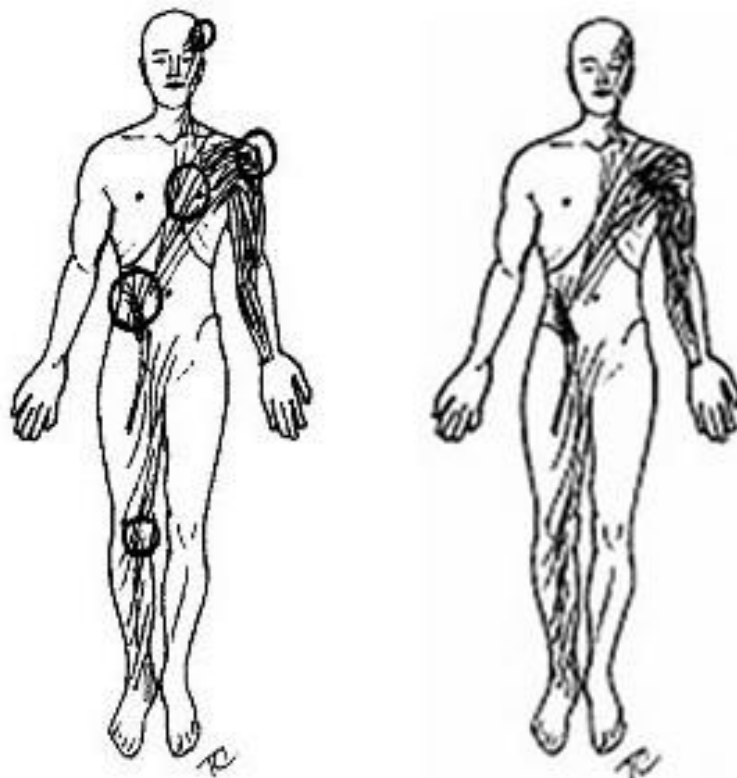


DAI TREATMENT APPROACH

The **DAI Treatment Approach** begins with taking a patient history and performing the **Total Body Screening Examination (TBSE)** to identify the **Lesion Type** (Systemic or Specific Lesion) and determine the appropriate **Evaluation and Treatment Approach** (Systemic or Specific Approach).

- If criteria are met for a **Systemic Approach**, then the appropriate **Systemic Evaluation** and **Systemic Treatment** are performed.
- If criteria are met for a **Specific Approach**, then the appropriate **Specific Evaluation** and **Specific Treatment** are performed.

Principle-based Treatment is followed by a **Re-Evaluation** to mark change and determine if further evaluation or treatment is needed. Treatment continues until criteria are no longer met for either approach.



DAI TREATMENT APPROACH CRITERIA

The **Total Body Screening Examination (TBSE)** identifies the **Lesion Type** (Systemic or Specific) and determines the appropriate **DAI Treatment Approach** (Systemic or Specific).

Systemic Lesions:

- Lines of Tension (extraneous lines of fascial tension)
- Intracavity Congestion (abnormal intracavity pressure changes)
- Transverse Diaphragm Imbalances (restrictions in the TD)
- ANS Imbalances (dysregulation in the ANS)
- Energetic Stress Patterns (unresolved energetically charged tension)

Specific Lesions:

- Muscle Lesions (Specific protective muscle spasm)
- Fascial Lesions (Specific fascial restrictions)
- Joint Lesions (Specific joint hypomobility or stiffness)
- Lymphatic Lesions (Specific swelling or congestion)
- Energetic Lesions (Specific energetic stress patterns)

CRITERIA FOR A SYSTEMIC APPROACH

If a **Systemic Lesion** is found to be contributing to the Specific area of complaint, then a **Systemic Approach** (Systemic Evaluation, Systemic Treatment, and Systemic Re-Evaluation) is indicated. The primary **Systemic Lesion** determines the appropriate **DAI Systemic Approach**.

CRITERIA FOR A SPECIFIC APPROACH

If a **Specific Lesion** is found to be contributing to the Specific area of complaint (no Systemic Lesions), then a **Specific Approach** (Specific Evaluation, Specific Treatment, and Specific Re-Evaluation) is indicated. The primary **Specific Lesion** determines the appropriate **DAI Specific Approach**.

DAI SYSTEMIC APPROACH

DAI Systemic Approach follows the principle of holism. The provider evaluates and treats the primary **Systemic Lesion**.

- **Systemic Orthopedic Balancing (STOB)** evaluates and treats **extraneous lines of fascial tension** throughout the body (Systemic Lesion) and balances the **Musculoskeletal** (muscles, fasciae, joints, bones) and **Nervous** (CNS/PNS) **Systems**.
- **Systemic Lymphatic Balancing (STLB)** evaluates and treats **systemic lymphatic congestion** (Systemic Lymphatic Lesion) and balances the **Lymphatic System** (superficial and deep cavity drainage pathways).
- **Systemic Energetic Balancing (STEB)** evaluates and treats **systemic energetic stress patterns** (Systemic Energetic Lesion) and balances the **Energetic Systems** (Biomatrix, Meridians).



DAI SPECIFIC APPROACH

DAI Specific Approach follows the principle of localization. The clinician evaluates and treats the primary **Specific Lesion**.

- **Muscle Balancing (MB)** evaluates and treats **Specific protective muscle spasm** (Muscle Lesions) and balances the local muscle tissues.
- **Fascial Balancing (FB)** evaluates and treats **Specific fascial restrictions** (Fascial Lesions) and balances the local fascial tissues.
- **Joint Balancing (JB)** evaluates and treats **Specific joint hypomobility or stiffness** (Joint Lesions) and balances the local joint tissues.
- **Lymphatic Balancing (LB)** evaluates and treats **Specific swelling or congestion** (Lymphatic Lesions) and balances the local lymphatics.
- **Energetic Balancing (EB)** evaluates and treats **Specific energetic stress patterns** (Energetic Lesions) and balances the Specific energetics.



DAI EVALUATION PRINCIPLES

Once the **Lesion** (Systemic or Specific Lesion) has been identified and **the DAI Approach** (Systemic or Specific Approach) has been determined, the appropriate **Evaluation** (Systemic and Specific) is performed.

PROVIDER REASONS FOR EVALUATION

- **Evaluation** identifies the **Lesion Type, Treatment Approach** (Systemic or Specific), and appropriate **Principle-based Treatment**.
- **Evaluation** gives a **starting point** from which to measure change.
- **Evaluation validates** the specific treatment approach when change occurs.
- **Evaluation** develops **confidence** and **credibility** once findings are validated.
- Frequent **Evaluation** and **Re-Evaluation** before, during, and after treatment helps develop **wisdom** about the interconnections of the body.

PATIENT REASONS FOR EVALUATION

- **Evaluation** helps the patient **understand why** you are treating where you are treating and why you are using that treatment.
- **Evaluation** helps the patient **understand how** they ended up in dysfunction and may prevent future dysfunction.
- **Evaluation** helps the patient **see progress** with each treatment.
- **Evaluation** helps the patient **get excited** about the objective improvements, which helps **build your practice** through their **referrals**.

Note: Evaluation is not used to diagnose pathology. It is used to obtain clues about the nature of the lesion and help guide treatment.

DAI EVALUATIONS

- **Systemic Evaluation (STEV)** is used to identify postural asymmetry, abnormal movement patterns, extraneous lines of tension, transverse diaphragm/ventral cavity (bowstring) imbalances, ANS imbalances, and orthopedic tissue impairments that may be influencing the Specific area of complaint. STEV consists of Systemic ARTS. (Refer to STOB)
- **Specific Evaluation (SPEV)** is used to identify the primary Specific dysfunction contributing to the Specific area of complaint and determine the appropriate Principle-based Specific Treatment Approach. SPEV consists of Specific ARTS. (Refer to the indicated Specific Approach)

DAI TREATMENT PRINCIPLES

Principle-based Treatment consists of **Specific** and **Supportive Techniques** (if indicated) to treat the primary **Lesion** (Systemic or Specific) found during the **Evaluation** to be contributing to the area of complaint.

TREATMENT OF THE SYSTEMIC LESION

- **STOB** uses **long-lever manual therapy techniques** to release extraneous lines of tension throughout the body, balance the transverse diaphragms, and modulate the ANS. (Systemic Lesion)
- **STLB** uses **manual lymphatic pumping and drainage techniques** (short and long lever) to relieve lymphatic congestion throughout the body, release extraneous lines of tension, and balance both the transverse diaphragms and ANS. (Systemic Lymphatic Congestion)
- **STEB** uses **holographic energetic techniques** to release unresolved energetically charged tension found throughout the body. (Systemic Energetic Stress Patterns)



TREATMENT OF THE SPECIFIC LESION

- **MB** uses **indirect manual therapy techniques** to treat Specific protective muscle spasm. (Muscle Lesions)
- **FB** uses **mechanical (indirect/direct) manual therapy release techniques** (short and long lever) to treat Specific fascial restrictions. (Fascial Lesions)
- **JB** uses **direct manual therapy techniques** to treat Specific joint hypomobility or stiffness. (Joint Lesions)
- **LB** uses **manual lymphatic pumping and drainage techniques** (short and long lever) to treat Specific tissue and joint swelling. (Lymphatic Lesions)
- **EB** uses **holographic energetic techniques** to treat Specific energetic stress patterns. (Energetic Lesions)



DAI RE-EVALUATION PRINCIPLES

Following **Principle-based Treatment**, a **Re-Evaluation** (Systemic or Specific) is performed to mark change and determine progression. **Treatment** continues until the patient no longer meets the **Systemic** or **Specific Approach** criteria.

SYSTEMIC RE-EVALUATION CRITERIA

- If **no Systemic Lesions** are found to be contributing to the Specific area of complaint, then the patient no longer meets the criteria for a **Systemic Approach**.
- If **Specific Lesions** persist after a **Systemic Treatment**, then a **Specific Approach** (Specific Evaluation, Specific Treatment, and Specific Re-Evaluation) is indicated at the Specific area of complaint.
- If **no Lesions** (Systemic or Specific) are found on **Systemic Re-Evaluation**, the patient no longer meets the criteria for continued treatment.

SPECIFIC RE-EVALUATION CRITERIA

- If **Specific Lesions** persist after **Specific Treatment**, a **different Specific Approach** is indicated at the Specific lesion. (See DAI Curriculum)
- If **no Specific Lesions** are found on **Specific Re-Evaluation**, the patient no longer meets the criteria for continued treatment.

Clinical Considerations:

If Specific lesions persist or recur with continued Specific treatment, a Systemic lesion may still be contributing to the Specific area of complaint.

GOALS OF TREATMENT

DAI Treatment Goals include the following:

- Remove Specific and Systemic barriers
- Reduce structural tissue impairments (imbalances/restrictions)
- Improve physiology
 - Increase tissue motion
 - Improve circulation of energy, blood, lymph, and axoplasmic flow
 - Reduce swelling/congestion
 - Relieve pain and reduce other subjective complaints
- Improve mobility, flexibility, and functional ROM
- Increase strength and functional ability
- Return to work, ADL, sports, and recreation
- Return the body to **Optimal Balance: ARTS**

Optimal Balance includes the following objective findings on **ARTS**:

- **Asymmetry:** Balanced posture and Specific landmarks in all three planes
- **Range of Motion:** Normal range of motion (normal end-feels)
- **Tissue Tenderness:** Normal muscle tone
- **Tissue Tension:** Normal joint mobility
- **Tissue Texture:** Normal tissue texture (no swelling or congestion)
- **Special Tests:** No specialized tissue impairments (fascial, lymphatic, musculoskeletal, energetic). Minimal complaints of pain.

Clinical Considerations:

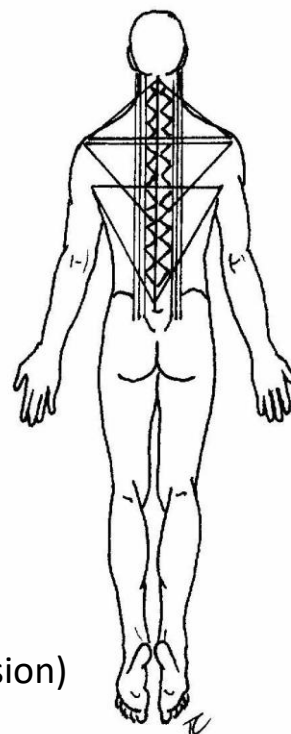
To maintain **Optimal Balance**, physiological tissue motion (structure and function) and functional pathways (supply/drainage) must be in a **balanced hemodynamic state**.

BALANCED HOMEODYNAMIC STATE

The **Human Organism** is in continuous and productive states of activity or change (motion). This dynamic organization of physiological states is described as **Homeodynamics**. When health is optimal, these homeodynamic states are balanced.

Balanced Biomechanical Structure

- Balanced Tissue Structure
 - Muscles
 - Fasciae (superficial, deep, meningeal, visceral)
 - Joints (bones)
 - Lymphatics
- Balanced Transverse Diaphragms (Bowstring)
- Balanced Postural Alignment
- Balanced Tissue Motion



Balanced Physiological Function

- Balanced Tissue Inflow/Outflow
 - Arterial flow and microcirculation (tissue perfusion)
 - Neural and Axoplasmic flow (Efferent/Afferent)
 - Venous return
 - Lymphatic, interstitial fluid, and CSF drainage
 - Energetic (QI) Circulation
- Balanced ANS (sympathetic/parasympathetic activity)
- Balanced function (ADLs, self-care, activity, skill)
- **Balanced Homeodynamic State**

Clinical Considerations:

DAI Treatment Approach provides **balance** to multiple body systems by improving motion and restoring the supply (inflow) and drainage pathways (outflow) to the tissues creating a better environment for tissue health and healing.

DAI MISSION AND VISION STATEMENT

The **DAI Mission** is to create and provide a comprehensive osteopathic manual therapy curriculum to train clinicians on how to make better decisions regarding patient care, with the **Vision** of offering this curriculum on a Specific, national, and international level.

DAI CURRICULUM

All courses in the **DAI Curriculum** include criteria-based **Principles of Practice** founded on the **DAI Philosophy** that provide clinical reasoning and guide the clinician in sound decision making. Specifically, each course includes the following:

- Evaluation
- Principle-based Treatment
- Re-Evaluation

CLINICAL REASONING AND DECISION MAKING

Clinical Reasoning uses a philosophical approach to patient care that increases the efficacy and efficiency of treatment and provides the foundation for safe, effective clinical care. It is important to use in decision making for the following reasons:

- Identifies where to treat
- Identifies how to treat
- Reduces ineffective and faulty treatment
- Decreases the incidence of adverse effects

Note: Clinical Reasoning helps answer the questions posed at the beginning of this section.

TECHNIQUE VERSUS TREATMENT

When using a philosophical approach to patient care (clinical reasoning), it is important to understand the difference between manual therapy technique application and manual therapy treatment.

MANUAL THERAPY TECHNIQUES

Manual Therapy Techniques are procedural interventions applied to structural and functional limitations. They normalize tissue impairments (muscle spasm, fascial tension, joint stiffness, Specific swelling, energetic imbalances), reduce pain, and improve function.

Manual Therapy Technique Application Characteristics

- **Technique** application usually follows a predetermined protocol.
- **Technique** application can usually be performed by anyone trained.
- **Technique** applications are goal focused.
- **Technique** application typically considers the biomechanical, lymphatic, and/or energetic origins of symptoms.

Manual Therapy Techniques may include the following:

- **Types:** muscle, fascia, joint, fluid, energetic
- **Lever:** short, long, combination
- **Approaches:** direct, indirect, combination
- **Application:** passive, active

Note: Manual Therapy Technique Application is a component of all courses offered in the DAI Curriculum and is included within DAI Manual Therapy Treatment Approach instruction.

MANUAL THERAPY TREATMENT

Manual Therapy Treatment incorporates guiding principles of practice (osteopathic and TCM) and investigates the nature of the barrier to determine the appropriate manual therapy technique intervention.

Manual Therapy Treatment Application Characteristics

- **Treatment** implies a philosophical approach to determine the appropriate treatment.
- **Treatment** implies that thought has been given to the chosen manual therapy technique and its application.
- **Treatment** implies a principle-based treatment approach: Evaluation, Principle-based Treatment, and Re-evaluation.
- **Treatment** implies that dosage has been taken into consideration.

Manual Therapy Treatment includes the following:

- **Evaluation** is performed to identify the appropriate treatment approach and provide a starting point from which to measure change and determine progression.
- **Principle-based Treatment** includes manual therapy and supportive techniques to provide the desired treatment effects.
- **Re-Evaluation** is performed to mark change and determine if further evaluation or treatment is needed.

Note: Manual Therapy Treatment Application is a component of all courses offered in the DAI Curriculum and includes instruction in an Evaluation and Treatment Approach founded on guiding Principles of Practice.

PART II: SYSTEMIC SCREENING EXAMINATION

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TOTAL BODY SCREENING EXAMINATION

The **Total Body Screening Examination (TBSE)** identifies the **Lesion Type** (Systemic or Specific Lesion) and determines the appropriate **DAI Evaluation and Treatment Approach** (Systemic or Specific Approach).

TYPES OF SYSTEMIC LESIONS

- Lines of Tension (LOT)
- Intracavity Congestion (ICC)
- Transverse Diaphragm (TD) Imbalances
- ANS Imbalances
- Energetic Stress Patterns



TYPES OF SPECIFIC LESIONS

- Muscle Lesions
- Fascial Lesions
- Joint Lesions
- Lymphatic Lesions
- Energetic Lesions



TOTAL BODY SCREENING EXAMINATION

Instructions: Perform the following examination to determine the primary type of dysfunction and document findings on the TBSE Form. Based on those findings, identify the primary Lesion Type and appropriate DAI Treatment Approach.

Posture Scan

- Occiput/Sacrum/Spine (ANS)
- T-Lines: Shoulder/Pelvic Levels (LOT)

Lower Extremity

- Limb Weight Test (ICC)
- Leg Pump (Compression-ICC; Decompression-LOT)
- Leg Vector (LOT LE)

Upper Extremity

- Limb Weight Test (ICC)
- Arm Pump (Compression-ICC; Decompression-LOT)
- Arm Vector (LOT UE)

Head/Neck

- Head Weight Test (ICC)
- Cervical Vector (LOT and TD)

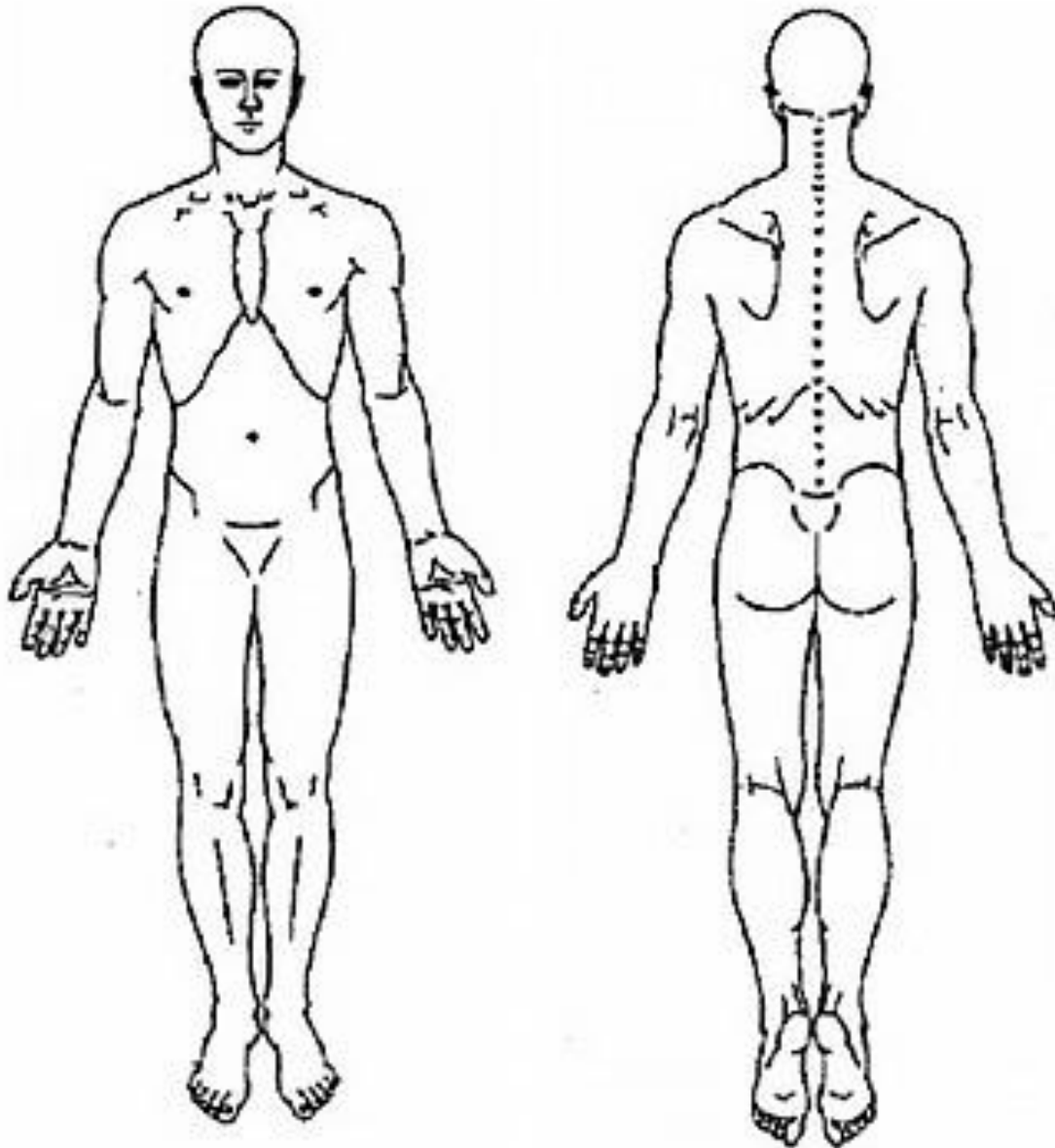
Thorax

- Upper Thoracic Rotation (LOT, TD, and ANS)
- Sternal Pump (ICC)
- Lower Thoracic Rotation (LOT, TD, and ANS)

Pelvis

- Abdominal Pump (ICC)
- Pelvic Rotation (LOT and TD)

TBSE EVALUATION FORM



CONGESTION/LOT/TD IMBALANCES		POSTURE SCAN/ASYMMETRY	
Congestion:	Shade	Occiput Asymmetry:	
Line of Tension:	_____	Sacral Asymmetry:	"●"
TD Direction of Ease:	————→	Spinal Asymmetry:	
TD Normal Movement:	←————→	T Lines Asymmetry:	
TD No Movement:	_____	Weight Test (heavier):	"√"

TBSE INSTRUCTIONS

POSTURE SCAN: STANDING POSTERIOR VIEW

- **Occiput/Sacrum:** Palpate inferior aspect of occiput and either the base or ILA of sacrum. Note any asymmetry. **(ANS Imbalance)**
 - **Occiput:** PNS CN X Vagus N
 - **Sacrum:** PNS S2, 3, 4
- **Spine:** Run fingers or thumbs down the transverse processes (TP) of the spine from T1-L2. Note any asymmetry. **(ANS Imbalance)**
 - **Thoracolumbar TP:** SNS T1—L2 (See ANS Anatomy Section)
- **T-Lines:** Palpate superior aspect shoulders and pelvis (iliac crest). Note any asymmetry. **(LOT)**
 - **Upper T-Line:** LOT from head, neck, and/or upper extremities
 - **Lower T-Line:** LOT from the lower extremities

LOWER EXTREMITY: SUPINE

- **Lower Extremity Limb Weight Test:** Support the leg at the ankle and assess the weight of each leg for congestion. Note heavier leg. **(ICC)**
- **Leg Pump:** Support the leg at the ankle against abdomen. Gently compress the leg superiorly to the first sign of resistance, pause, and note the end-feel. Then decompress and note the end-feel.
 - **ICC:** Bogginess and tension noted on compression
 - **LOT:** Tension noted on decompression
- **Leg Vector:** Support the leg at the ankle. Gently rotate the leg in a clockwise and counterclockwise circumduction motion. Note any motion restrictions. **(LOT)**

UPPER EXTREMITY: SUPINE

- **Upper Extremity Limb Weight Test:** Support the arm at the wrist or hand and assess the weight of each arm for congestion. Note heavier arm. **(ICC)**
- **Arm Pump:** Support the arm in a “shotgun” position. Gently compress the arm superiorly to the first sign of resistance, pause, and note the end-feel. Then decompress and note the end-feel.
 - **ICC:** Bogginess and tension noted on compression
 - **LOT:** Tension noted on decompression
- **Arm Vector:** Support the arm at the wrist or hand and apply slight traction/external rotation. Gently rotate the arm in a clockwise and counterclockwise circumduction motion. Note any motion restrictions. **(LOT)**

HEAD/NECK: SUPINE

- **Head Weight Test:** Support the head and assess the weight for congestion. Note heaviness. **(ICC)**
- **Cervical Vector:** Support the head. Gently flex the cervical spine to the first barrier and note any tension. Rotate to the right/left to the first barrier and note any asymmetry.
 - **LOT:** Tension noted with cervical flexion
 - **Tentorium TD Imbalance:** Asymmetry noted with cervical rotation

THORAX: SUPINE

- **Upper Thoracic Rotation:** Patient with arms crossed and resting along the front of the body. Standing at the head of the table, contact the anterior shoulder with one hand and the posterior contralateral shoulder with the other. Compress and lift to create rotation. Return to neutral, switch hands, and repeat in the other direction. Assess mobility in each direction and note any motion restrictions. **(LOT, Thoracic Inlet TD, and ANS/SNS T1–T8 Imbalances)**
- **Sternal Pump:** Standing at the head of the table, locate the angle of Louis on the sternum. Contact the angle with the heel of one hand and overlap with the other hand. With lean-on pressure, pump the sternum in a posterior and inferior direction. Note any boggiess or increased tension on compression. **(ICC Thoracic Cavity)**
- **Lower Thoracic Rotation:** Standing next to the patient, contact the lower thoracic cage (bilateral) with both hands placing thumbs in sub-costal space and fingers along lateral ribs 7-10. Rotate the lower thorax like a cylinder to the right/left. Assess mobility in each direction and note any motion restrictions. **(LOT, Respiratory TD, and ANS/SNS T8–L2 Imbalances)**

PELVIS: SUPINE

- **Abdominal Pump:** Overlap hands and contact the abdomen between the umbilicus and the xiphoid process. Gently compress, pause, then decompress. Note any boggiess or increased tension on compression. **(ICC Abdominal Cavity)**
- **Pelvic Rotation:** Standing next to the patient, contact the ASIS (bilateral) with both hands. Rotate the pelvis forward/backward around its central axis (steering wheel). Assess mobility in each direction and note any motion restrictions. **(LOT and Pelvic Floor TD Imbalance)**

Note: Can perform Rotations (Thoracic/Pelvis) one side at a time, if needed.

TBSE SUMMARY FINDINGS

The **primary type of dysfunction** identified by the **TBSE** determines the primary **Lesion Type** (Systemic or Specific). **Lesion Types** include the following:

TYPES OF LESIONS

Lines of Tension (LOT): Extraneous lines of tension throughout the body that contribute to the Specific area of complaint.

- Posture Scan: T-Lines: Shoulder/Pelvic Levels (LOT)
- Leg Pump: Decompression (LOT)
- Leg Vector (LOT)
- Arm Pump: Decompression (LOT)
- Arm Vector (LOT)
- Cervical Vector (LOT)
- Upper Thoracic Rotation (LOT)
- Lower Thoracic Rotation (LOT)
- Pelvic Rotation (LOT)

Intracavity Congestion (ICC): Areas of Systemic lymphatic congestion that contribute to the Specific area of complaint or general lack of wellness.

- Lower Extremity Limb Weight Test (ICC)
- Leg Pump: Compression (ICC)
- Upper Extremity Limb Weight Test (ICC)
- Arm Pump: Compression (ICC)
- Head Weight Test (ICC)
- Sternal Pump (ICC)
- Abdominal Pump (ICC)

Transverse Diaphragm (TD) Imbalances: Imbalances and mobility restrictions in the Transverse Diaphragms that contribute to the Specific area of complaint.

- Cervical Vector (Tentorium TD Imbalance)
- Upper Thoracic Rotation (Thoracic Inlet TD Imbalance)
- Lower Thoracic Rotation (Respiratory TD Imbalance)
- Pelvic Rotation (Pelvic Floor TD Imbalance)

ANS Imbalances: Imbalances and mobility restrictions in the ANS that contribute to the Specific area of complaint.

- Posture Scan: Occiput/Sacrum/Spine (ANS Imbalance)
- Upper Thoracic Rotation (ANS Imbalance)
- Lower Thoracic Rotation (ANS Imbalance)

Energetic Stress Patterns: Unresolved energetically charged tension and stress patterns (Systemic) that contribute to the Specific area of complaint.

- Inconclusive findings (testing and end-feels)

Specific Lesions: Primary Specific lesion(s) found to be contributing to the Specific area of complaint.

- No Systemic Lesions were identified on TBSE Primary Specific Lesion(s) were identified on TBSE

DAI TREATMENT APPROACH CRITERIA

The primary **Lesion Type** (Systemic or Specific) identified on the **TBSE** determines the appropriate **DAI Treatment Approach** (Systemic or Specific).

SYSTEMIC APPROACH CRITERIA

If a **Systemic Lesion** is found to be contributing to the Specific area of complaint, then a **Systemic Treatment Approach** (Systemic Evaluation, Systemic Treatment, and Systemic Re-Evaluation) is indicated. **Primary Systemic Lesions** can include the following:

- **Systemic Lesion: Lines of Tension**
- **Systemic Lesion: Intracavity Congestion**
- **Systemic Lesion: TD Imbalances**
- **Systemic Lesion: ANS Imbalances**
- **Systemic Lesion: Energetic Stress Patterns (Systemic)**

Note: The primary Systemic Lesion found on TBSE determines the appropriate Systemic Treatment Approach.

SPECIFIC APPROACH CRITERIA

If a **Specific Lesion** is found to be contributing to the Specific area of complaint (no Systemic Lesions), then a **Specific Treatment Approach** (Specific Evaluation, Specific Treatment, and Specific Re-Evaluation) is indicated. **Primary Specific Lesions** can include the following:

- **Specific Lesion(s): Muscle, Fascial, Joint, Lymphatic, Energetic**

Note: The TBSE does not identify the specific type of primary Specific lesion but only that a Specific Treatment Approach is indicated.

DAI SYSTEMIC APPROACH

The **DAI Systemic Approach** is based on the **three** fundamental principles of the **DAI Philosophy** and consists of the following:

- **Evaluation: Systemic Evaluation** to identify the current level of dysfunction and provide a starting point from which to measure change and determine progression.
- **Principle-based Systemic Treatment: Specific Treatment Application** to treat the indicated Systemic lesion.
- **Re-Evaluation: Systemic Re-Evaluation** to measure change and determine progression.

DAI SYSTEMIC TREATMENT APPROACH



Clinical Considerations:

DAI Systemic Approach can be integrated with any **DAI Specific Treatment Approach** as needed. See **Appendix** for the complete **DAI Curriculum**.

TBSE OBJECTIVE FINDINGS

The primary **Systemic Lesion** identified by the **TBSE** determines the appropriate **Principle-based Systemic Treatment Approach**. TBSE findings may include the following:

Primary Systemic Lesion: Lines of Tension

- **Primary Finding: LOT: Extraneous lines of fascial tension**
- TD: Imbalances in the transverse diaphragms
- ANS: Imbalances in the ANS
- **Principle-based Systemic Treatment Approach: Systemic Balancing**

Primary Systemic Lesion: Intracavity Congestion

- **Primary Finding: ICC: Intracavity (Systemic) congestion**
- LOT: Extraneous lines of fascial tension
- TD: Imbalances in the transverse diaphragms
- ANS: Imbalances in the ANS
- **Principle-based Systemic Treatment Approach: Lymphatic Balancing Systemic**

Primary Systemic Lesion: Energetic Stress Patterns (Systemic)

- **Primary Finding: All findings inconclusive**
- **Principle-based Systemic Treatment Approach: Energetic Balancing Systemic**

DAI SPECIFIC APPROACH

The **DAI Specific Approach** is based on the **three** fundamental principles of the **DAI Philosophy** and consists of the following:

- **Evaluation: Specific Evaluation (ARTS)** to identify the primary Specific lesion(s).
- **Principle-based Specific Treatment: Specific Treatment Application** to treat the primary Specific lesion(s).
- **Re-Evaluation: Specific Re-Evaluation (ARTS)** to measure change and determine progression.

DAI SPECIFIC TREATMENT APPROACH



Clinical Considerations:

DAI Specific Approach can be integrated with other **DAI Specific Treatment Approaches** as needed. See **Appendix** for the complete **DAI Curriculum**.

SPECIFIC EVALUATION

If a **DAI Specific Approach** is indicated, then a **Specific Evaluation (SPEV)** is performed to identify the primary **Specific Lesion** (Specific areas of tension and imbalances) and determine the appropriate **Principle-based Specific Treatment Approach**. **SPEV** consists of the following **Specific ARTS**:

- **A: Asymmetry Landmark Evaluation:** Identifies **Asymmetry** in the Specific bony landmarks.
- **R: Range of Motion Evaluation:** Identifies limited Specific active and passive **Range of Motion (ROM)** and abnormal **end-feels**.
- **T: Tissue (Tenderness, Tension, and Texture) Tests:** Identifies Specific tissue impairments.
 - **Tissue Tenderness:** Identifies protective muscle spasm (firm end-feel) contributing to the area of complaint.
 - **Tissue Tension:** Identifies joint hypomobility/stiffness (hard end-feel) contributing to the area of complaint.
 - **Tissue Texture:** Identifies tissue/joint swelling (soft/boggy end-feel) contributing to the area of complaint.
- **S: Special Tests:** Identifies specialized tissue impairments as indicated to confirm findings.
 - **Fascial Glide Test:** Identifies Specific fascial restrictions (firm end-feel).
 - **Limb Weight Test:** Identifies Specific limb congestion (heaviness).
 - **Nodal Evaluation:** Identifies proximal node swelling (fullness).
 - **Biofeedback Test:** Identifies Specific energetic stress patterns.
- **Other Specific Special Tests:** Identifies other specialized Specific tissue impairments and can include:
 - Orthopedic Tests
 - Manual Muscle Tests
 - Balance Tests
 - Proprioception Tests
 - Neurological Examination
 - Listening/Arcing Tests

SPEV (ARTS) OBJECTIVE FINDINGS

The **primary Specific dysfunction** identified by the **SPEV** determines the primary **Specific Lesion** and the appropriate **Principle-based Specific Treatment Approach**. **Specific ARTS** findings may include the following:

Primary Specific Lesion: Specific Protective Muscle Spasm

- **Asymmetry** is noted in the Specific landmarks.
- **ROM:** Limited active/passive ROM with a firm end-feel.
- **Tissue Tenderness:** Abnormal tenderness in the Specific muscle.
- **Special Tests:** Other Specific Special Tests (Weak Manual Muscle Test)
- **Principle-based Specific Treatment Approach: Muscle Balancing**

Primary Specific Lesion: Specific Fascial Restriction

- **Asymmetry** is noted in the Specific landmarks.
- **ROM:** Limited active/passive ROM with a firm end-feel.
- **Special Tests: Fascial Glide Test:** Positive for Specific restrictions.
- **Principle-based Specific Treatment Approach: Fascial Balancing**

Primary Specific Lesion: Specific Joint Restriction (Hypomobility)

- **Asymmetry** is noted in the Specific landmarks.
- **ROM:** Limited active/passive ROM with a hard end-feel.
- **Tension:** Abnormal hypomobility/stiffness found in the Specific joints.
- **Special Tests:** Other Specific Special Tests (Positive Orthopedic Tests)
- **Principle-based Specific Treatment Approach: Joint Balancing**

Primary Specific Lesion: Specific Swelling (Congestion)

- **Asymmetry** is noted in the Specific landmarks.
- **ROM:** Limited active/passive ROM with a soft/boggy end-feel.
- **Tissue Texture** changes (soft/bogginess) noted in the Specific area.
- **Special Tests: Limb Weight Test:** Heaviness noted in the Specific limb.
- **Special Tests: Nodal Evaluation:** Fullness/tension in proximal nodes.
- **Principle-based Specific Treatment Approach: Lymphatic Balancing**

Primary Specific Lesion: Specific Energetic Stress Pattern

- **Asymmetry** is noted in the Specific landmarks.
- **ROM:** ROM/End-feel testing is inconclusive (empty end-feel).
- **Tissue Tests (ALL)** findings are inconclusive.
- **Special Tests: Biofeedback Test:** Specific energetic stress patterns.
- **Principle-based Specific Treatment Approach: Energetic Balancing**

Clinical Considerations:

If there are multiple Specific tissue impairments (primary areas of dysfunction) identified on the SPEV, treatment will occur in the following order: energetic, muscle, fascia, joint, lymphatics.

SECTION II

ANATOMY

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PART I

FASCIAL ANATOMY

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“The fascia forms the largest system in the body as it is the system that touches all the other systems.”

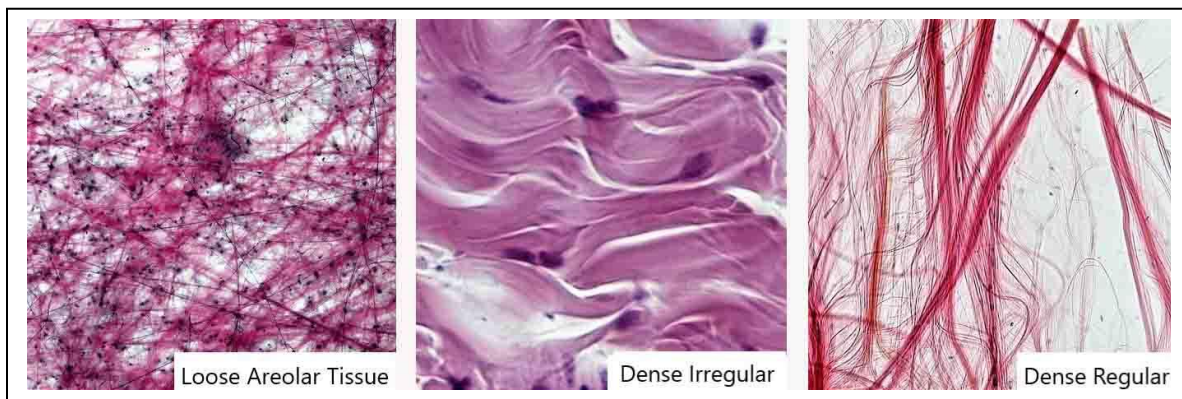
–James Oschman, PhD

ANATOMICAL CLASSIFICATION OF FASCIA

Anatomically, fascia has been classified into **four** distinct layers. However, there is no clear division between each layer, and since the fascial system is a continuous interconnected tissue, each layer smoothly transitions from one to the next.

FASCIAL LAYERS

- **Superficial Fascia** is composed of dense (irregular) proper CT that connects the skin to the deep fasciae.
- **Deep Fasciae** is composed of mixed loose and dense (regular) proper CT that surrounds the components of the musculoskeletal system.
- **Visceral Fasciae** is composed of mixed loose and dense (regular) proper CT that surrounds the viscera and lines the ventral cavities.
- **Meningeal Fasciae** is composed of dense (regular) proper CT that surrounds the central neural structures and lines the dorsal cavities.



Note: The arrangement and thickness of the fascial layers vary according to gender, age, body region, body surface, and body composition.

SUPERFICIAL FASCIA

Superficial Fascia divides the subcutaneous tissue (subcutis) into two layers and acts as a sliding surface between superficial (skin) and deep tissues (muscles). These layers play a role in skin integrity, support/organize subcutaneous structures, and provide protection (adipose tissue).

SUPERFICIAL FASCIAL LAYERS

Superficial Fascia is composed of a membranous tissue layer that anchors the skin to the underlying deep fasciae (via fibrous septa) and divides the subcutis into **two** loosely organized adipose layers (superficial and deep). Adipose layers include the following:

- **Superficial Adipose Tissue Layer** is composed of adipocytes and houses the retinaculum cutis superficialis (connects the superficial fascia to the skin).
- **Deep Adipose Tissue Layer** is composed of adipocytes and houses the retinaculum cutis profundus (connects the superficial fascia to the deep fasciae).

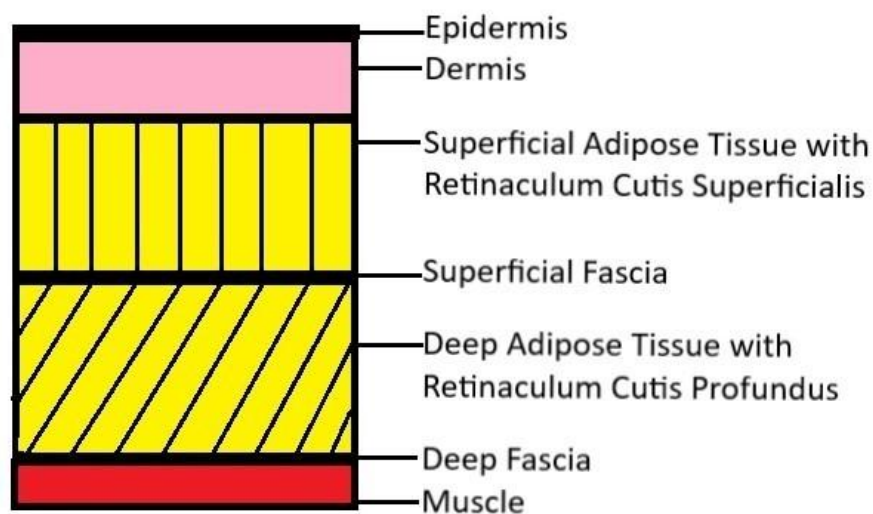


Image Credit: Becker, TA. Organizational schema of subcutaneous tissue, 2019.

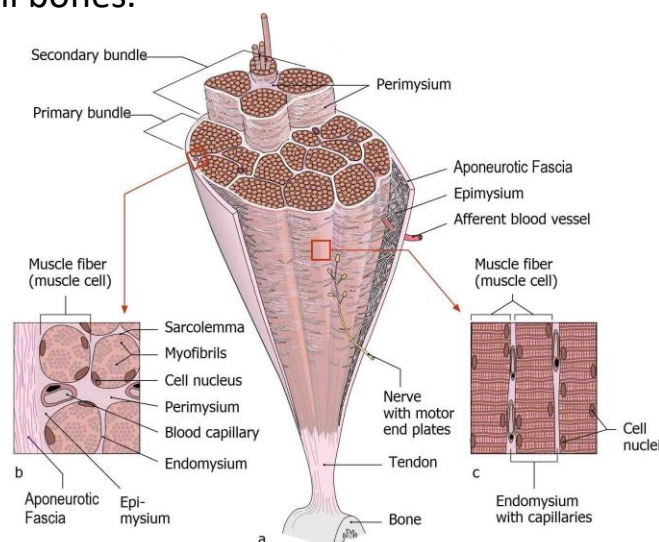
DEEP FASCIAE

Deep Fasciae covers and penetrates the musculoskeletal structures, creating a functionally continuous deep fascial system within the musculoskeletal system of the body. This system functions to transmit contractile forces (mechanical load) and accommodate large shear displacements across the musculoskeletal structures.

DEEP FASCIAL LAYERS

Deep Fasciae is composed of multiple membranous layers that cover and invest the muscles, tendons, joints, and ligaments down to the periosteum of the bone. Layers include the following:

- **Aponeurotic Fascia:** Thick fascial sheath that covers muscle groups and serves as a broad muscle attachment.
- **Epimysium:** Thin fascial sheath that surrounds the musculotendinous unit and attaches it to the bone.
- **Perimysium:** Fascial network that divides the muscle tissue into muscle fibers bundles (fascicles).
- **Endomysium:** Thin membranous layer that separates the fascicle into individual muscle fibers.
- **Periosteum:** Dense membranous layer of vascular CT that covers the surface of all bones.



Schuenke, Atlas of Anatomy Vol. 1, 2nd Ed., Fig. 5.58 A, Illustrator: Karl Wesker, ©2021 Thieme Medical Publishers, Inc. All Rights Reserved.

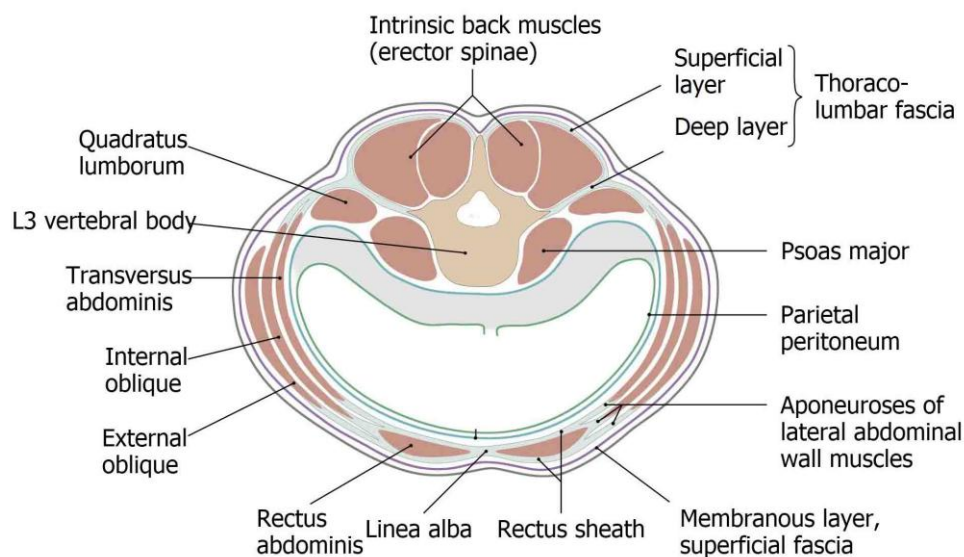
DEEP FASCIAE DIVISIONS

Deep Fasciae are classified into the following **two** divisions based on the anatomical location in the body:

- **Axial Fascia** is composed of deep, circular fascial layers that invest the axial muscles of the torso/neck and attach to the transverse process of the spine.
- **Appendicular Fascia** is composed of deep fascial layers that invest the appendicular muscles of the extremities.

AXIAL FASCIAL TYPES

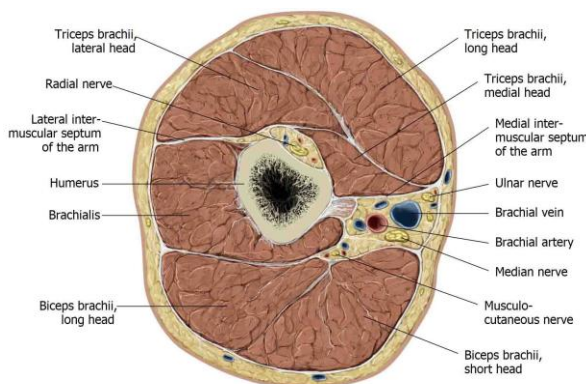
- **Hypaxial Fascia** surrounds the anterior hypaxial muscles.
 - **Cervical Region:** Cervical Fascia (superficial/deep)
 - **Abdominopelvic Region:** Rectus Sheath (anterior/posterior)
- **Epaxial Fascia** surrounds the posterior epaxial muscles.
 - **Craniocervical Spinal Region:** Nuchal Fascia (superficial/deep)
 - **Thoracolumbar Spinal Region:** Thoracolumbar Fascia (sup/deep)



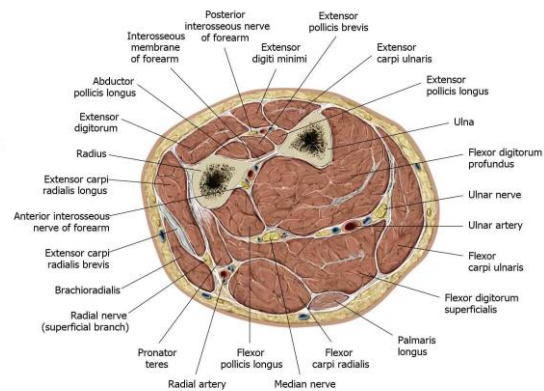
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APPENDICULAR FASCIAL TYPES

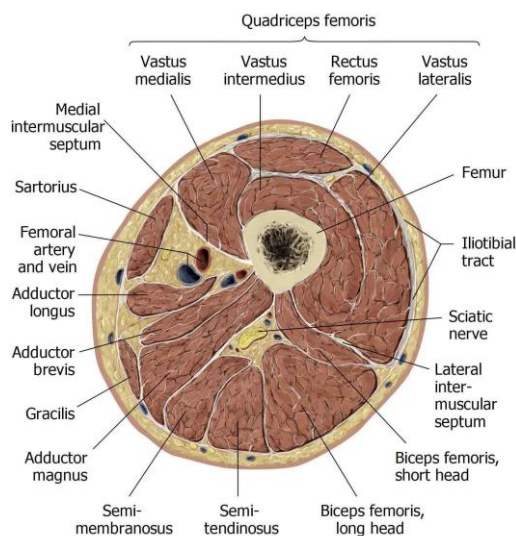
- **Upper Extremity (UE) Fasciae** surround the UE muscles.
 - **Shoulder Fasciae:** Pectoral, Deltoid, Clavipectoral, Axillary, Subscapularis, Infraspinatus, Supraspinatus
 - **Arm Fasciae:** Brachial, Antebrachial
 - **Hand Fasciae:** Retinacula, Palmar Aponeurosis
- **Lower Extremity (LE) Fasciae** surround the LE muscles.
 - **Hip Fascia:** Gluteal
 - **Leg Fasciae:** Fascia Lata, Crural
 - **Foot Fasciae:** Retinacula, Plantar



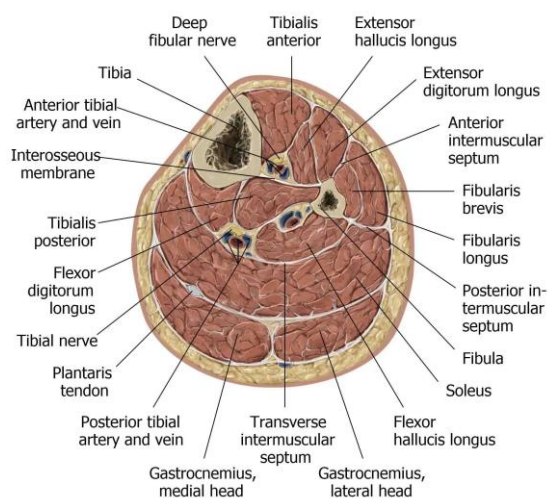
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Schuenke, Atlas of Anatomy Vol. 1, 2nd Ed., Fig. 16.342 B, Illustrator: Karl Wesker, ©2021 Thieme Medical Publishers, Inc. All Rights Reserved.



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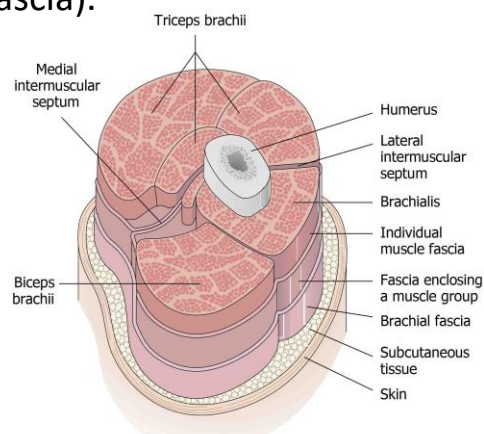


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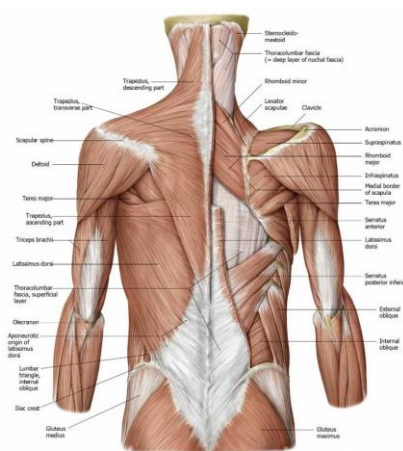
DEEP FASCIAE DIVISIONAL RELATIONSHIPS

Deep Fasciae Divisions are structurally interconnected and functionally interdependent through complex anatomical attachments.

- **Axial Fascia** extends uninterrupted into the extremities as **the intermuscular septum**. This septum houses the distal branches of neurovascular bundles and divides the extremity into functional compartments (groups of muscles that perform a similar function).
- **Appendicular Fascia** contains **myofascial expansions** from extremity muscles that extend to the torso and attach to the midline of the body, either directly (spinous processes) or indirectly (via aponeurotic fascia).



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Schuenke, Atlas of Anatomy Vol. 1, 2nd Ed., Fig. 11.166 A, Illustrator: Karl Wesker, ©2021 Thieme Medical Publishers, Inc. All Rights Reserved.

Clinical Considerations:

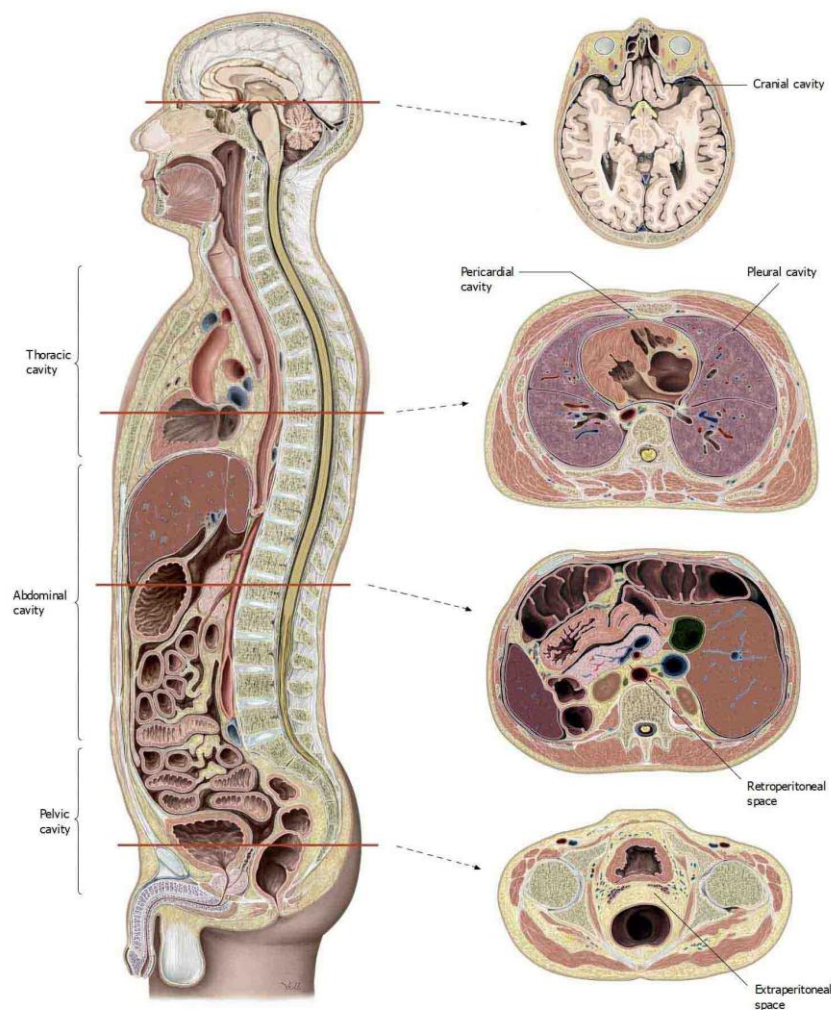
Because of the interconnectedness between the axial and appendicular fasciae, Fascial Tension in one division can create impairments in the other. Alternatively, these connections can be used therapeutically to affect change across the body.

Note: Manual Therapy can effectively treat these extraneous lines of fascial tension and restore balance throughout the deep fascial divisions.

VISCERAL FASCIAL SYSTEM

Visceral Fascial System is a **continuous vertical sleeve** of fascial membranes that runs ventrally from the cranial base to the pelvic floor. Together, these membranes compartmentalize the ventral cavity and are classified into the following divisions based on anatomical location:

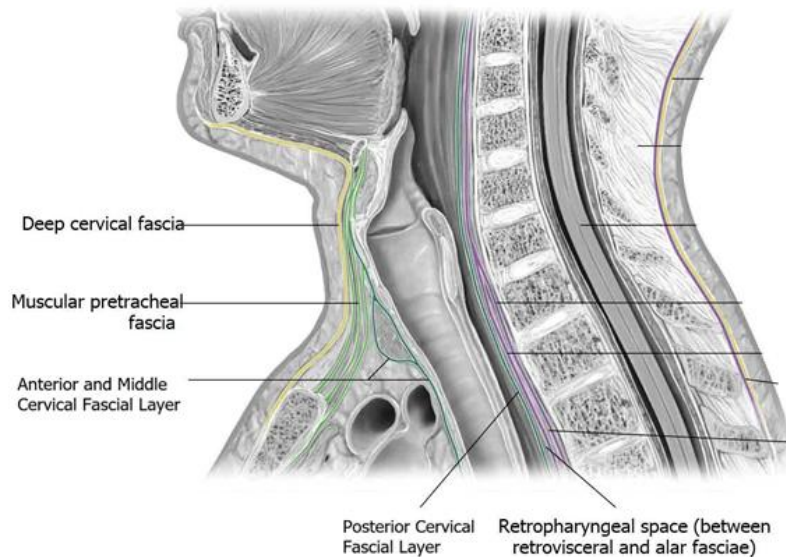
- **Cervical Visceral Fascia:** Anterior, Middle, Posterior Divisions
- **Thoracic Visceral Fasciae:** Pleura, Pericardium
- **Abdominopelvic Visceral Fascia:** Peritoneum (abdominal/pelvic)



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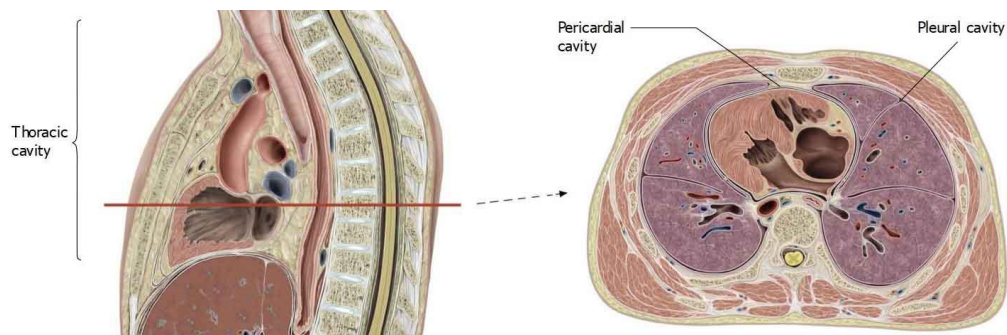
VISCERAL FASCIAE DIVISIONS

Cervical Visceral Fascia attaches to the cranial base and extends through the nasopharyngeal region of the cervical spine into the thorax. It runs internal to the hyoid muscles and anterior to the longus muscles (longus capitus and longus colli).



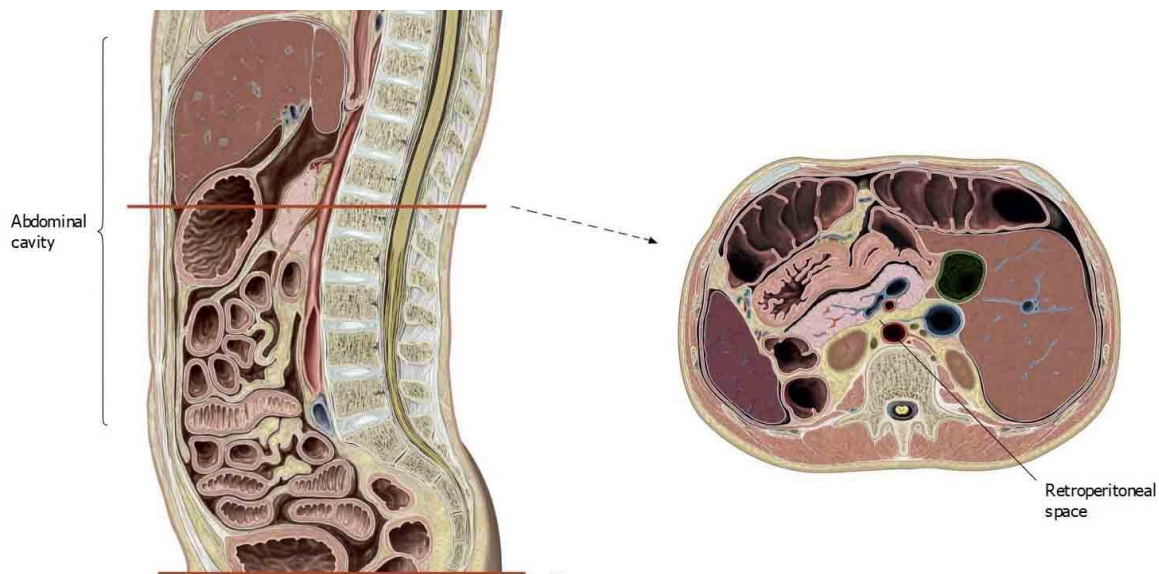
Gilroy, Atlas of Anatomy, 2nd ed., Fig. D 12.16 B, Illustrator: Karl Wesker,
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Thoracic Visceral Fascia is a continuation of the cervical fascia into the thorax, where it runs from the superior thoracic aperture (thoracic inlet) to the inferior thoracic aperture (thoracic outlet) and diaphragm. It divides the thoracic cavity into the pleural and mediastinal (pericardial) cavities



Schuenke, Atlas of Anatomy Vol. 1, 2nd Ed., Fig. 2.25 E, Illustrator: Karl Wesker,
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Abdominopelvic Visceral Fascia is a continuation of the cervicothoracic fascia into the abdominopelvic cavity, where it runs from the diaphragm to the pelvic basin and inserts into the levator ani and coccygeus muscle of the pelvic floor. It divides the abdominopelvic cavity into the abdominal and pelvic cavities.



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Clinical Considerations:

Because of the interconnectedness and continuous nature of the visceral fascial system, **Fascial Tension** within the system can create impairments throughout the ventral cavity. Alternatively, these connections can be used therapeutically to affect change across this system.

Note: Manual Therapy can effectively treat these extraneous lines of fascial tension and restore balance throughout the visceral fasciae.

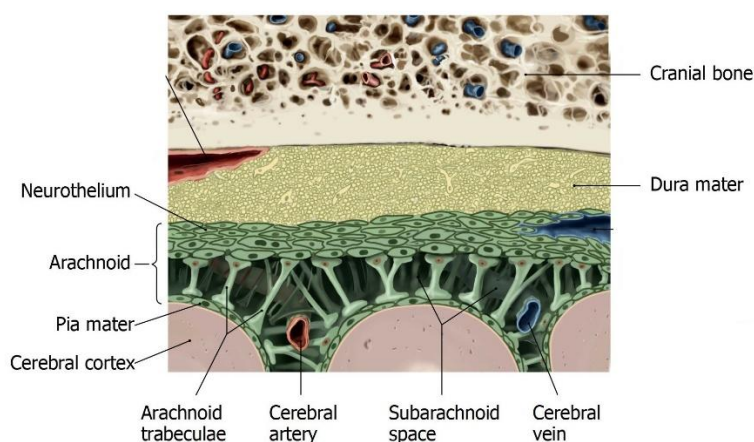
MENINGEAL FASCIAE

Meningeal Fasciae encases and surrounds the neural structures of the central nervous system, creating a functionally continuous meningeal fascial (dural) system within the dorsal body cavity. Collectively, this system functions to protect the nervous system by resisting stress and transmitting force away from the vital CNS organs.

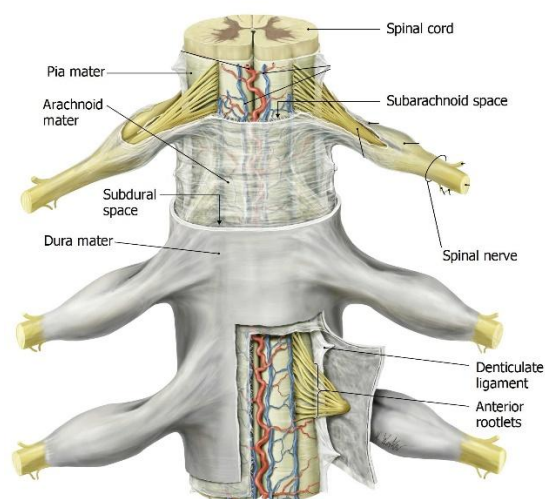
MENINGEAL FASCIAE MEMBRANE LAYERS

Meningeal Fasciae is composed of **three** membranous layers that cover the brain and spinal cord. These layers run dorsally from the cranium to the coccyx, collectively terminating at the epineurium (outermost covering) of the peripheral spinal nerves. Membrane layers include:

- **Pia Mater:** soft, inner membrane layer
- **Arachnoid Mater:** spongy, middle membrane layer
- **Dura Mater:** hard, fibrous outer membrane layer



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Anatomy for Dental Medicine, Fig. 4.6, Illustrator: Karl Wesker, ©2020 Thieme Medical Publishers, Inc. All Rights Reserved.

MENINGEAL FASCIAL SYSTEMS

The **Meningeal Fascial Membranes** in the cranium and spine are structurally interconnected and functionally interdependent. Together, they form the following **two** distinct fascial systems: **Horizontal and Vertical Meningeal (Dural) Systems**.

HORIZONTAL MENINGEAL (DURAL) SYSTEM

Horizontal Meningeal (Dural) System is composed of the Tentorium Cerebelli and Diaphragm Sellae. Together, they act to tighten the cranial base. Attachments include the following:

- **Tentorium Cerebelli Attachments**

- **Anterior:** anterior clinoid process of the sphenoid (superior leaves), posterior clinoid process of the sphenoid (inferior leaves)
- **Lateral:** petrous ridge of the temporal bone, mastoid portion of the temporal bones, inferior angle of parietal bones
- **Posterior:** transverse ridge of the occipital bone

Note: The superior leaves of the Tentorium Cerebelli are continuous with Falx Cerebri, and the inferior leaves are continuous with Falx Cerebelli.

- **Diaphragm Sellae Attachments**

- **Anterior:** tuberculum sellae of the sphenoid bone
- **Lateral:** posterior clinoid processes of the sphenoid bone
- **Posterior:** dorsum sellae of the sphenoid bone

Note: The horizontal leaves of the Diaphragm Sellae are deficient centrally to allow for the infundibulum of the pituitary to pass.

VERTICAL MENINGEAL (DURAL) SYSTEM

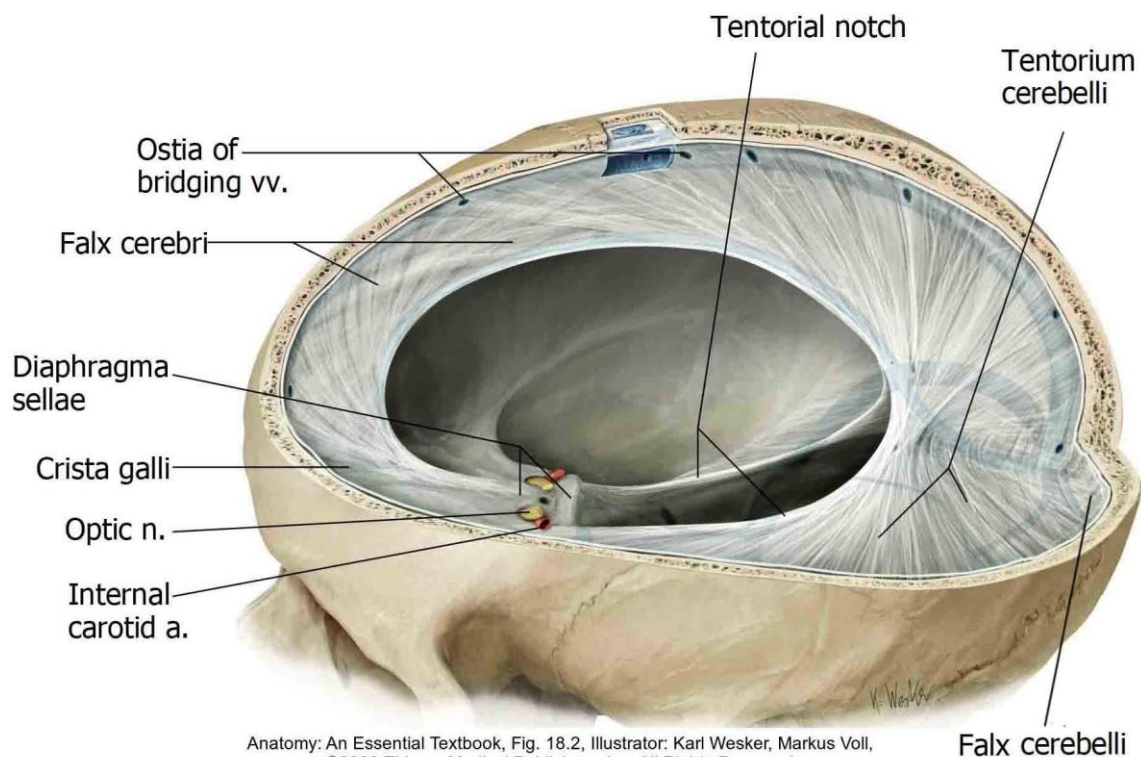
Vertical Meningeal (Dural) System is composed of the Falx Cerebri, Falx Cerebelli, and Spinal Dural Tube. Together, they act to tighten the cranial vault. Attachments include the following:

- **Falx Cerebri Attachments**

- **Anterior:** internal vertical midline of the frontal bone, crista galli of the ethmoid bone, ethmoid notch of the frontal bone
- **Posterior:** internal occipital protuberance, vertical line of occiput
- **Superior:** midline of the undersurface of the sagittal suture; frontal, parietal, and occipital bones
- **Inferior:** Tentorium Cerebelli

- **Falx Cerebelli Attachments**

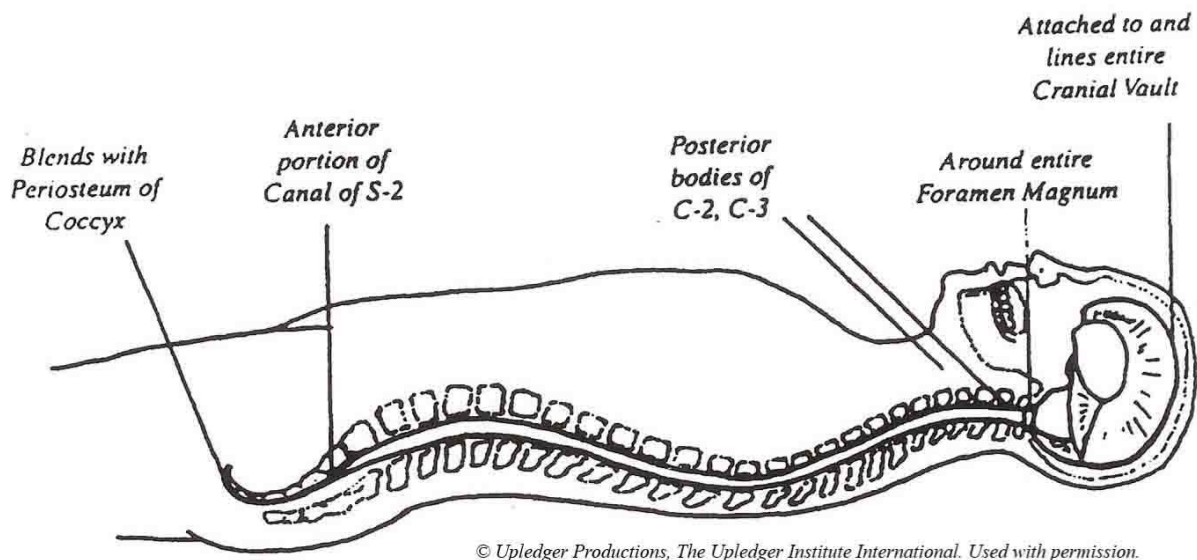
- **Superior:** inferior leaves of the Tentorium Cerebelli, straight sinus
- **Posterior:** Internal midline ridge of the occiput
- **Inferior:** dense fibrous ring around the foramen magnum



Anatomy: An Essential Textbook, Fig. 18.2, Illustrator: Karl Wesker, Markus Voll,
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- **Spinal Dural Tube Attachments:**

- **Superior:** fibrous ring around the foramen magnum, posterior C2/C3 vertebral bodies
- **Inferior:** anterior portion of the canal at S2, periosteum of the coccyx (blends)



Clinical Considerations:

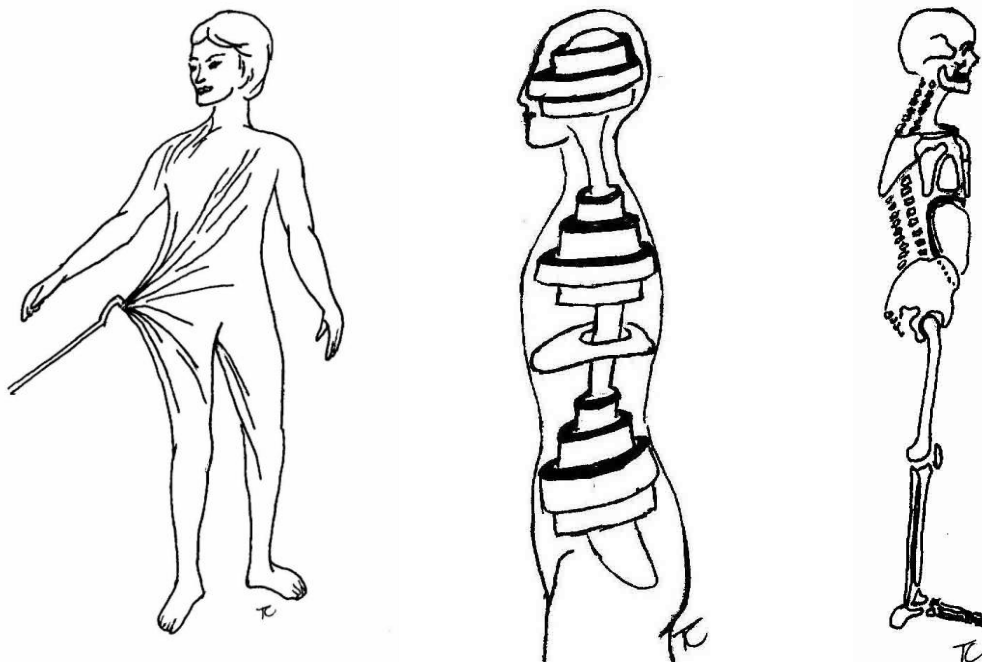
Because of the interconnectedness between the meningeal fascial systems, **Fascial Tension** in one system can create impairments throughout the dorsal cavity. Alternatively, these connections can be used therapeutically to affect change across the systems.

Note: Manual Therapy can effectively treat these extraneous lines of fascial tension and restore balance throughout the meningeal fasciae.

FASCIAL SYSTEM

According to the Fascial Research Society (2015), the **Fascial System**:

- Consists of the three-dimensional continuum of soft, collagen-containing, loose and dense fibrous connective tissues that permeate the body.
- Incorporates elements such as adipose tissue, adventitiae and neurovascular sheaths, aponeuroses, deep and superficial fasciae, epineurium, joint capsules, ligaments, membranes, meninges, myofascial expansions, periosteal, retinacula, septa, tendons, visceral fasciae, and all the intramuscular and intermuscular connective tissues including endo-/peri-/epimysium.
- Surrounds, interweaves between, and interpenetrates all organs, muscles, bones, and nerve fibers, endowing the body with a functional structure and providing an environment that enables all body systems to operate in an integrated manner.



TRANSVERSE DIAPHRAGMS

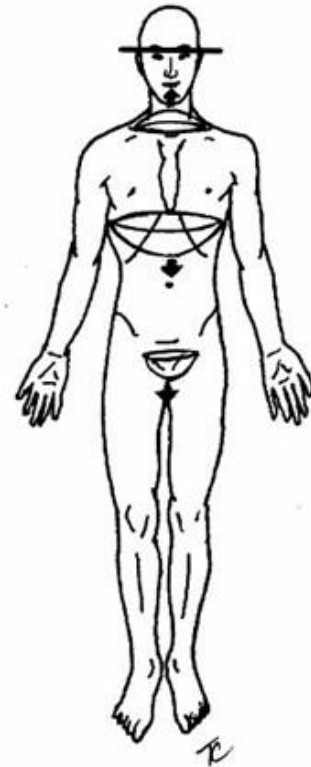
Transverse Diaphragms are layers of CT or fascial sheets that run horizontally and compartmentalize different body cavities into separate functional spaces.

FUNCTION OF TRANSVERSE DIAPHRAGMS

- Separate the body into cavities
- Moderate intracavity pressures
- Provide visceral support

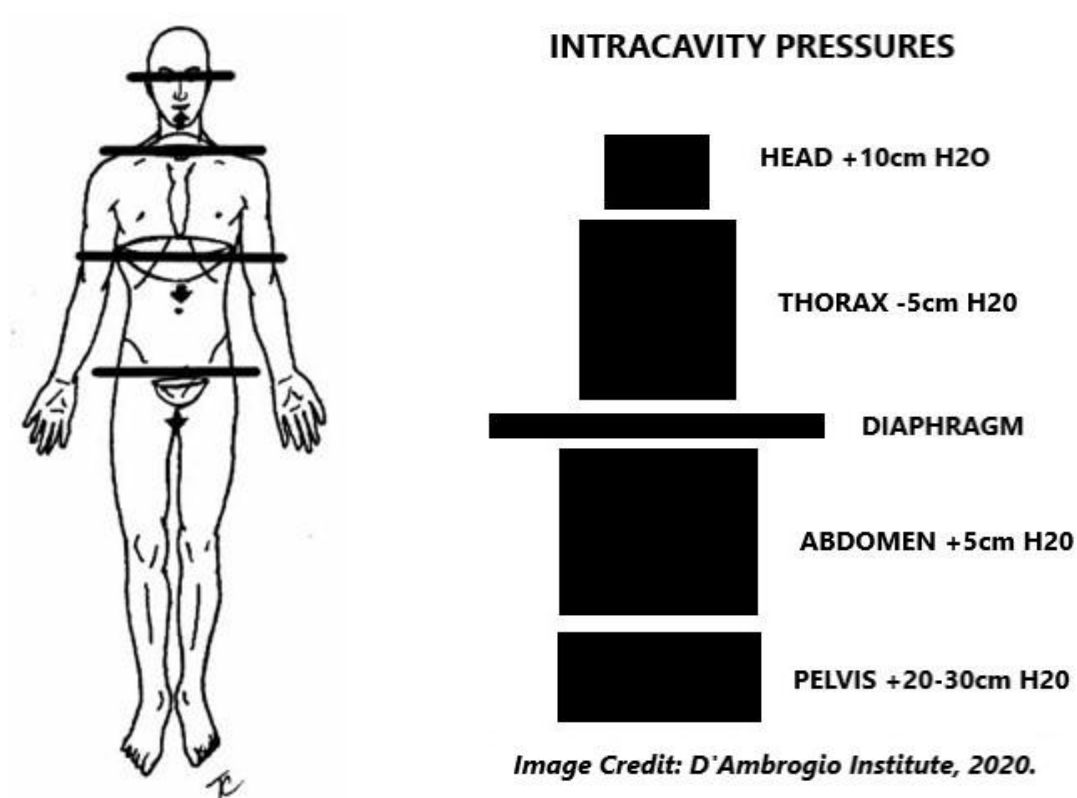
FOUR MAJOR TRANSVERSE DIAPHRAGMS

- Tentorium Cerebelli
- Thoracic Inlet
- Respiratory Diaphragm
- Pelvic Floor



TRANSVERSE DIAPHRAGM IMBALANCES

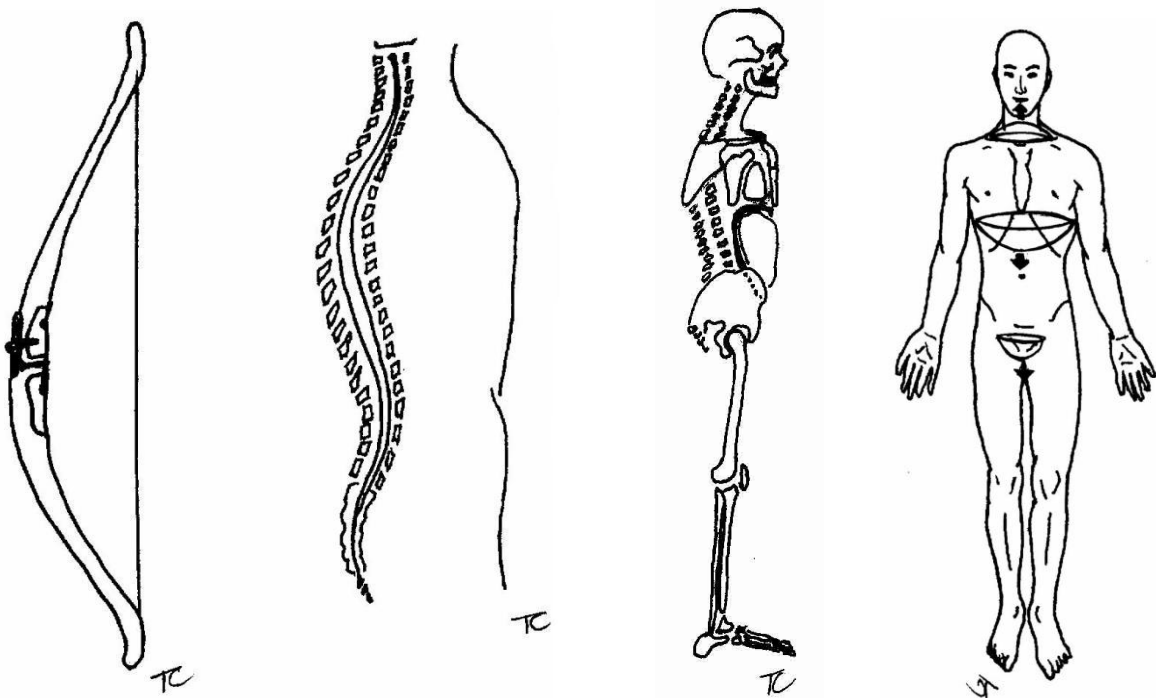
Transverse Diaphragm Imbalances can cause barriers and changes to intracavity pressure gradients that impede the vertical flow of vital substances (blood, lymph, nerve impulses, and energy) through the body.



BOWSTRING THEORY

“You cannot just treat “Backs,” you must also treat “Fronts.” Our bodies are three dimensional.” –Rollin E. Becker, DO

- Think of the spine like a bow.
- The anterior fascia (superficial, deep, and visceral) of the body represents the string of the bow (Bowstring).
- If the string is tight, the spine cannot straighten.
- The Bowstring connects the transverse diaphragms and the visceral fascia as it runs from the base of the skull down the front of the body.
- The Bowstring relates to the anterior, longitudinal, and interconnected fascia that helps maintain the anterior-posterior balance of the body.



PART II: **LYMPHATIC ANATOMY**

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VASCULAR AND LYMPHATIC CIRCULATION

The **Circulatory System** plays a crucial role in bringing needed substances to cells AND removing accumulated waste products from cellular metabolism.

- The **Heart** pumps oxygenated blood from the left ventricle into the aorta, then arteries and arterioles, and then into the capillaries.

HEART → AORTA → ARTERIES → ARTERIOLES → CAPILLARIES

- In the **Capillary Bed**, there is an exchange of nutrients and respiratory gases between the blood and the tissue fluid around the cells (interstitial fluid).

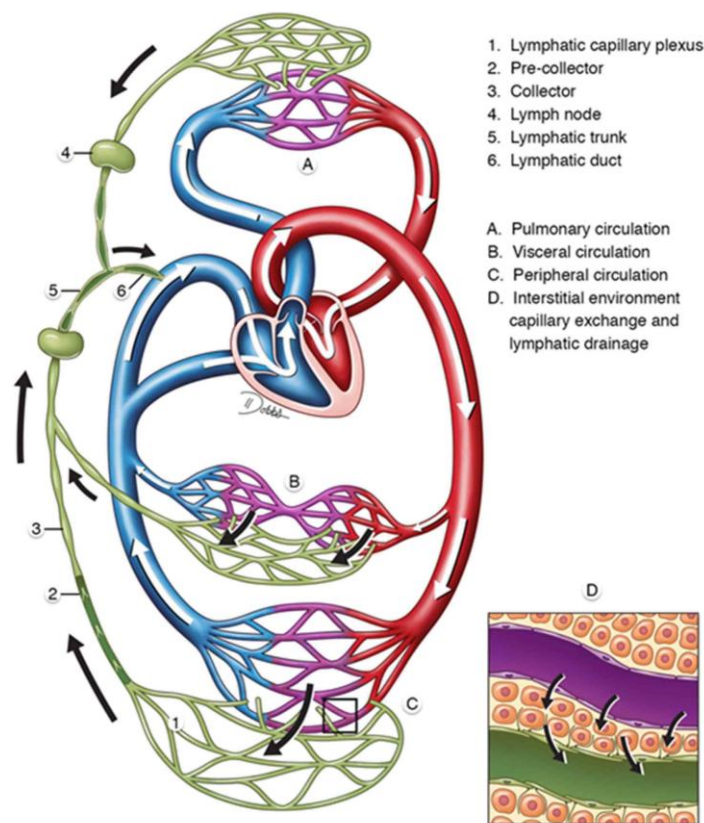
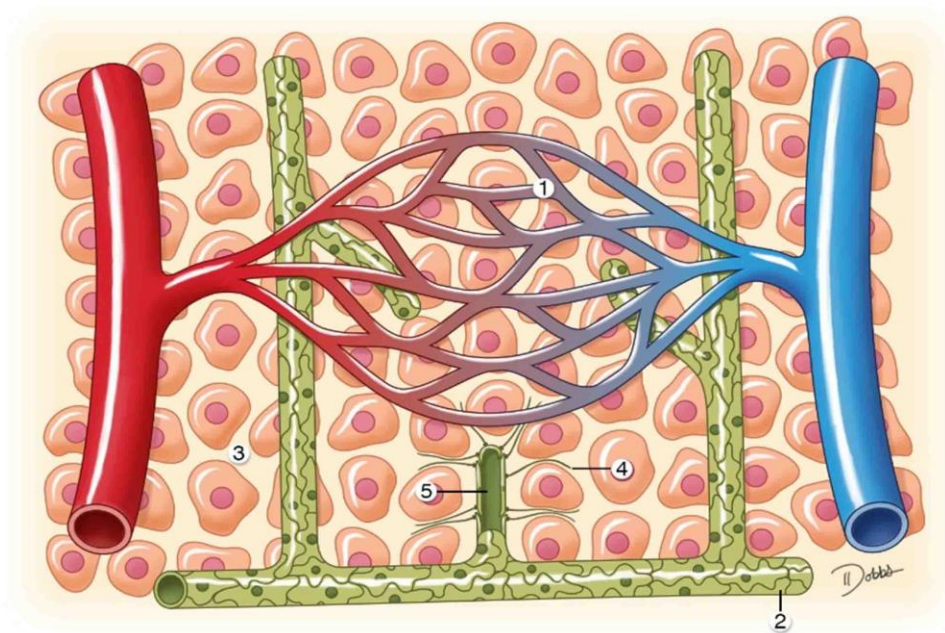


Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm, Upledger Productions, 2016.

- At the **arteriole** end of the capillary bed, the **vessel blood pressure** is higher than the interstitial colloid osmotic pressure causing fluid to move from the capillaries into the interstitial spaces.
- At the **venous end** of the capillary bed, the **interstitial colloid osmotic pressure** is higher than the blood pressure causing fluid to move back into the capillaries from the interstitial spaces.
- Approximately **thirty (30) liters of fluid** filters out of the capillaries into the interstitial spaces each day. About 27 of the 30 liters drain back into the blood capillaries (interstitial fluid). The remaining 3 liters drain into the lymphatic capillaries and eventually back into circulation.



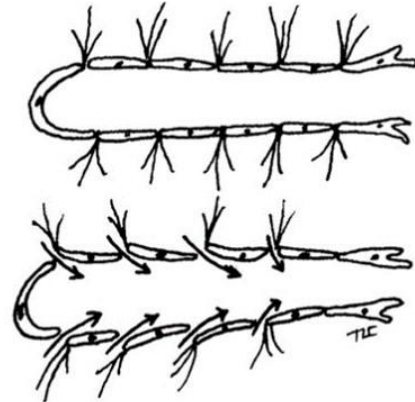
- | | |
|-----------------------------|----------------------------------|
| 1. Capillary bed | 4. Anchoring filament |
| 2. Lymph capillary | 5. Lumen of capillary projection |
| 3. Interstitial environment | |

*Note single layer endothelial cells and the inlet valves

Image Credit: Doubblestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm, Upledger Productions, 2016.

The **Lymphatic System** is a secondary pathway from the tissues back to the heart. It runs parallel to the vascular systems (venous and arterial) and is critical in returning interstitial fluid (lymph) to the circulatory system. It primarily functions in removing accumulated waste products from cellular metabolism.

- Before passing into the lymphatic capillaries, the interstitial fluid cleans the extracellular spaces of particulate matter, exudates, and bacteria.
- Lymph is composed of this interstitial fluid and these extracellular waste products making lymph the fluid that originates in the connective tissue spaces of the body.
- Lymph vessels collect and filter the lymph through the lymph nodes. From there, lymph is directed through the larger lymphatic vessels, ducts, and trunks moving towards the subclavian veins, superior vena cava, and finally, the heart. It is here that lymph re-enters blood circulation.
- Returning lymph to the blood helps maintain normal blood volume and pressure. It also helps rid the body of waste products and helps prevent the excess accumulation of fluid around tissues (edema).



Clinical Indications:

The **Lymphatic System** is known as the second circulatory system in the body. If this system were to stop functioning, the patient would be dead within 24 hours due to massive edema and the retention of toxic metabolic waste.

LYMPHATIC PATHWAYS

The **Lymphatic Pathways** are present in nearly all tissues of the body. The following is the common outflow drainage pathways lymph takes from the interstitium towards the heart:

- Pre-Lymphatic Pathways
- Lymphatic Capillaries
- Lymphatic Pre-Collectors
- Lymphatic Collectors
- Lymph Nodes
- Lymphatic Trunks (9)
- Lymphatic Ducts (2)
- Subclavian Veins
- Heart

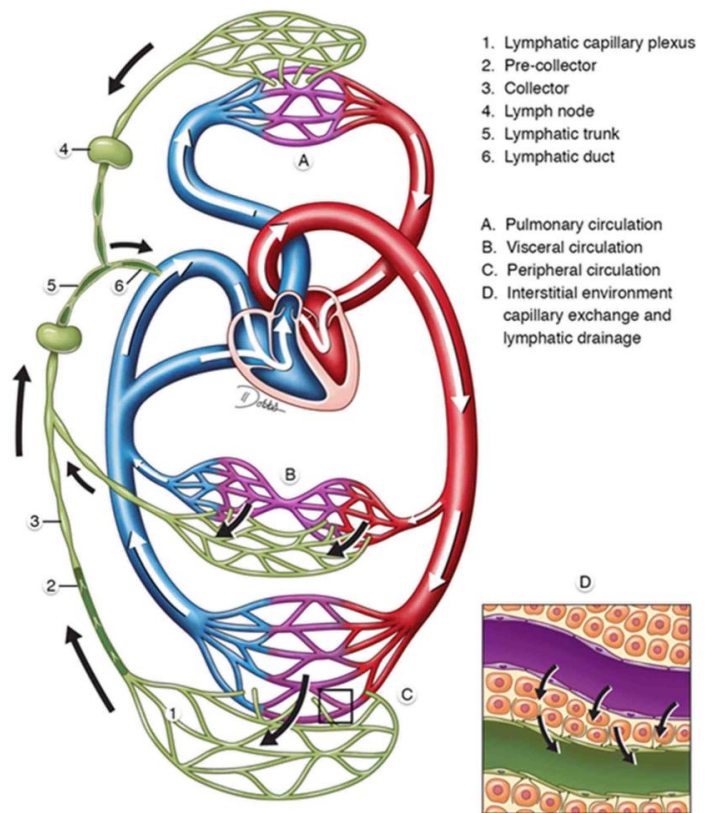


Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm, Upledger Productions, 2016.

Note: Lymphatics are absent in avascular tissues (epithelium and cartilage), teeth dentin, corneal tissues, scleral tissue, eye lens, inner ear labyrinth, bone marrow, placenta, and brain parenchyma. See **CLB** for brain lymphatic drainage pathways.

THE PRE-LYMPHATIC PATHWAYS

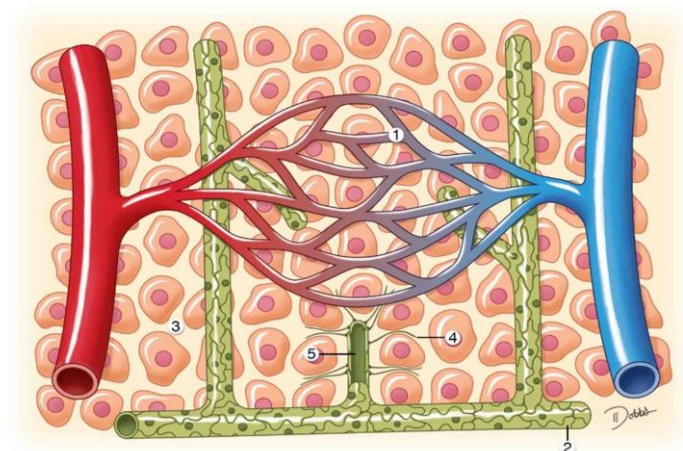
The **Pre-Lymphatic Pathways** direct interstitial fluid towards the lymphatic capillaries via osmotic pressure changes in the interstitium.

- **Extracellular Compartment:** Blood pressure forces plasma out of the blood capillaries into the extracellular compartment (30L). Here, oxygen and nutrients migrate to the cells.
- **Intracellular Compartment:** Cellular waste, carbon dioxide, and excess fluid move into the extracellular space from the intracellular compartment.

Due to **osmotic pressure**, excess fluid and accumulated microscopic waste products migrate towards the lymphatic capillaries (3L) and venules (27L). Along the way, the interstitial fluid performs the following:

- Bathes the tissues
- Cleans the extracellular spaces of particulate matter, exudates, and bacteria

This excess fluid, cellular waste, and larger molecules (proteins) migrate along high to low-pressure gradients through unorganized pathways, sometimes called tissue canals, towards the lymphatic capillaries.



1. Capillary bed
2. Lymph capillary
3. Interstitial environment
4. Anchoring filament
5. Lumen of capillary projection

*Note single layer endothelial cells and the inlet valves

Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm, Upledger Productions, 2016.

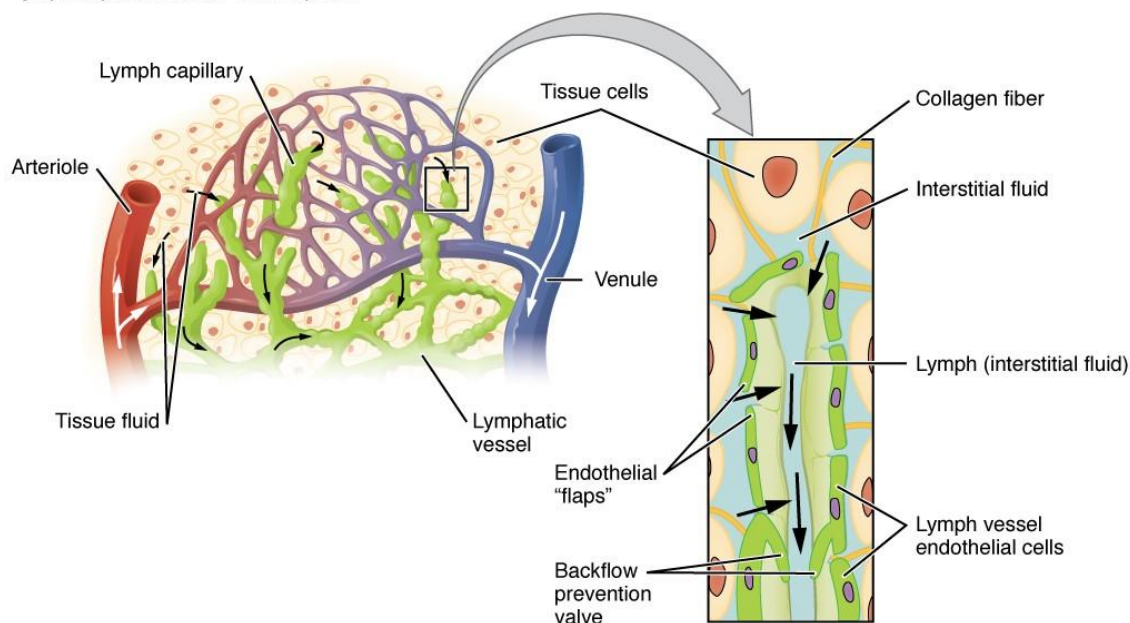
LYMPHATIC CAPILLARIES

Lymphatic Capillaries (initial lymphatic vessels) are composed of a single layer of flattened endothelial cells that have the following structural characteristics:

- Single Endothelial Cell Wall
- Cellular Gap Junctions (inlet valves)
- Non-valvular (lack valves)
- Non-contractile (lack smooth muscle cells)
- Unidirectional flow (inward)
- Large lumen (4 to 6 times bigger than blood capillaries)

Note: This structure allows the lymphatic capillaries to collect toxins and proteins from the interstitium that are too large for the venules.

Lymph capillaries in the tissue spaces

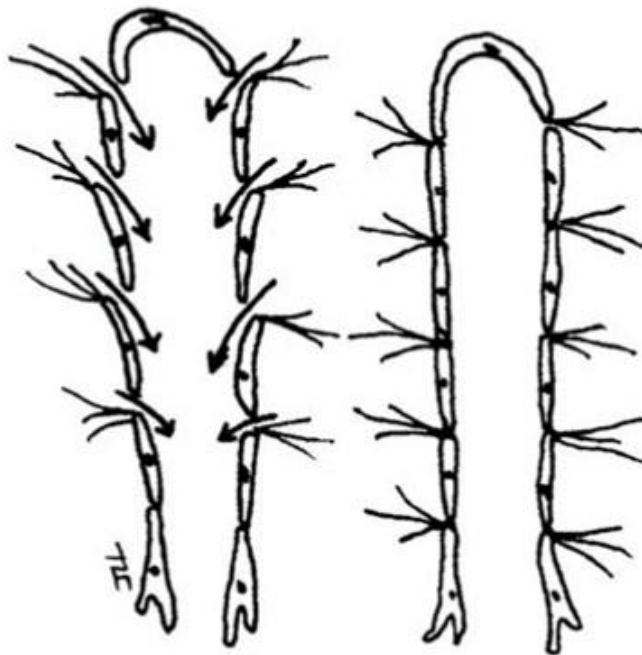


OpenStax College - Anatomy & Physiology, Connexions Web site. <http://cnx.org/content/col11496/1.6/>, Jun 19, 2013.

CAPILLARY FLUID INFLOW

Interstitial fluid and cellular waste products flow into the lymphatic capillaries in one of the **two** following ways:

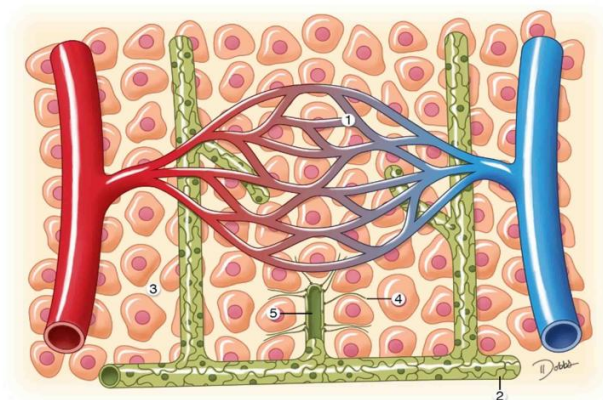
- **Pressure Gradients:** As fluid pressure increases, the gaps (inlet valves) between the endothelial cells widen, allowing pre-lymphatic fluid inflow. Once the capillaries fill, the pressure inside the lumen causes the flattened endothelial cells in the capillary wall to close.
- **Mechanical Stretch:** Below the epidermis, 2-3 layers of superficial lymphatic capillaries (plexus) cover the entire body. The basement membrane of these capillaries connects to the epidermis and fascia via anchoring filaments. When the skin is stretched, these anchoring filaments pull on the basement membrane, opening the gaps (inlet valves) between the endothelial cells and allowing fluid to enter.



FORMATION OF LYMPH

Before filling, lymphatic capillaries are empty and collapsed. The capillary anchoring filaments and the interstitial fiber network are relaxed. (Low Capillary Pressure)

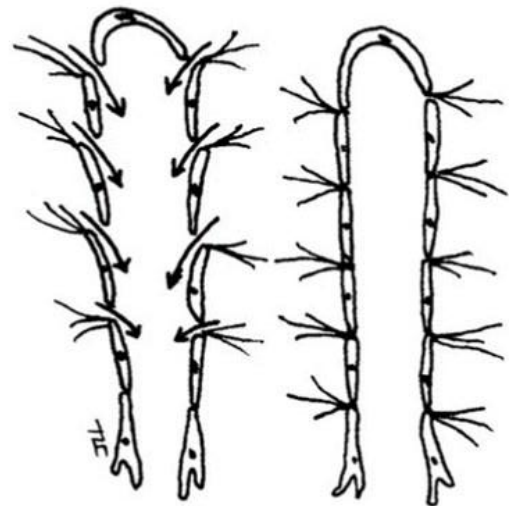
- **Filling Phase:** As the interstitium fills with fluid, the interstitial pressure starts to exceed the pressure in the lymphatic capillary. The interstitial fiber network and the capillary anchoring filaments tighten, opening the outer swinging flaps of the lymphatic capillary and allowing an inflow of fluid. As the fluid flows inside the lymphatic capillary, the inner flaps open inward, causing the inlet valves to open.
- **Emptying Phase:** As the lymphatic capillary fills with lymph, the capillary pressure starts to exceed the interstitial pressure. This closes the inlet valves from the interstitium and opens the valve to the pre-collector causing lymph to flow proximally.



1. Capillary bed
2. Lymph capillary
3. Interstitial environment
4. Anchoring filament
5. Lumen of capillary projection

*Note single layer endothelial cells and the inlet valves

Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm, Upledger Productions, 2016.



COMPOSITION OF LYMPH

Once inside the capillaries, **Lymph** is composed of the following substances:

- **Water** (96%)
- **Colloid Materials:** ions, minerals, insoluble particles
- **Proteins** (10 to 60 grams per liter): An essential function of the lymphatic system is to help recirculate proteins that have leaked from the blood circulation.
- **Lipids:** Chyle, a milky fluid consisting of free fatty acids and lipoproteins, is absorbed from lacteals during digestion in the intestinal tract.
- **White Blood Cells:** Lymphocytes (85%); Macrophages (13-15%); Granulocytes (mastocytes)
- **Red Blood Cells** (few)
- **Platelets** (inflammation)
- **Metabolic Waste:** dead, migratory (cancer), and foreign waste cells
- **Other Substances:**
 - Hormones, peptides, and various other substances
 - Toxic agents, debris, waste, colorants, dust, food preservatives, etc.

LYMPHATIC PRE-COLLECTORS

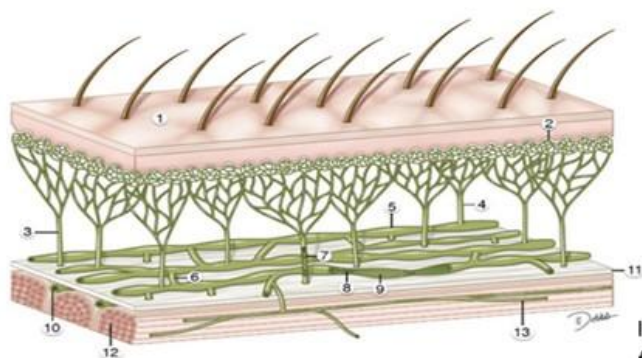
Lymphatic Pre-Collectors act as an intermediate vessel to collect and transfer lymph from the **Lymphatic Capillaries** to the **Collectors** (larger vessels). They are structurally similar to the lymphatic capillaries and have the following characteristics:

- Multilayer Endothelial Cell Wall (1-3 layers)
- Valvular (2-3mm intervals)
- Contractile (intermittent/sporadic smooth muscle cells)
- Unidirectional flow (proximally)
- Larger lumen

Pre-Collectors run perpendicular to the Collectors and contain semilunar valves at regular intervals (2-3mm) that prevent the backflow of lymph into the lymphatic capillary.

Lymph flows sequentially from each valvular section via peristalsis caused by a vacuum effect from the lymphangions in the subsequent collectors, not from the pre-collector itself.

Perforating Pre-collectors pass through the fascial layer and connect superficial lymphatic capillaries to deeper lymph collectors. They are typically dormant but are useful during edematous pathologies in re-routing fluid. They most frequently help lymph pass from the deeper lymphatics towards the superficial and transport superficial to deep.



Perforating Precollectors

- | | |
|-----------------------------|--------------------------|
| 1. Epidermis | 8. Bicuspid valve |
| 2. Lymph capillary plexus | 9. Lymphangion |
| 3. Perforating precollector | 10. Subfascial collector |
| 4. Precollector | 11. Fascia |
| 5. Collector | 12. Muscle fibers |
| 6. Anastomosis | 13. Lymphatics of muscle |
| 7. Bicuspid valve | |

Image Credit: Doublestein D. *Manual Lymphatic Techniques for The Orthopedic Manual Therapist*. West Palm, Upledger Productions; 2016.

LYMPHATIC COLLECTORS

Lymphatic Collector Vessels are larger than the pre-collector vessels and are differentiated based on their location, either **superficial** or **deep**. They are composed of the following **three** layers:

- **Tunica Externa** (outer layer) is composed of collagen and elastic fibers.
- **Tunica Media** (middle layer) is composed of smooth muscle (spiral and longitudinal) and elastic fibers to help squeeze the lymph through the vessels.
- **Tunica Intima** (inner layer) is composed of endothelial cells and a basal membrane. This layer also contains **semilunar valves** located at regular intervals (2-3mm) to prevent the backflow of lymph.

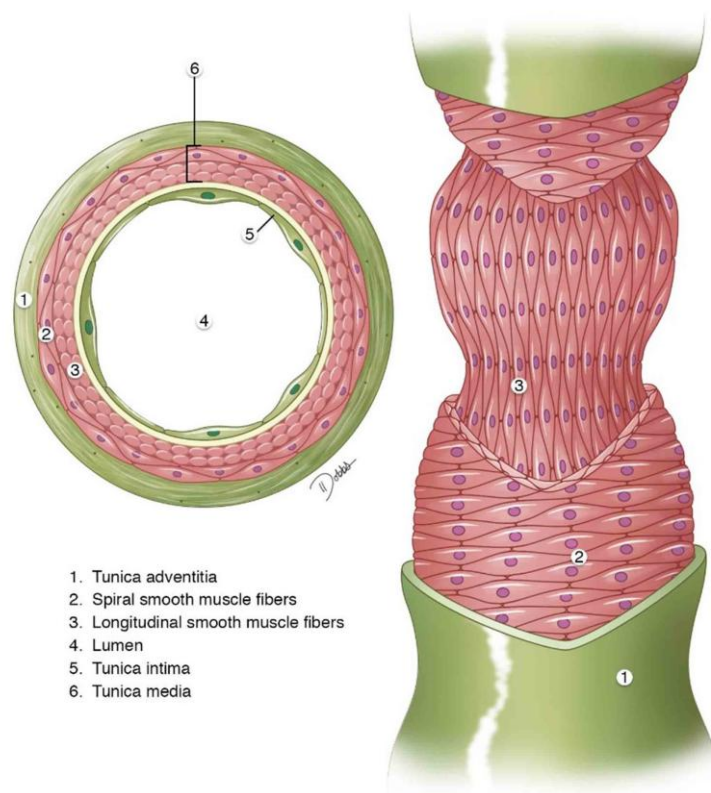
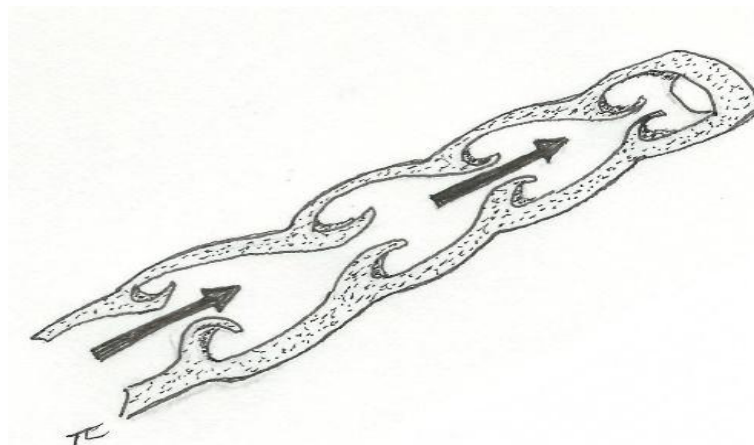
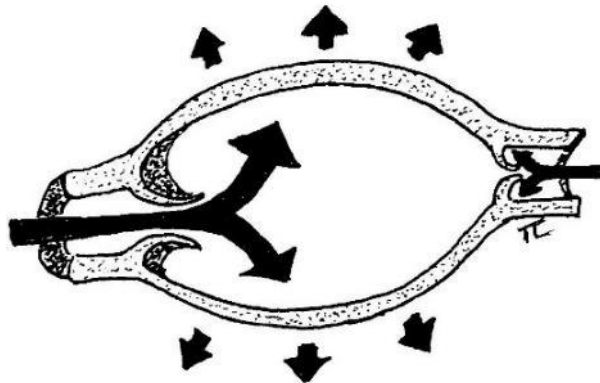


Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm, Upledger Productions, 2016.

LYMPHANGIONS

Lymphangion are the **functional units** of the lymphatic vessel that lie between two semilunar valves. In contrast to blood circulation, where the heart acts as a pump, lymph is transported by the intrinsic contractions of the lymphangion (little hearts).

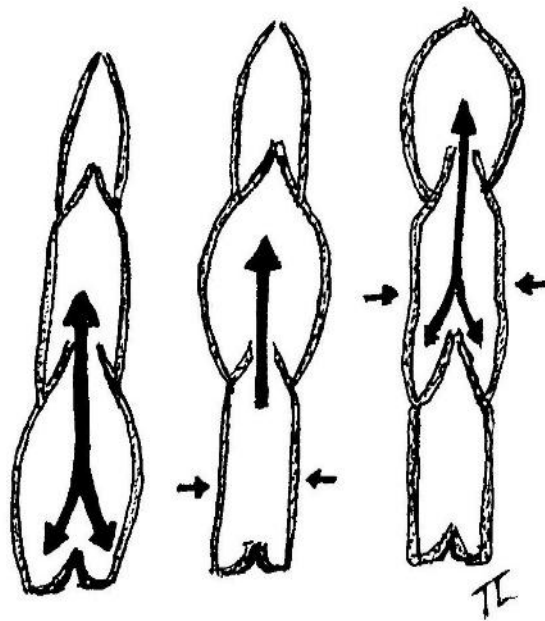
- As a lymphangion fills with fluid, it contracts, closing the flap valves through which the fluid entered and opening the flap leading to the next lymphangion.
- As the next lymphangion fills with fluid, it contracts. This wavelike contraction of the lymphangion is the critical factor in the circulation of lymph.



Lymphangion Contraction Frequency

The **frequency** at which lymphangion's contract is not correlated with breathing or heart rate but is instead determined by autonomous regulation of the sympathetic nervous system through stretch receptors in the smooth muscle and the lymph volume.

- When lymph volume stretches the vessel wall, its smooth muscle responds with a contraction. The frequency of contractions amounts to 6-10 x/min at rest but may increase to 10 times during exercise.
- Increased lymph fluid due to physical activity, heat inflammation, or infection results in boosted lymph time volume due to heightened pulsation frequency and higher filling amplitude of the lymphangion.



SUPERFICIAL LYMPHATIC COLLECTORS

There are **two** types of **Superficial Lymphatic Collectors**:

- **Superficial Collectors** are located **above the superficial fascia** in the subcutaneous fat tissue and drain into the **superficial lymph nodes**. They follow the course of the superficial vessels (veins/arteries) and drain about 70% of the lymph of the body. Specifically, they drain the skin and subcutis.
- **Deep Collectors** are located **below the superficial fascia** and drain into the **deep lymph nodes**. They are usually larger than the superficial collectors and run within the fascial sheath that houses the deep arteries and veins. Specifically, they drain related muscles, bones, joints, and ligaments.

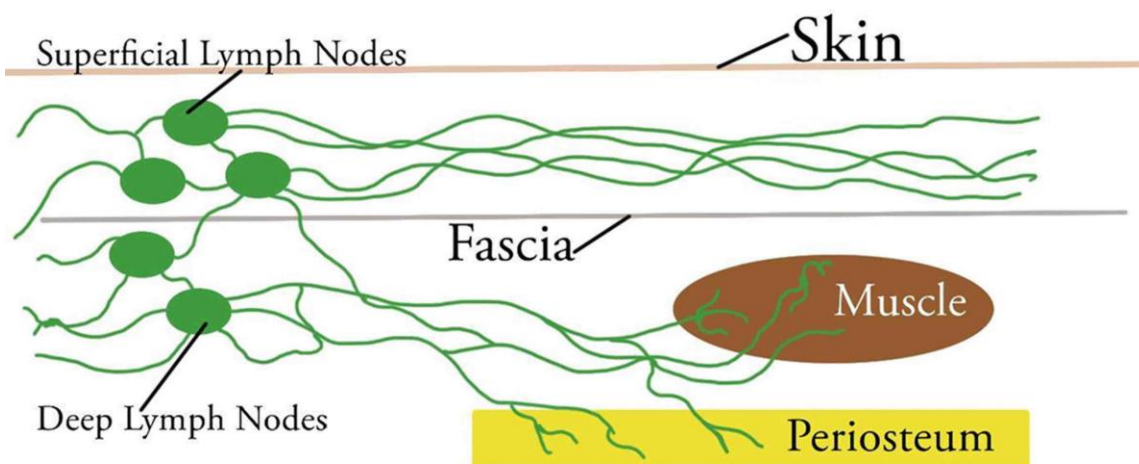


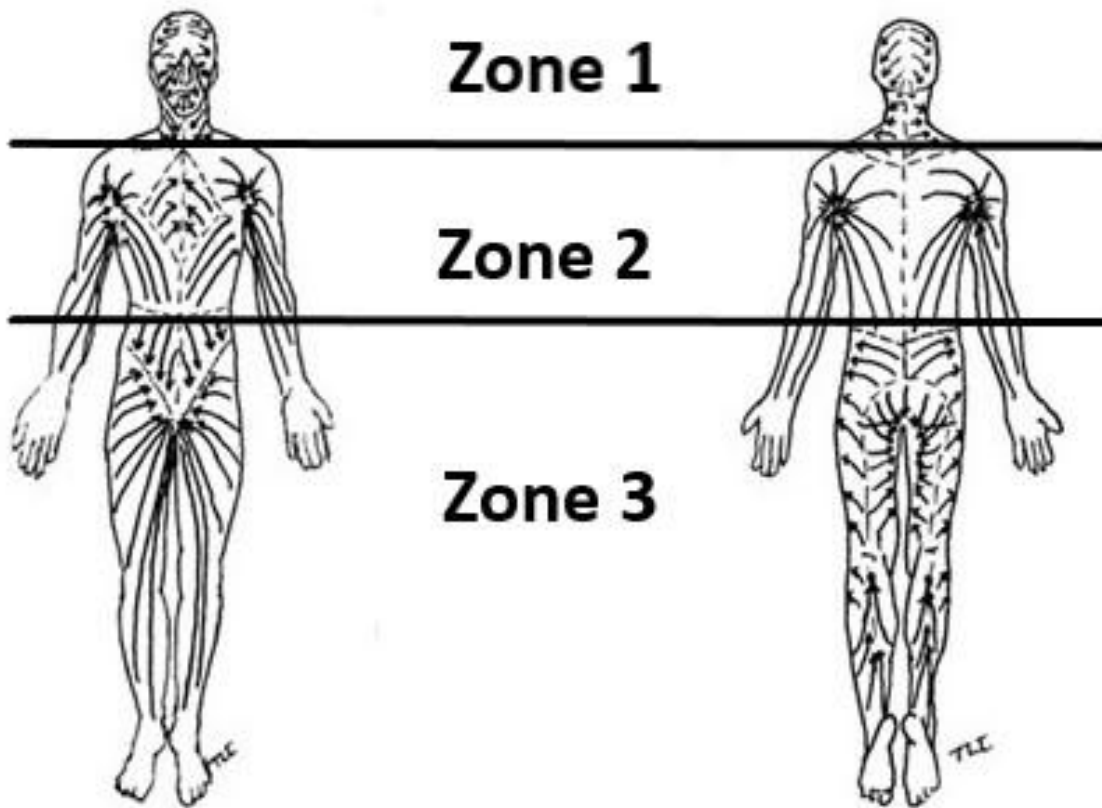
Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm, Upledger Productions, 2016.

Suction Effect

In the **Lymphatic Collectors**, a palpable “suction pressure” creates a drop in pressure downstream (distally). This combined suction and pressure drop draws fluid into the initial lymphatics and propels lymph upstream (proximally).

SUPERFICIAL DRAINAGE ZONES

- **Zone 1: Cranium/Cervical**
Collectors (superficial and deep) in this area drain to the cervical and supraclavicular nodes.
- **Zone 2: Axillary**
Collectors (superficial and deep) in this area drain to the axillary nodes.
- **Zone 3: Inguinal**
Collectors (superficial and deep) in this area drain to the inguinal nodes.



LYMPH NODES

Lymph Nodes are specialized collections of lymphatic tissue located along the lymphatic vessels. They are kidney or bean-shaped and range in size from a few millimeters to about 1–2 cm long. There are 400 to 1000 nodes in the body, with over half located in the abdomen alone.

COMPOSITION OF LYMPH NODES

Lymph Nodes are comprised of dense, irregular connective tissue and contain the following structural components:

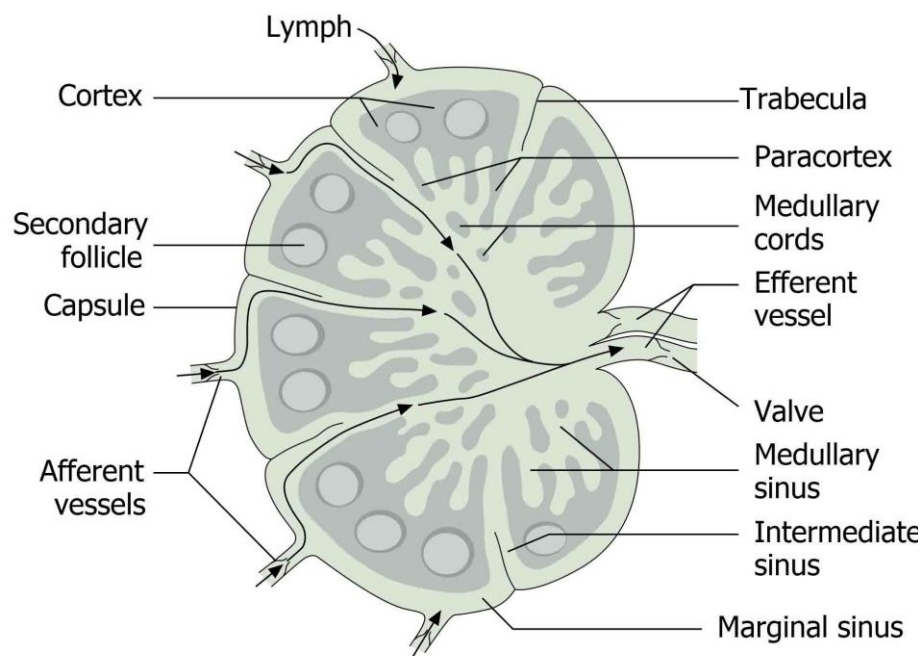
- Fibrous outer capsule (lymph node capsule)
- Sporadic plain smooth muscle fibers
- Interlacing Trabeculae (membranous processes) Meshwork
- Proper Gland Substance (Lymphoid Tissue)



STRUCTURE OF LYMPH NODES

Lymph Nodes are structurally divided into the **outer cortex** and the **inner medulla**.

- **Lymph Node Cortex** is the peripheral portion underneath the capsule and the subcapsular sinus. The subcapsular sinus drains lymph into the trabecular sinuses then drains into the medullary sinuses.
- **Lymph Node Medulla** contains large blood vessels, sinuses, and medullary cords that house antibody-secreting plasma cells. The medullary cords are composed of lymphatic tissue and include plasma cells, macrophages, and B cells.



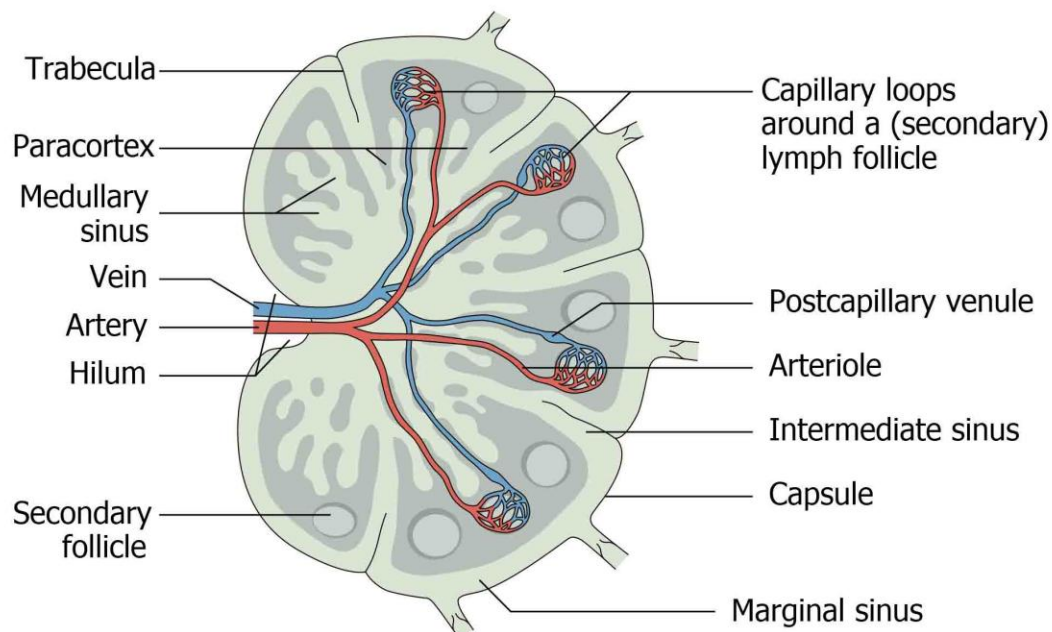
Schuenke, Atlas of Anatomy Vol. 1, 2nd Ed., Fig. 7.69 Ea, Illustrator: Karl Wesker,
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NODULAR FLOW

Lymphatic Collector Vessels enter the lymph node in multiple locations and exit at a depression in the side of the lymph node called the **hilum** (same location as the feeding artery and vein). There are **two** types of collector vessels:

- **Afferent Vessels** carry lymph from the interstitium towards the nodes.
- **Efferent Vessels** carry lymph away from the nodes towards ducts.

A single lymph node has several afferent vessels (2-12) but only one or two efferent vessels exiting each node. This design effectively slows the lymph circulation at the nodes, allowing macrophages to entrap and phagocytize harmful substances.

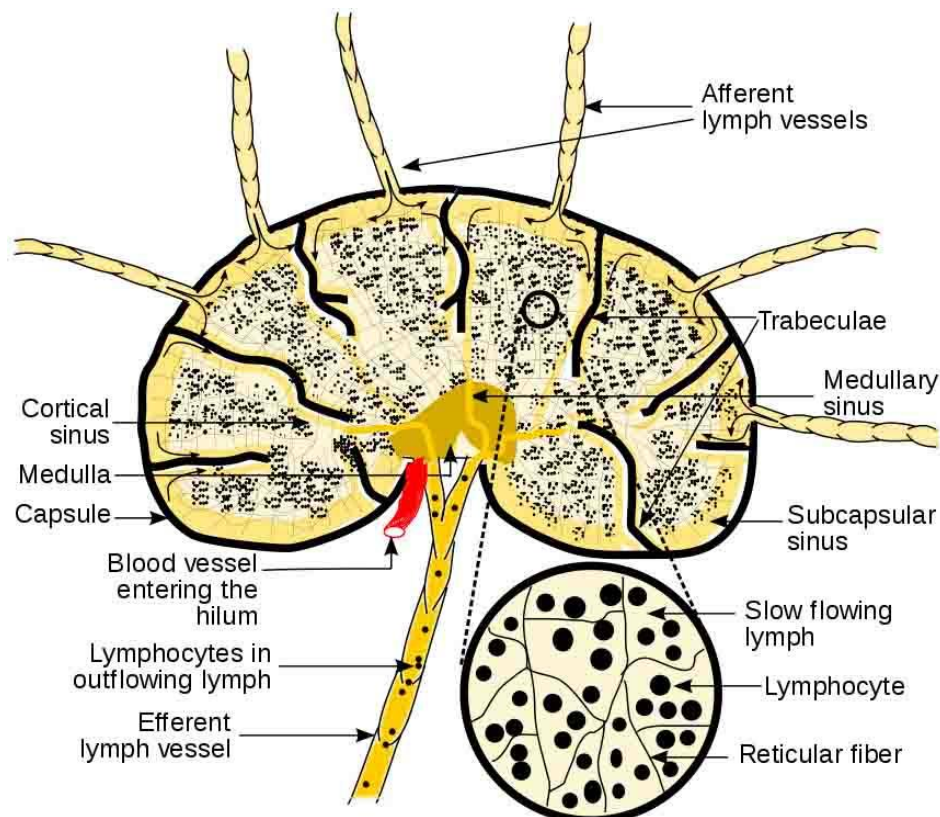


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LYMPH NODE FUNCTION

Lymph Nodes contain sinuses filled with immunological cells (lymphocytes and macrophages) that identify and eliminate invading viruses, bacteria, cell debris, cancer cells, and other foreign substances. Specifically, lymph nodes perform the following functions:

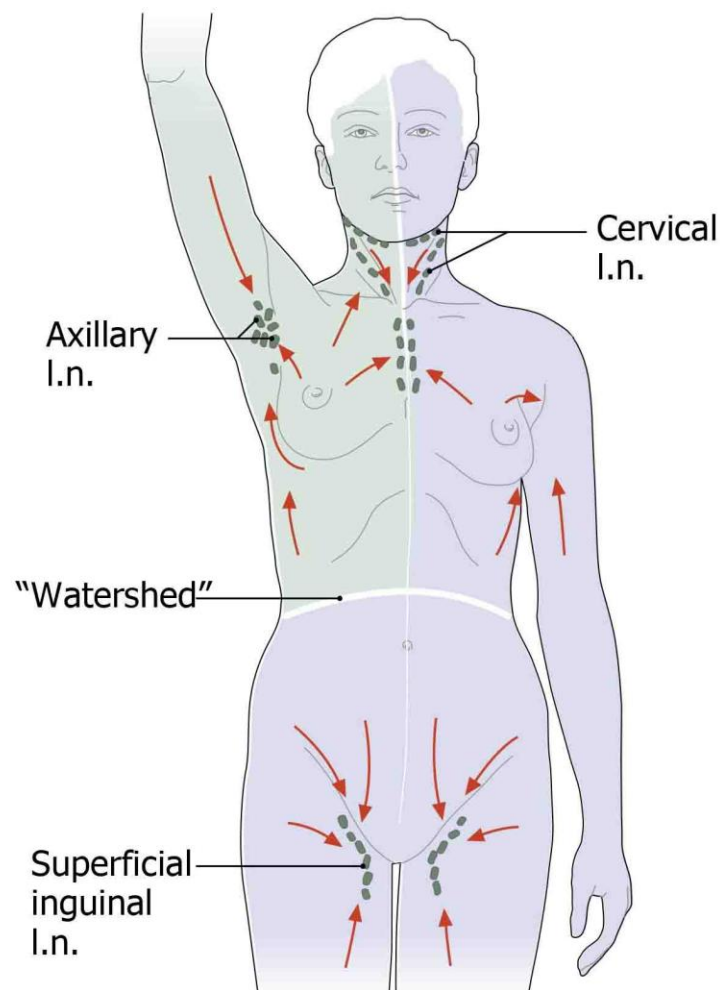
- Filter and purify lymph fluid
- Entrap and destroy toxins of the body
- House numerous lymphocytes (B & T) and macrophages that remove bacteria, cellular debris, and cancer cells from lymph fluid
- Regulate the concentration of protein in the lymph (allows for the reabsorption of excess water (40%) into blood capillaries as lymph flows through the node)
- Produce and store lymphocytes (lymphocyte production rises with increased lymphatic flow)



MAIN NODULAR GROUPS

There are **three** main groups of lymph nodes:

- **Cervical Nodes** (neck/head)
- **Axillary Nodes** (upper quadrant)
- **Inguinal Nodes** (lower quadrant)



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Note: Other nodular groups are located in the abdominal, mediastinal, sub-occipital, sub-mandibular, cervical, breast, elbow, and knee areas.

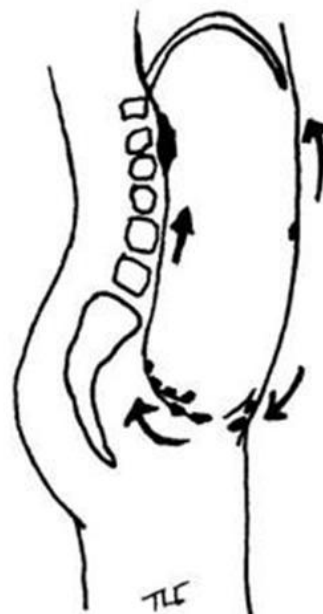
LYMPHATIC TRUNKS

Lymphatic Trunks are larger *regional* vessels located in various body regions that form from merged efferent lymphatic collector vessels. Once filtered by the lymph nodes, lymph travels through the efferent vessels and collects in the lymphatic trunk specific to that region.

LYMPHATIC TRUNK REGIONS

There are nine (9) Lymphatic Trunks that collect fluid from the viscera, the extremities, and the related body trunk quadrants. They include the following:

- **Lower Quadrant:** Three (3) lymphatic trunks (1-paired, 1-unpaired)
- **Upper Quadrant:** Six (6) lymphatic trunks (3-paired)



LYMPHATIC TRUNKS: LOWER QUADRANT

Right and Left Lumbar Trunks

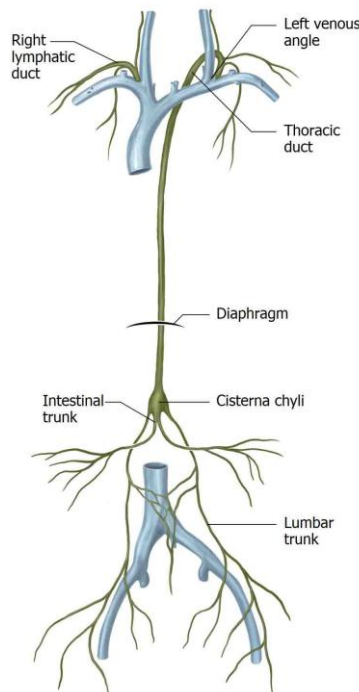
These paired trunks receive lymph from the lower extremities, adjacent trunk quadrants (lower superficial abdomen, lumbar spine, pelvis, and sacrum), external genitalia, pelvic viscera, kidney, adrenals, and ureters.

- RIGHT LOWER QUADRANT → INGUINAL NODES → RIGHT LUMBAR TRUNK → CISTERNA CHYLI → THORACIC DUCT
- LEFT LOWER QUADRANT → INGUINAL NODES → LEFT LUMBAR TRUNK → CISTERNA CHYLI → THORACIC DUCT

Intestinal Trunk

This unpaired trunk receives lymph from the abdominal viscera (lower esophagus, stomach, lower part of the liver, gallbladder, pancreas, spleen, mesentery, mesocolon, omentum, small and large intestines).

- INTESTINAL TRUNK → CISTERNA CHYLI → THORACIC DUCT



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LYMPHATIC TRUNKS: UPPER QUADRANT

Right and Left Jugular Trunks

These paired trunks receive lymph from the head, face, and neck.

- RIGHT CERVICAL NODES → RIGHT JUGULAR TRUNK → RIGHT LYMPHATIC DUCT
- LEFT CERVICAL NODES → LEFT JUGULAR TRUNK → THORACIC DUCT

Right and Left Subclavian Trunks

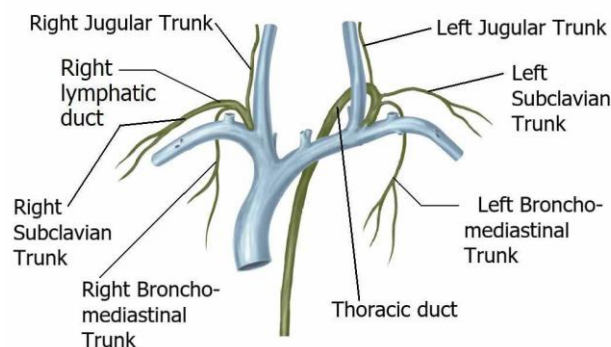
These paired trunks receive lymph from the upper extremities, adjacent trunk quadrants (chest, upper superficial abdomen, and thoracic spine), and pleura of the lungs.

- RIGHT AXILLARY NODES → RIGHT SUBCLAVIAN TRUNK → RIGHT LYMPHATIC DUCT
- LEFT AXILLARY NODES → LEFT SUBCLAVIAN TRUNK → THORACIC DUCT

Right and Left Broncho-mediastinal Trunks

These paired trunks receive lymph from the esophagus, thymus, trachea, bronchi, lungs, and mediastinum.

- RIGHT BRONCHO-MEDIASTINAL TRUNK → RIGHT LYMPHATIC DUCT
- LEFT BRONCHO-MEDIASTINAL TRUNK → THORACIC DUCT

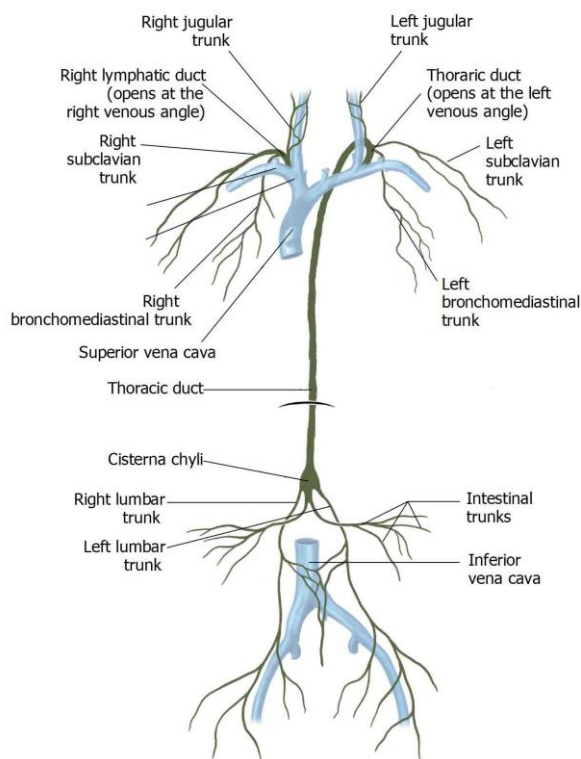


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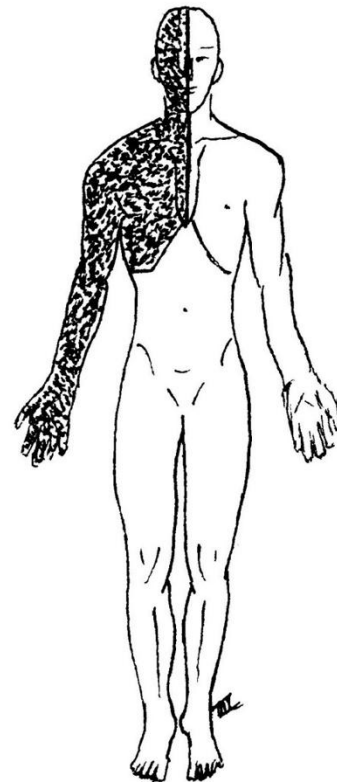
LYMPHATIC DUCTS

Lymphatic Ducts receive drainage from the nine lymphatic trunks. There are **two** lymphatic ducts:

- **Right Lymphatic Duct:** Receives one-quarter ($1/4$) of the total body lymph from the right side of the face, neck, thorax, and right upper extremity.
- **Thoracic Duct:** Receives three-quarters ($3/4$) of the total body lymph from all areas of the body below the diaphragm via the **Cisterna Chyli**, as well as the left side of the face, neck, thorax, and left upper extremity.



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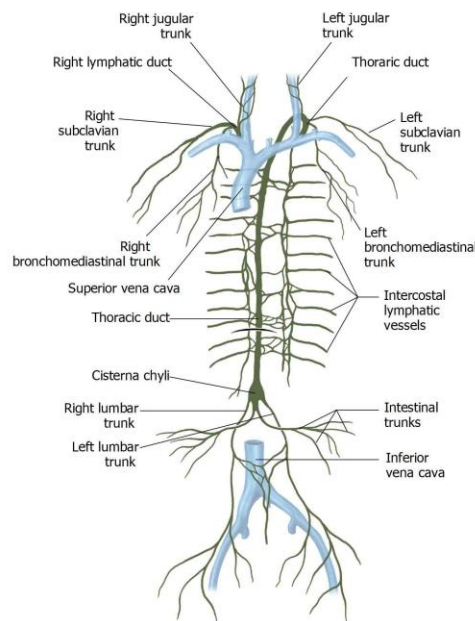
LYMPHATIC DUCT DRAINAGE

The **Right Lymphatic Duct** receives lymph from the following:

- Right Jugular Trunk (right side of head/face/neck)
- Right Subclavian Trunk (right upper extremity, chest, thoracic spine, upper abdominal wall, and lung pleura)
- Right Broncho-mediastinal Trunk (thoracic organs)

The **Thoracic Duct** receives lymph from the following:

- Left Jugular Trunk (left side of head/face/neck)
- Left Subclavian Trunk (left upper extremity, chest, thoracic spine, upper abdomen, and lung pleura)
- Left Broncho-mediastinal Trunk (thoracic organs)
- Posterior Chest Wall
- Right and Left Lumbar Trunk (lower extremities, lumbar spine, pelvis, sacrum, external genitalia, kidneys, adrenals, ureters, pelvic organs, and lower abdominal wall)
- Intestinal Trunk (digestive organs)
- Upper Part of the Liver



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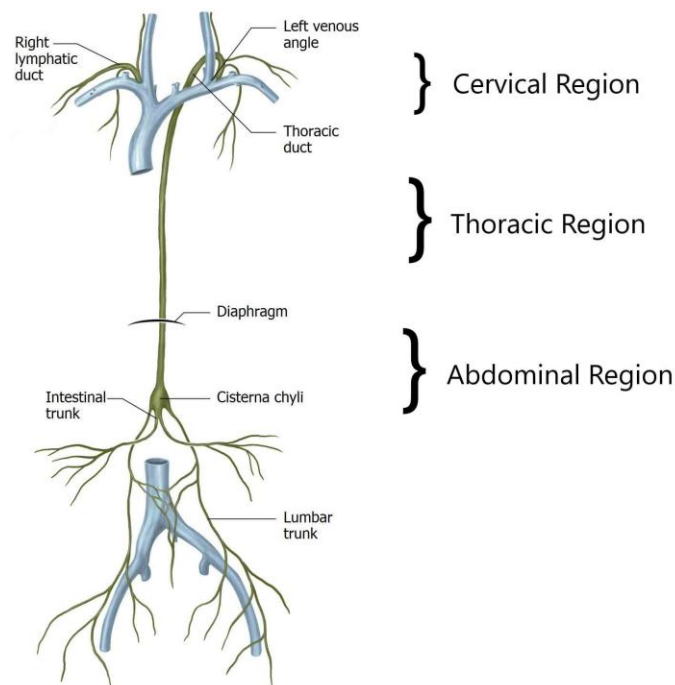
THORACIC DUCT

The **Thoracic Duct** is the largest lymphatic vessel in the human body. It is approx. 2 – 5 mm in diameter and 40 cm long. It is located deep in the trunk and runs parallel to the spine from L2 to the venous angle (juncture between the left internal jugular and left subclavian veins).

THORACIC DUCT DIVISIONS

Because it penetrates the diaphragm and runs through the chest into the root of the neck, the Thoracic Duct can be subdivided into the following regions:

- Abdominal Region
- Thoracic Region
- Cervical Region

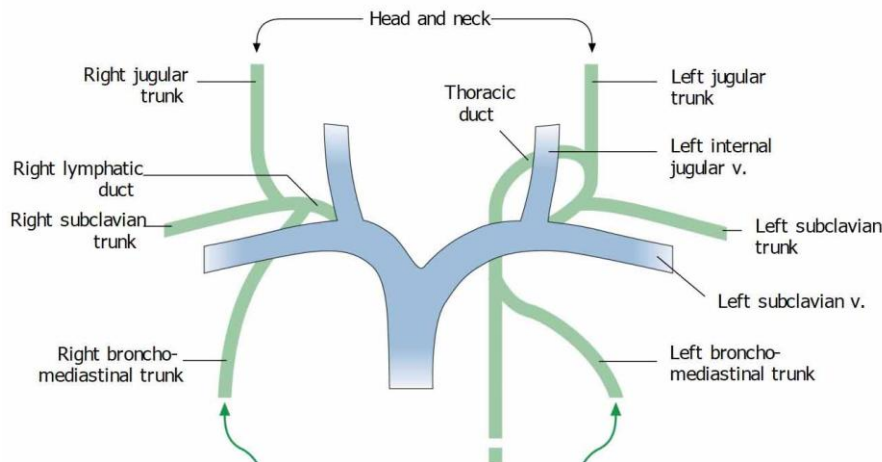


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Note: The abdominal portion of the thoracic duct is a sack-like enlargement called the **Cisterna Chyli**. It is located posterior to the abdominal aorta on the anterior aspect of the L1/2 vertebral body.

SUBCLAVIAN VEINS

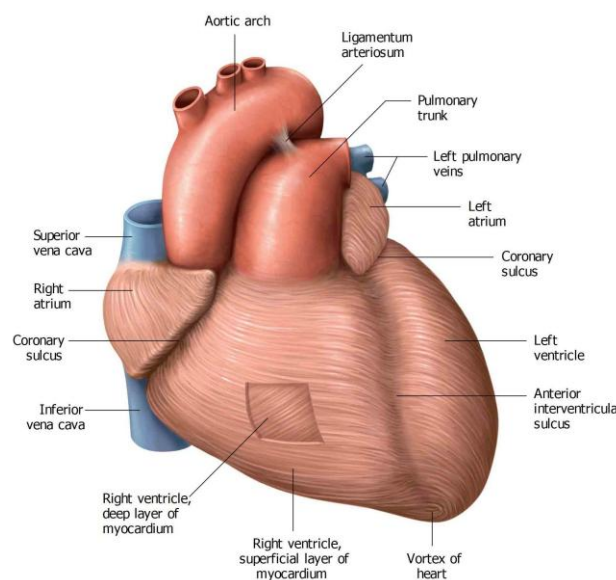
Subclavian Veins (right and left) collect lymph from the right lymphatic and thoracic ducts, respectively. Here the lymph mixes with blood and drains into the superior vena cava of the heart.



Gilroy, Atlas of Anatomy, 2nd ed., Fig. 7.8, Illustrator: Markus Voll,
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HEART

The right **Heart Atrium** collects the combined blood and lymph from the superior vena cava. Here, the lymph re-enters the circulation.



Schuenke, Atlas of Anatomy Vol. 2, 2nd Ed., Fig. 12.94 Aa, Illustrator: Wesker/Voll,
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PART III: AUTONOMIC NERVOUS SYSTEM

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NERVOUS SYSTEM

The human **Nervous System** is a complex network of nerves and specialized cells that act as the communication network of the body. It has three divisions: **Central (CNS)**, **Peripheral (PNS)**, and **Enteric (ENS)**.

CENTRAL NERVOUS SYSTEM (CNS)

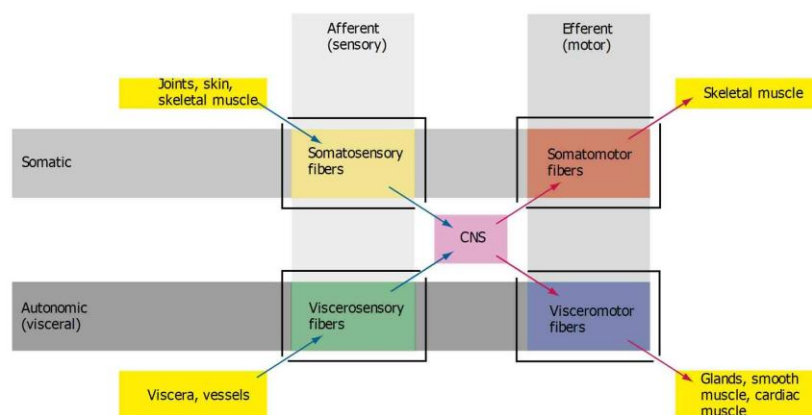
- Brain and Spinal Cord
- Controls central function
- Receives, processes, and responds to sensory information from the periphery

PERIPHERAL NERVOUS SYSTEM (PNS)

- Network of nerves: cranial, spinal, and peripheral
- Controls peripheral function
- Transmits information to/from the CNS (Afferent/Efferent Divisions)
- Efferent (motor) Subdivisions
 - **Somatic Nervous System:** voluntary motor responses
 - **Autonomic Nervous Systems:** involuntary motor responses

ENTERIC NERVOUS SYSTEM (ENS)

- Digestive Neuronal Plexuses: Myenteric and Submucosal
- Controls digestive (GI) motility and secretion



Anatomy for Dental Medicine, Fig. 4.2 , Illustrator: Karl Wesker,
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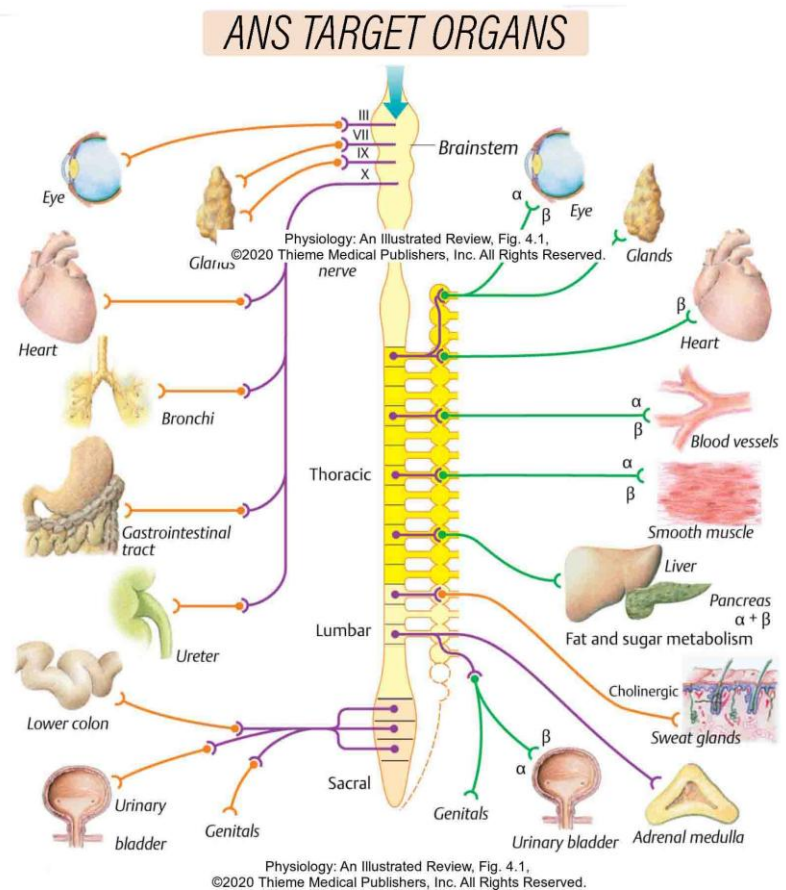
AUTONOMIC NERVOUS SYSTEM

The **Autonomic Nervous System (ANS)** consists of autonomic motor neurons (cranial, thoracolumbar, and sacral) that regulate involuntary physiologic processes and play a critical role in maintaining homeostasis.

AUTONOMIC MOTOR NEURONS

Autonomic Motor Neurons relay impulses from the central nervous system to the involuntary organs and smooth muscles of the body. **Target Organs** include the following:

- **Smooth Muscle**
 - Vessels: arteries, veins, lymphatics
 - Urinary Tract
 - Respiratory Tract
 - Reproductive Tract
 - Eye: ciliary muscles
 - Skin: papillary muscles
 - Hollow Organs
 - Tubular Structures
 - Sphincters
- **Cardiac Muscle**
- **Glandular Cells/Ducts**
- **Lymph Organs**



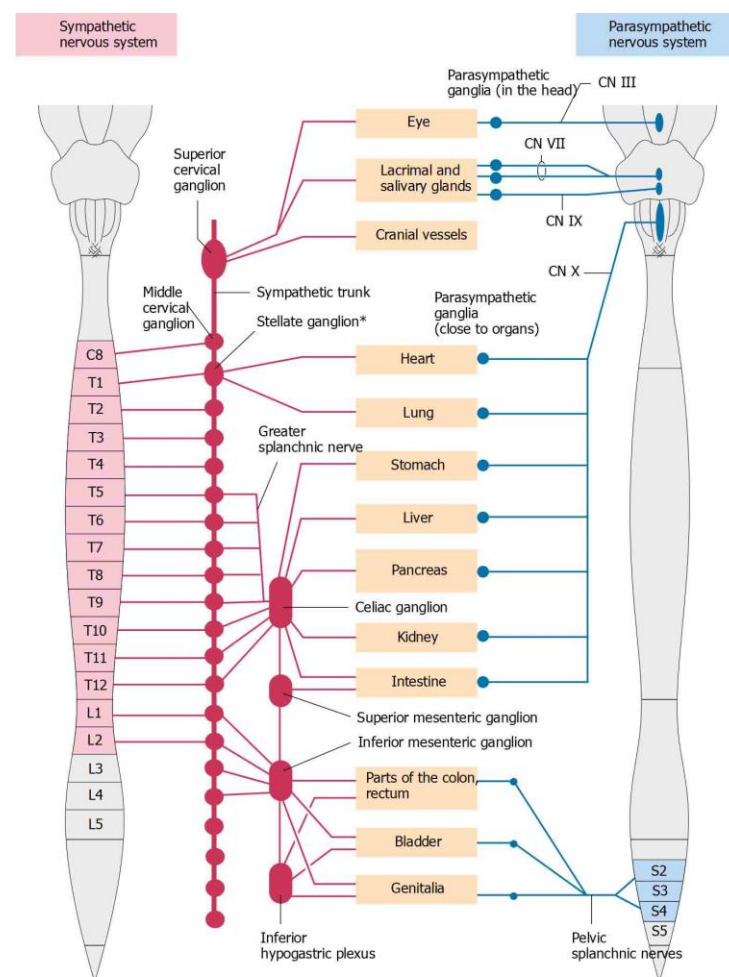
Clinical Considerations:

Autonomic Motor Neurons provide a degree of continual input (tonically active) to their target organs, giving the ANS greater control to activate or inhibit physiologic processes, including heart rate, blood pressure, respiration, digestion, and sexual arousal.

DIVISIONS OF THE ANS

The **ANS** contains **two** anatomically and functionally distinct divisions that work antagonistically but in a well-integrated manner. It is the **balance** of the actions of both divisions that maintains a stable internal environment.

- **Sympathetic Nervous System (SNS):** The SNS is an energy-expending (catabolic) system that enables the body to use energy to respond to stressful situations and emergencies appropriately.
- **Parasympathetic Nervous System (PNS):** The PNS is an energy-conserving (anabolic) system that enables the body to conserve/store energy to regulate bodily functions.



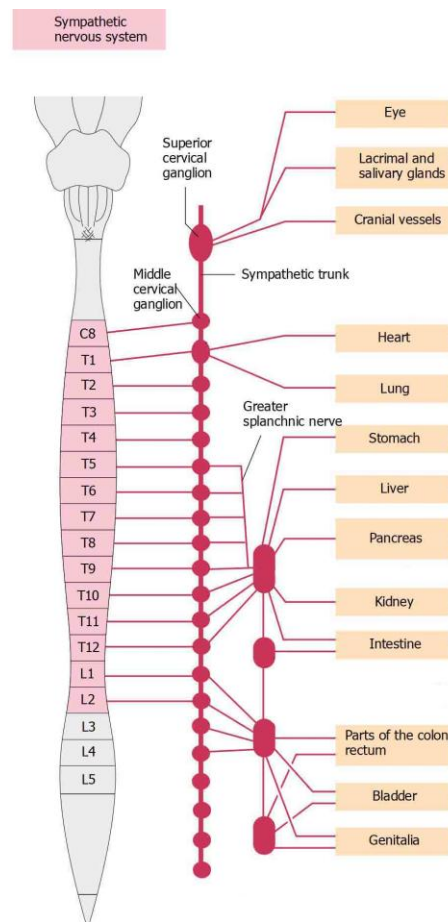
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SYMPATHETIC NERVOUS SYSTEM

The **Sympathetic Nervous System (SNS)** neurons originate in the thoracic and lumbar spinal cord regions (T1-L2), and their fibers create the lateral sympathetic trunk. These preganglionic fibers either synapse here or at terminal ganglia closer to the target organ (effector tissue).

THORACOLUMBAR AUTONOMIC NEURONS (T1 – L2)

- **T1 – T5 (Upper)**
 - Head/Neck
 - Upper Limb
 - Thoracic Viscera
- **T5 – T11 (Middle)**
 - Body Wall
 - Abdominal Viscera
- **T11 – L2 (Lower)**
 - Lower Limb
 - External Genitalia
 - Pelvic Viscera



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Note: The **Adrenal Medulla** receives asynaptic innervation from the SNS, allowing for the release of epinephrine (adrenaline) directly into the bloodstream and resulting in a widespread sympathetic response.

SYMPATHETIC RESPONSE

The **SNS** primarily functions during emergency reactions and exercise. The overall effect is to prepare the body for strenuous physical activity.

Physiological structures and outcomes associated with the **Sympathetic Response** are listed below:

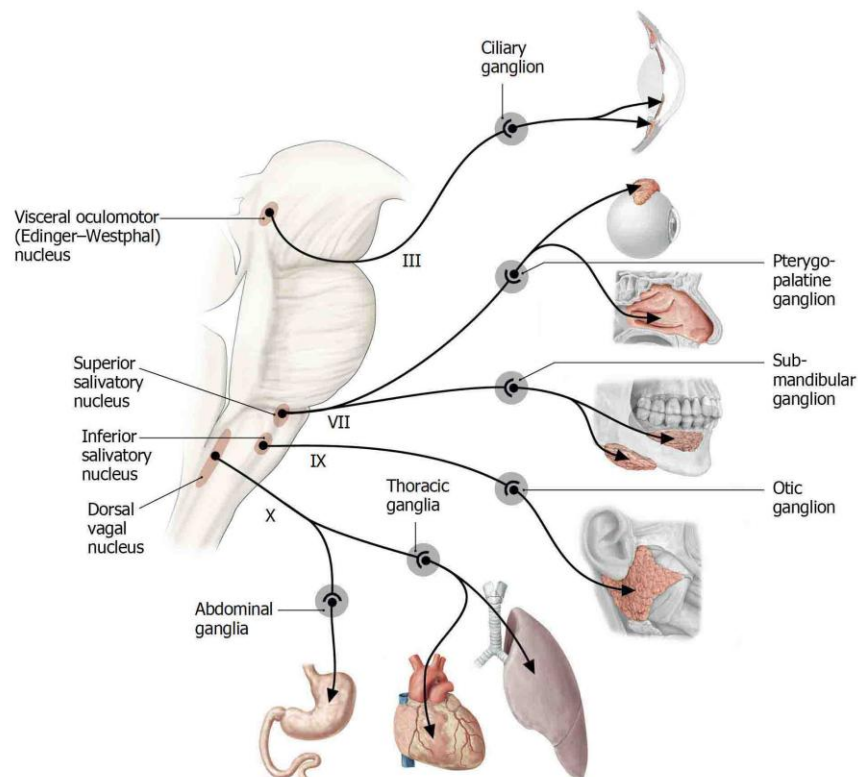
- Preganglionic neurons in the lateral horn of spinal cord T1 to L2
- Central control by the hypothalamus
- Catabolic system
- Fight or Flight
- Expend energy resources
- Depresses immune functions
- Releases epinephrine and norepinephrine hormones
- Dilates pupils
- Causes piloerection (hairs stand on end)
- Causes sweating
- Decreases secretions (thickens)
- Increases heart rate and strength of contraction
- Causes bronchodilation and reduces secretions
- Redirects blood from digestive organs to muscles
- Contracts internal anal sphincter causing fecal continence
- Increases breakdown of glucose
- Contracts bladder sphincter
- Causes ejaculation, remission of erection
- Releases adrenaline into the bloodstream

PARASYMPATHETIC NERVOUS SYSTEM

The **Parasympathetic Nervous System (PNS)** neurons originate in the brainstem and sacral region (S2-S4) of the spinal cord and synapse at terminal ganglia close to the target organ (effector tissue).

CRANIAL AUTONOMIC NEURONS (Cranial Nerves)

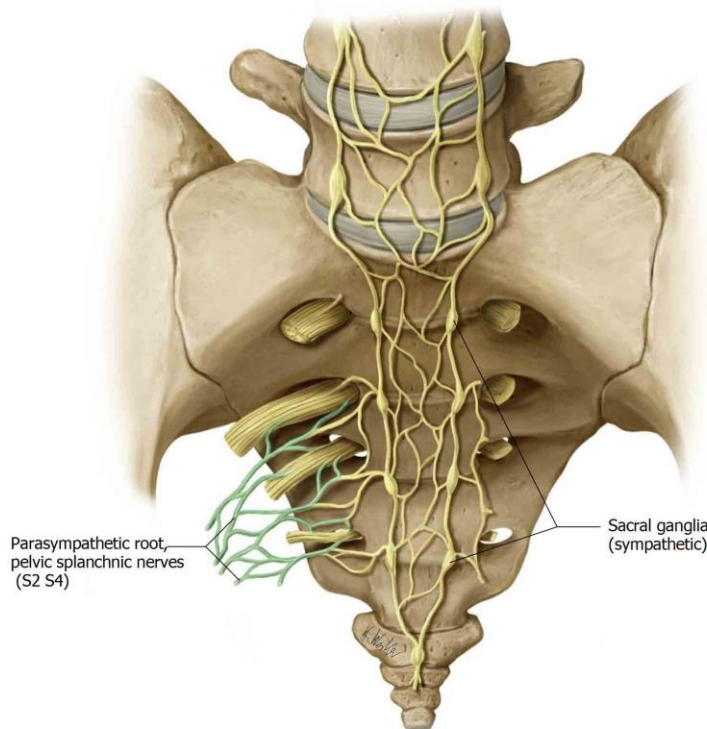
- **CN III: Oculomotor Nerve**
 - Ciliary Muscles (eye)
 - Sphincter Pupillae (Iris)
- **CN VII: Facial Nerve**
 - Lacrimal Glands
 - Submaxillary Glands
 - Submandibular Glands
 - Sublingual Glands
- **CN IX: Glossopharyngeal Nerve**
 - Parotid Salivary Glands
- **CN X: Vagus Nerve**
 - Pharyngeal Muscles
 - Laryngeal Muscles
 - Thoracic Viscera
 - Abdominal Viscera



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SACRAL AUTONOMIC NEURONS (S2 – S4) **

- **S2 – S4 (Lateral Horn)**
 - External genitalia
 - Descending Colon
 - Pelvic Viscera



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Note: A 2016 study by Espinosa-Medina questioned the classical scheme of the autonomic nervous system by suggesting that the sacral autonomic neurons were, in fact, part of the sympathetic nervous system and not the parasympathetic nervous system. This has led to a strenuous ongoing debate among neuroscientists regarding this proposed classification that is currently undecided at this time.

Espinosa-Medina I, Saha O, Boismoreau F, et al. The sacral autonomic outflow is sympathetic. *Science*. 2016;354(6314):893–897.

PARASYMPATHETIC RESPONSE

The **PNS** primarily functions during rest and repair. The overall effect is to support bodily functions that conserve and restore energy. Physiological structures and outcomes associated with the **Parasympathetic Response** are listed below:

- Preganglionic neurons in the brain and lateral horn of S2 to S4
- Central control from the brain stem and sacral segments of the spine
- Anabolic system
- Rest and digest
- Conserves energy resources
- Assists regeneration of injured tissue
- Contributes to deep relaxation states during sleep
- Stimulates immune functions
- Constricts pupils
- No effect on hair/sweating
- Promotes secretions (watery)
- Decreases heart rate and strength of contraction
- Causes bronchodilation and reduces secretions
- Constricts bronchi and promotes secretions
- Stimulates peristalsis and secretions of digestive juices
- Inhibits internal anal sphincter causing defecation
- Conserves glycogen and increases secretion of bile
- Inhibits contraction of the internal sphincter of the bladder, allowing urination
- Produces engorgement of erectile tissue

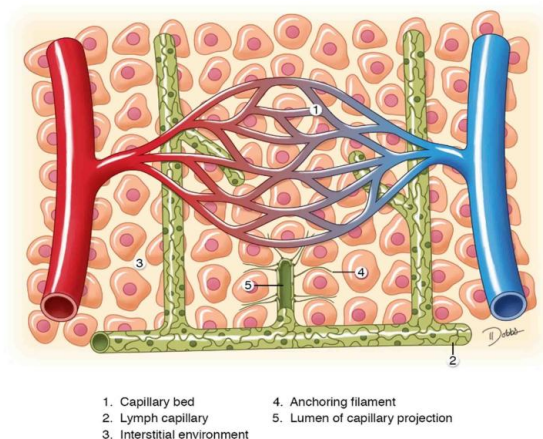
VASCULAR AND LYMPHATIC VESSELS

Vascular and Lymphatic Systems are an extensive network of vessels that collectively transport blood and fluid throughout the body, delivering nutrients and chemicals to tissues, removing waste products, and maintaining health and homeostasis.

VESSEL WALL STRUCTURE

Generally, vessels (veins, arteries, lymphatics) are similarly structured with variations based on functional differences. Structures include:

- **Arterial Structure:** Arterial walls are more muscular and elastic to pump blood and withstand pressure.
- **Venous Structure:** Venous walls contain more connective tissue and valves to prevent collapse and backflow.
- **Capillary Structure:** Capillaries are composed of a single layer of endothelial cells to aid in gas exchange and nutrient transfer.
- **Lymphatic Structure:** Lymphatics function exclusively as a low-pressure collection system that relies on smooth muscle contraction, skeletal muscle compression (adjacent), and semi-lunar valves to move fluid (lymph) towards the heart.

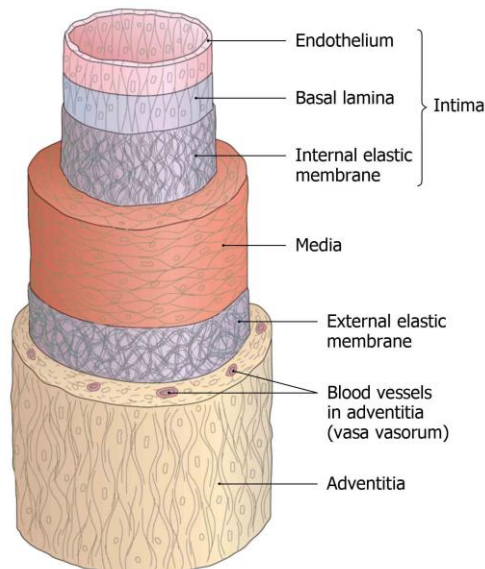


*Note single layer endothelial cells and the inlet valves

Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm. Uolddaer Productions. 2016.

VESSEL WALL LAYERS

- **Tunica Adventitia (outer):** Thick, outer layer of connective tissue
- **Tunica Media (middle):** Elastic fibers, connective tissue, and smooth muscle cells; innervated by the ANS
- **Tunica Intima (inner):** Single layer of endothelium



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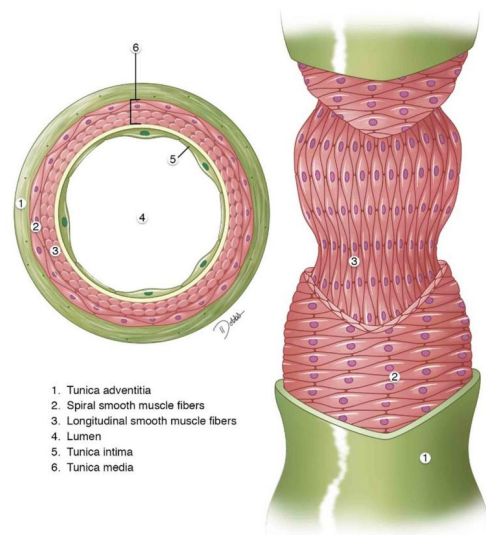


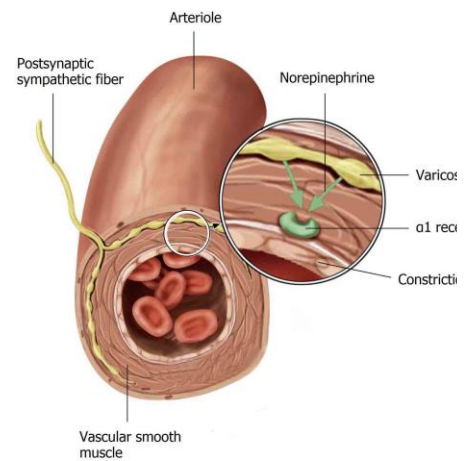
Image Credit: Doublestein, D. *Manual Lymphatic Techniques for the Orthopedic Manual Therapist*. West Palm. Uoleadoer Productions. 2016.

VESSEL WALL LAYER INNERVATION

The **SNS** primarily innervates the smooth muscle tissue located within the tunica media and regulates vessel contraction and wall tension.

- **SNS (Norepinephrine, NE)**
 - Mostly all vascular and lymphatic vessels
 - Vasoconstriction

Note: The PNS (CN X) innervates the coronary arteries and causes vasodilation.



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VESSEL VASOMOTION

Vasomotion is the cyclical variation in vessel wall tone that allows fluid to flow through the lumen of the vessel.

- Balanced ANS stimulation of the smooth muscle cells (tunica media) creates an optimum resting level of contraction or tone of the smooth muscle fibers of the vessels.
- This optimum tone of contraction helps maintain the diameter of the vessels and therefore plays a crucial role in microcirculation, tissue perfusion, and lymphatic flow.

VASOMOTOR TONE

The optimal level of vessel contraction in the vascular system (all vessels) is called **Vasomotor Tone**. Imbalances in the ANS can decrease the diameter of the vessels, altering vasomotor tone and negatively impacting the flow of fluids through both the circulatory and lymphatic systems.

- **Circulatory System:** ANS imbalances can increase blood pressure and negatively impact vascular perfusion and microcirculation in all organs and tissues of the body. These alterations are not only detrimental to the overall health and homeostasis of an individual but can also be lethal.
- **Lymphatic System:** ANS imbalances can increase pressure in the lymphangion and negatively impact lymphatic flow from the organs and tissues of the body. Since the lymphatic system is a low-pressure system, this can create lymphatic congestion throughout the body (cavity) and local swelling (tissue, joint, and viscera).

Clinical Considerations:

Imbalances in the ANS impair the vasomotor tone of arteries, veins, and lymphatics, affecting microcirculation, tissue perfusion, and lymphatic flow.

SECTION III

PRINCIPLES OF LB

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Principles of Lymphatic Balancing (LB)

1. Know Your Lymphatic Anatomy

- Understand the structure and location of **lymphatic vessels, nodes, trunks, and ducts**.
- Be familiar with key deep drainage structures: the **cisterna chyli, thoracic duct, and right lymphatic duct**.

2. Understand the Drainage Patterns of the 2 Cavities and 3 Zones

- **Thoracic Cavity:** Drains via the **broncho-mediastinal trunks** into the **right lymphatic duct** or **thoracic duct**, then into the heart.
- **Abdominopelvic Cavity:** Drains through the **left/right lumbar trunks** and **intestinal trunk** into the **cisterna chyli**, the lower origin of the **thoracic duct**, and then to the heart.
- **Zone I (Cranium/Cervical):** Drains the head, face, and neck to the **cervical nodes**, then into the **jugular trunks**, which empty into the **right lymphatic duct** (right side) or **thoracic duct** (left side), and then to the heart.
- **Zone II (Axilla):** Drains the upper trunk and upper extremities to the **axillary nodes**, then into the **subclavian trunks**, which drain into the **right lymphatic** or **thoracic duct**, and then to the heart.
- **Zone III (Inguinal):** Drains the lower trunk and lower extremities to the **inguinal nodes**, then into the **left and right lumbar trunks**, which flow into the **thoracic duct**, and then to the heart.

3. Understand Lymph Flow Dynamics

- Lymph flows in **one direction**, from the **periphery to the heart**.
- It moves along a **high-to-low pressure gradient**.
- Flow is assisted by **muscle contractions, movement, and manual pumping techniques**.

4. Start with Evaluation

- Determine if the patient presents with a **lymphatic issue**.
- Identify whether the issue is **specific (localized)** or **systemic (global)**.

5. If the Issue is Specific (Localized Swelling)

- **Trace the swelling back to the heart** by identifying:
 - The **proximal lymph nodes**
 - The **trunks and ducts** involved in the drainage pathway
- **Treat proximal to distal** to open the main drainage pathway.
- Then treat **distal to proximal** to encourage movement of lymph toward the cleared exit.
- Focus on the **affected Lymphotome** but consider the entire drainage pathway.

6. If the Issue is Systemic (Total-Body Lymphatic Congestion)

- Use a **systemic treatment sequence**:
 - Clear the **thoracic** and **abdominopelvic cavities** first.
 - Treat **Zone I** (Cranium/Cervical).
 - Then **Zone II** (Axilla).
 - Finish with **Zone III** (Inguinal).
- This approach treats the body in a **top-down, central-to-peripheral** order.

7. Apply the LB Treatment Flow Principle

- Always **open proximal drainage** first.
- Begin with **proximal to distal pumping** to prepare the pathway.
- Then perform **distal to proximal pumping** to guide lymph back toward the heart.

INDICATIONS FOR LB

LB Treatment Application is appropriate for the following patient populations:

- Athletes (Sports and recreational injuries)
- Trauma patients (MVAs, falls, accidents, etc.)
- Post-surgical patients
- Orthopedic patients (Acute/chronic musculoskeletal injuries)
- Geriatric/Pediatric patients
- Internal medicine patients
- Wellness and preventative healthcare patients

LB Treatment Application is effective for the following conditions:

- Edema (swelling)
- Lymphedema
- Tissue Injury
- Burns/Wounds
- Skin Impairments
- Orthopedic Injury
- Traumatic Injury
- Muscle Spasm/
Hypertonicity
- Sports/Athletic Injury
- Post-Surgical Recovery
- Amputations
- Whiplash
- Acute and Chronic Pain
- Headaches
- TMJ
- Sinus/Tooth Pain
- Breathing Dysfunctions
- Dysphagia
- Stroke
- Head Injuries
- Organ Dysfunction
- Subacute and Chronic
Inflammation
- Chronic Fatigue
- Fibromyalgia
- Acute and Chronic Stress
- Insomnia
- Loss of Vitality
- Total Body Congestion
- Total Body Toxicity
- General Wellness
- Esthetics

CONTRAINDICATIONS TO LB

LB is not a therapy to be used in emergency cases and should not cause pain. If you have any questions, work under the guidance of a physician.

Absolute Contraindications: LB **may not** be performed in the following clinical situations:

- **Acute infectious/inflammatory illnesses**
 - Hot, red, painful tissues with fever
 - Infected and diseased lymph nodes
 - Bacterial infections are accompanied by fever.
 - Acute visceral inflammation (with or without chronic disease)
 - Body in a state of inflammatory and immune crisis
 - Avoid stimulating a taxed immune system (may exacerbate symptoms)
- **Serious circulatory problems**
 - Aneurysm, Thrombosis (risk of embolism)
 - Phlebitis, Venous obstruction
 - DVT: DO NOT RISK tampering with a blood clot.
- **Major cardiac problems**
 - Acute angina (pectoris), coronary thrombosis (heart attack)
 - Congestive heart failure (cardiac insufficiency)
 - Major and uncontrolled high blood pressure
- **Hemorrhage (Bleeding)**
 - Be certain that bleeding has stopped before draining.
 - Fractures, recent surgery
- **Renal Failure and/or Acute Anuresis**

Urination is a major elimination route for excess fluid and waste products. Increasing this fluid outflow can overload and damage impaired kidneys.

- **Malignancy (fear of metastasis)**
To be safe, patients with cancer should be under the care of a physician and referred for the LB treatment. Current literature suggests that acceleration of tumor growth or malignancy IS NOT a result of LB (Földi et al., 2003), and that LB has been known to be beneficial in palliative care.
- **Cervical Region:** Avoid LB to the cervical region in these conditions:
 - **Carotid Stenosis and/or Endarterectomy:** may provoke an arrhythmia
 - **Hyperthyroidism:** may provoke release of thyroid hormones
 - **History of Cerebrovascular Accident:** The presence of a thrombus affecting the internal and external carotid arteries may be a risk factor for embolic stroke.

Relative Contraindications: LB may or may not be performed in the following clinical situations. Clinical judgement and guidance is indicated for the following conditions:

- **Pregnancy:** Avoid direct abdominopelvic cavity work.
- **Dysmenorrhea:** Avoid direct abdominopelvic cavity work.
- **Diverticulosis and acute inflammatory conditions of small and large intestines:** Avoid direct abdominopelvic cavity work.
- **Allergies:** LB can spread histamines which could result in increased inflammation.
- **Age:** Avoid cervical and abdominal cavities in the elderly with a suspicious history of atherosclerosis and aneurysms.
- **Low Blood Pressure:** Patient may become dizzy or faint upon standing after LB.
- **Unexplained pain and/or weight loss:** Refer to primary care physician for further studies.
- **Foreign objects:** Identify location and consider type/purpose; including abdominal mesh, stents, permanent sutures, staples, and pacemakers (leads).

SECTION IV

ALP TECHNIQUES

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Active Lymphatic Pump (ALP) Exercises

LB Techniques are performed to remove impairments in the superficial and deep (cavity) lymphatics to promote lymphatic flow.

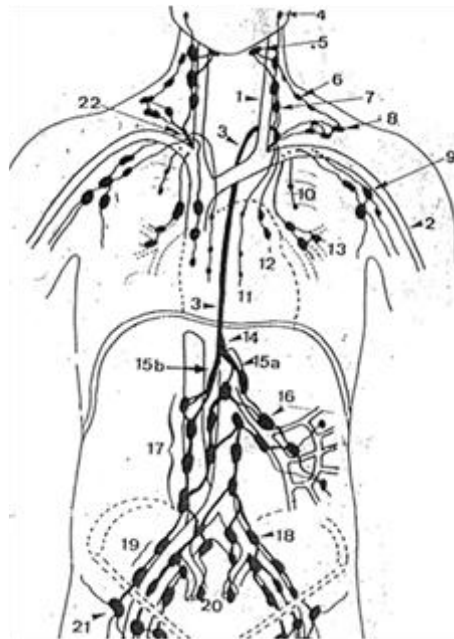
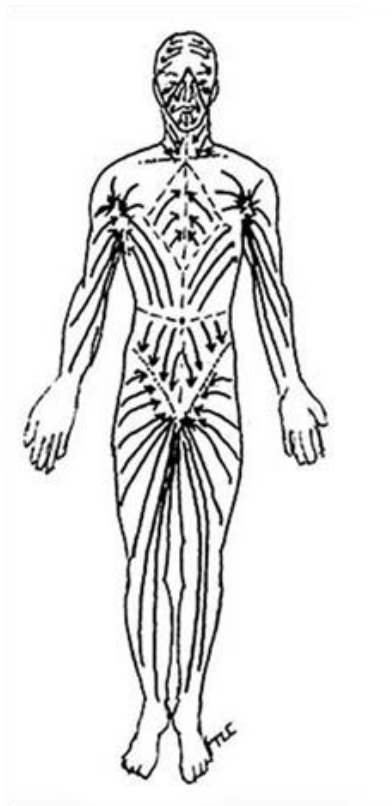
Cavities

- Thoracic Cavity Sequence
- Abdominal Cavity Sequence

Lymphotome

- **Zone I:** Cranium/Cervical Sequence
- **Zone II:** Axilla Sequence
- **Zone III:** Inguinal Sequence

Systemic Sequence



ALP Exercises for the Cavities

Active Lymphatic Pump (ALP) Exercises engage multiple muscle groups to provide compression and decompression of the tissues at a deeper level to move fluid out of the treatment area. All ALP Exercises should be performed in a position of comfort using a maximal muscle contraction within available pain-free range of motion and following the same rhythm (1, pause, 2, 3) used for the other LB Techniques.

Thoracic Cavity (Sitting)

- **Spinal Roll Down Pump:** In sitting, tuck chin to chest and roll down into spinal flexion. Reverse direction and roll up one vertebra at a time.
- **Shoulder Roll Pump:** In sitting, roll both shoulders posteriorly.
- **Anterior Arm Lift Pump:** In sitting, inhale and lift the arms anteriorly above the head. Lower arms on exhalation.

Abdominal Cavity (Supine)

- **Lower Body Twist Pump:** In hook-lying, rotate bent knees to one side, rotating the lumbar spine. Repeat to the other side. Can add **Anterior Arm Lift Pump**.
- **Supine Roll Up Pump:** In hook-lying, on exhalation, tuck the chin towards chest and roll into a sit-up while gliding hands up the legs towards the knees. On inhalation, return to starting position.
- **Hip Flexion Pump:** In hook-lying, rhythmically bring one knee at a time to the chest, alternating legs.

ALP Exercises for the Zones

Zone I: Cranium/Cervical (Sitting)

- **Lower Cervical Spine Flexion:** Tuck chin and bend head towards chest.
- **Upper Cervical Spine Flexion:** Tuck chin and perform small nod.
- **Facial Pump:** Slowly contract facial muscles, then relax

Zone II: Axilla (Sitting)

- **Shoulder Adduction Isometric Pump:** In sitting, place a rolled-up towel between the torso and middle of the upper arm. Rhythmically squeeze arm towards towel, holding for a count of 5, then relax.
- **Lateral Arm Lift Pump:** In sitting inhale and lift the arms laterally above the head. Lower the arms on exhalation.
- **Elbow Pump:** In sitting, alternately flex and extend the elbow.
- **Wrist Pump:** In sitting, alternately flex and extend the wrist.
- **Hand Pump:** In sitting, alternate opening/closing the hand.

Zone III: Inguinal (Supine)

- **Hip Flexion Pump:** In hook-lying, rhythmically bring one knee at a time to the chest, alternating legs.
- **Knee Flexion Pump:** In hook-lying, slide one leg straight and then back towards the ischial tuberosity. Repeat on the other side. Can perform with legs elevated on an exercise ball or against a wall.
- **Pedal Pump:** In supine with legs extended, dorsiflex and plantarflex both ankles. Can perform with legs elevated on an exercise ball or against a wall.

ALP Exercise Sequence

The ALP Exercise Sequence is progressive and should be performed as prescribed in the following order. All ALP Exercises should be performed within an available pain-free range of motion during (if indicated) and/or after each STLB treatment session. Repeat each set 3-5 repetitions, 1-2x/day.

Cavities

Perform the ALP exercises in the following order THEN repeat them in reverse order.

Thoracic Cavity Sequence

- Spinal Roll Down Pump
- Shoulder Roll Pump
- Anterior Arm Lift Pump

Abdominopelvic Cavity Sequence

- Spinal Roll Down Pump
- Shoulder Roll Pump
- Anterior Arm Lift Pump
- Lower Body Twist Pump: Optional Anterior Arm Lift
- Supine Roll Up Pump
- Hip Flexion Pump

Zones

Perform the ALP exercises in the following order THEN repeat them in reverse order.

Zone I: Cranium/Cervical Lymphotome Sequence

- Spinal Roll Down Pump
- Shoulder Roll Pump
- Anterior Arm Lift Pump
- Lower Cervical Flexion Pump
- Upper Cervical Flexion Pump
- Facial Pump

Zone II: Axilla Lymphotome Sequence

- Spinal Roll Down Pump
- Shoulder Roll Pump
- Anterior Arm Lift Pump
- Shoulder Adduction Isometric
- Lateral Arm Raise Pump
- Elbow Pump
- Wrist Pump
- Hand Pump

Zone III: Inguinal Lymphotome Sequence

- Spinal Roll Down Pump
- Shoulder Roll Pump
- Anterior Arm Lift Pump
- Lower Body Twist Pump: Optional Anterior Arm Lift
- Supine Roll Up Pump
- Hip Flexion Pump
- Knee Flexion Pump
- Pedal Pump

Systemic ALP Sequence

Perform the ALP exercises in the following order THEN repeat them in reverse order.

Thoracic Cavity Sequence

- Spinal Roll Down Pump
- Anterior Arm Lift Pump
- Shoulder Roll Pump

Zone I: Cranium/Cervical Lymphotome Sequence

- Lower Cervical Flexion Pump
- Upper Cervical Flexion Pump
- Facial Pump

Zone II: Axilla Lymphotome Sequence

- Shoulder Adduction Isometric
- Lateral Arm Raise Pump
- Elbow Pump
- Wrist Pump
- Hand Pump

Zone III: Inguinal Lymphotome Sequence

- Lower Body Twist Pump: Optional Anterior Arm Lift
- Supine Roll Up Pump
- Hip Flexion Pump
- Knee Flexion Pump
- Pedal Pump

SECTION V

APPENDIX

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DR. KERRY D'AMBROGIO

DOM, AP, PT, DO-MTP

Course Developer



- Physical Therapist
- Osteopath / Classical Osteopath
- Doctor of Oriental Medicine
- Senior Certified BodyTalk Instructor & Practitioner
- Author: *Positional Release Therapy* (Mosby / Elsevier)
- Faculty: Dialogues in Contemporary Rehabilitation
- Faculty: Northeast Seminars
- Faculty: Dogwood Institute
- Faculty: Upledger Institute
- Faculty: Barral Institute
- Faculty: International Alliance of Healthcare Educators
- Founder & President: D'Ambrogio Institute

Background Information

Dr. Kerry D'Ambrogio, DOM, AP, PT, DO-MTP is an internationally recognized lecturer, author, physical therapist, osteopath, and board-certified acupuncture physician with over 35 years of clinical and teaching experience.

He is the founder and director of the **D'Ambrogio Institute (DAI)** and **Therapeutic Systems, Inc. (TSI)** in Sarasota, Florida. Through the D'Ambrogio Institute, Dr. D'Ambrogio has developed a comprehensive integrative manual therapy curriculum designed to help healthcare practitioners improve clinical decision-making and patient outcomes.

Dr. D'Ambrogio graduated from:

- The Physical Therapy Program – University of Toronto (Canada)
- The Osteopathic Program – Canadian Academy of Osteopathy (Canada)
- John Wernham College of Classical Osteopathy (England)
- The Acupuncture Program – Academy of Chinese Healing Arts (Florida)

His work integrates principles from **orthopedic manual therapy, osteopathy, energetic medicine, and clinical evaluation systems**. His background includes training in Maitland, Kaltenborn, Cyriax, McKenzie, the Norwegian approach, and classical osteopathy. His energy medicine background includes BodyTalk, Mindscape, acupuncture, energetic balancing, consciousness-based approaches, and other integrative healing systems.

Dr. D'Ambrogio is the author of the textbook **Positional Release Therapy**, published by Mosby / Elsevier Medical Publishing, and his work has appeared in physical therapy, osteopathic, and massage therapy journals.

He has lectured internationally for more than three decades and has taught healthcare professionals in **over 20 countries worldwide**.

Through the D'Ambrogio Institute, he developed the **Integrative Manual Therapy Program**, which includes two primary educational tracks:

- **Energetic Manual Therapy (EMT)**
- **Orthopedic Manual Therapy (OMT)**

These programs teach clinicians how to determine **where to treat and what to treat** through structured evaluation systems including the **Total Body Screening Evaluation (TBSE), Systemic Evaluation (STEV), and Specific Evaluation (SPEV)**.

Dr. D'Ambrogio is widely recognized for his ability to integrate energetic and structural treatment approaches to improve clinical outcomes.

Clinical Practice

Dr. D'Ambrogio is the owner and director of **Therapeutic Systems, Inc. (TSI)**, a Center for Mind-Body Medicine located in Sarasota, Florida.

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Website
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Education Programs
DAmbrogioInstitute.com

Social Media

Facebook: facebook.com/DAmbrogioInstitute
Instagram: instagram.com/dambrogioinstitute
LinkedIn: linkedin.com/in/kerry-dambrogio
YouTube: youtube.com/DAmbrogioInstitute

Mission and Vision Statement

Mission

At the D'Ambrogio Institute (DAI), we provide a structured learning platform for Energetic Manual Therapy (EMT) and Orthopedic Manual Therapy (OMT), focusing on evaluation, principle-based treatment, and re-evaluation. Our mission is to equip clinicians with the tools, techniques, and clinical reasoning skills needed to make better treatment decisions. We are committed to building a global community of skilled practitioners who share knowledge, grow professionally, and improve patient outcomes.

Vision

To set the standard in manual therapy education by expanding DAI's curriculum locally, nationally, and internationally. Our vision is to create a global network of highly skilled clinicians who make better decisions for better patient outcomes.

DAI Core Principles

Every DAI course follows a structured clinical decision-making approach:

- **Evaluation** – Identify the appropriate treatment approach and establish a baseline for measuring progress.
- **Principle-Based Treatment** – Apply hands-on energetic and/or orthopedic manual therapy techniques to achieve effective, measurable results.
- **Re-Evaluation** – Assess treatment outcomes and determine if further intervention is needed.

At DAI, we provide clear, effective, and principle-driven education to shape the future of manual therapy worldwide.

DAI Integrative Manual Therapy Program

A principle-based path to clinical clarity and mastery.

At the D'Ambrogio Institute (DAI), the Integrative Manual Therapy System provides a structured, principle-based approach to clinical decision-making, evaluation, treatment, and re-evaluation designed to improve patient outcomes.

Our method integrates both energetic and orthopedic perspectives, recognizing that structural dysfunction often begins with subtle imbalances in the body's energetic field. In most cases, practitioners begin by restoring coherence to the energetic blueprint, the Bio-Matrix, and then align the physical structure. This approach allows clinicians to address the root of dysfunction with greater clarity and precision.

We offer two specialized tracks within the DAI Integrative Manual Therapy System:

Energetic Manual Therapy (EMT) Track

Drawing from energy medicine, quantum physics, and manual therapy, EMT restores coherence to the Human Bio-Matrix, the body's energetic framework.

Orthopedic Manual Therapy (OMT) Track

Focused on musculoskeletal, fascial, joint, and lymphatic dysfunctions, OMT trains practitioners to identify systemic and specific patterns and apply precise hands-on interventions.

EMT addresses the energetic blueprint, including the influence of emotions, beliefs, consciousness, and environmental factors. OMT works directly with the body's structure. Together, these tracks form the DAI Integrative Manual Therapy System, a complete principle-based approach to evaluation, treatment, and re-evaluation across both energy and structure.

Which Track Should You Start With?

Both the EMT and OMT Tracks are essential components of the DAI Integrative Manual Therapy Program, and together they offer a truly integrative approach to care. Begin with the track that feels most aligned with your interests or clinical strengths, there's no wrong place to start.

Most students eventually benefit from training in both. In clinical practice, we often start with EMT to restore energetic coherence in the Bio-Matrix, followed by OMT to support and align the physical body. This sequence leads to more efficient, sustainable therapeutic results.

Once you've chosen your track, **review the Track Roadmap** to see what your training journey will look like step by step. Then, check out the **Course Descriptions** to get a clear picture of what each course entails and how it builds your clinical expertise.

Choose your entry point and let your journey unfold with clarity, intention, and support.

EMT Track

At the D'Ambrogio Institute, our **Energetic Manual Therapy (EMT) Track** offers a structured, principle-based pathway designed to help healthcare professionals understand and address the energetic dimensions of dysfunction. Drawing from energy medicine, quantum physics, and manual therapy, this track provides a clear framework for evaluation, treatment, and re-evaluation across the Bio-Matrix, Internal Matrix (emotions, thoughts, beliefs, behaviors, and consciousness), and External Matrix (environmental influences).

Recognizing that the human body is fundamentally composed of energy fields, EMT addresses how disruptions in these fields can impact physical health, homeostasis, and healing capacity. By restoring coherence to the Human Bio-Matrix, the body's energetic framework, practitioners can improve therapeutic effectiveness and achieve more sustainable outcomes.

The EMT Track is organized into three progressive phases: foundational tools, advanced techniques, and clinical mastery. Across each phase, clinicians learn to assess and treat the **Bio-Matrix** (physical body), **Internal Matrix** (emotions, thoughts, beliefs, behaviors, and consciousness), and **External Matrix** (environmental influences), supporting a fully integrative treatment model.

Whether you're new to energy work or an experienced practitioner looking to refine your skills, the EMT Track provides the tools and insights needed to address the energetic origins of dysfunction and enhance patient care.

EMT Roadmap

The **EMT Track** is organized into three progressive phases, guiding clinicians from foundational awareness to advanced energetic mastery.

Phase 1: Pre-Practitioner Training

Ideal for those new to energy work, this phase introduces the core principles and hands-on tools of Energetic Manual Therapy.

- **EMT-I: Introduction**

Explore the basics of energy work and experience EMT firsthand through live demonstrations. (1 hour, Free)

- **EMT-F: Foundations**

Learn essential techniques to perform EMT on yourself and others. (6 hours)

Phase 2: Practitioner Training

Designed to deepen clinical skills, this phase builds from single-location treatments to full-body energetic integration.

- **EMT-1: Fundamental Practitioner (10 Modules)**

Master single-location treatments for muscles, bones, joints, fascia, organs, brain, and spinal cord within the Bio-Matrix. Techniques include Hold Space, Realignment, Molding, Fascial Glide, and Listen & Follow.

- **EMT-2: Matrix Integration (10 Modules)**

Integrate the Bio-Matrix (physical body) with the Internal Matrix (emotions, thoughts, beliefs, behaviors, consciousness) and the External Matrix (environmental influences) for a fully holistic approach.

- **EMT-3: Advanced Practitioner (10 Modules)**

Expand into multi-location treatments and advanced protocols involving vital structures such as vascular, lymphatic, nervous, and energetic systems. Techniques include vectors, fascial chains, regional work, and combinations.

Phase 3: Advanced Integrative Practitioner Training (Invitation Only)

A focused, immersive phase for experienced EMT practitioners to refine mastery, deepen clinical integration, and grow through mentorship, case studies, and advanced exploration.

EMT Course Descriptions

EMT-I: Introduction (1 Module)

Experience EMT firsthand and explore the role of energy in manual therapy.

This one-hour course introduces the foundational principles of EMT and provides a direct experience of its effectiveness. You'll begin by observing a live demonstration of evaluation, EMT treatment, and re-evaluation. Then, you'll be guided through a self-evaluation and self-treatment sequence to personally feel the impact of EMT techniques.

EMT-F: Foundations (4 Modules)

Build your core EMT skills and start applying treatments with confidence.

Learn essential techniques, including grounding, biofeedback testing, tapping, and calibration. This course teaches you a five-step protocol to evaluate, treat, and re-evaluate a priority region, a specific subregion, and identify the exact area of the body where EMT should be applied.

EMT-1: Fundamental Practitioner (10 Modules)

Refine your EMT skills by focusing on single-location treatments.

This course deepens your clinical skills by teaching you to treat muscles, bones, joints, fascia, and organs within the Bio-Matrix. You will learn essential hands-on techniques, including Hold Space, Realignment, Molding, Fascial Glide, and Listen & Follow.

EMT-2: Matrix Integration (10 Modules)

Integrate the Bio-Matrix with the Internal and External Matrices.

Expand beyond physical treatment by addressing internal factors (emotions, thoughts, beliefs, behaviors, and consciousness) and external factors (environmental influences). Learn how to balance the body, mind, and environment using EMT techniques that address all three matrices.

EMT-3: Advanced Practitioner (10 Modules)

Expand into multi-location treatments and advanced techniques.

Develop a comprehensive treatment strategy by integrating the musculoskeletal system and organs with vital structures, including arteries, veins, lymphatics, the nervous system, and energy systems. Learn to apply advanced techniques such as vectors, fascial chains, regions, and combinations to optimize patient outcomes.

EMT-AI: Advanced Integrative Practitioner (By Invitation Only)

Advance Clinical Integration Through Mentorship and Applied Learning

This final phase supports experienced EMT practitioners in refining their clinical expertise through advanced application, personalized mentorship, and immersive learning. Mini-courses, case-based studies, and optional retreats offer space for deeper insight and skill integration across all layers of the Human Matrix. Content evolves with practitioner needs and clinical complexity, providing flexible opportunities for continued growth and mastery.

OMT Track

The **Orthopedic Manual Therapy (OMT) Track** is a structured clinical decision-making framework designed to improve treatment precision for manual therapists. Rooted in osteopathic principles and supported by clear evaluation methods, OMT equips clinicians with tools to identify and address both systemic and specific dysfunctions.

At the heart of this approach is the Total Body Screening Evaluation (TBSE), which determines the appropriate clinical path, Systemic or Specific. When systemic dysfunction is identified, a Systemic Evaluation (STEV) helps determine whether Systemic Orthopedic Balancing (STOB) or Systemic Lymphatic Balancing (STLB) is needed. If the dysfunction is specific, a Specific Evaluation (SPEV) is used to pinpoint the exact nature of the issue—whether it involves Muscle (SPMB), Fascia (SPFB), Joints (SPJB), or Lymphatic structures (SPLB).

Whether systemic patterns or localized issues are present, OMT teaches practitioners how to restore structural balance and functional mobility using precise hands-on methods. This results in more efficient care, faster recovery, and improved long-term outcomes.

OMT Roadmap

The **OMT Track** is structured into three progressive phases that guide clinicians from clinical decision-making to treatment application and advanced integration.

The OMT system follows a clear clinical model:

Evaluation → Treatment → Re-Evaluation

Phase 1: Evaluation and Clinical Decision-Making

This phase teaches practitioners how to determine **where to treat and what to treat** using the D'Ambrogio Institute's structured evaluation system.

- **OMT-I: Introduction**

An overview of the DAI philosophy and clinical decision-making framework. Practitioners are introduced to the concept of systemic versus specific dysfunction and how evaluation guides treatment decisions.

- **OMT-F: Foundations**

Learn the **Total Body Screening Evaluation (TBSE)** to determine whether the patient presentation is systemic or specific.

If systemic, apply the **Systemic Evaluation (STEV)** to determine whether orthopedic or lymphatic balancing is indicated.

If specific, apply the **Specific Evaluation (SPEV)** to determine whether muscles, fascia, joints, or lymphatic structures require treatment.

Phase 2: Treatment Application

This phase focuses on applying the appropriate treatment once evaluation has determined the clinical priority.

- **OMT-ST: Systemic Approach**

Integrate orthopedic and lymphatic techniques to address global restrictions, restore movement, and improve fluid dynamics for healing.

- **Systemic Orthopedic Balancing (STOB)**
Address systemic musculoskeletal imbalances affecting the body's structural integrity.
- **Systemic Lymphatic Balancing (STLB)**
Enhance systemic lymphatic flow to reduce congestion and support physiological balance.

- **OMT-SP: Specific Approach**

Target localized dysfunctions with precise treatment techniques.

- **Orthopedic Focus**
 - **Muscle Balancing (SPMB)**
Relieve protective muscle spasms, restore joint biomechanics, and improve functional range of motion.
 - **Fascial Balancing (SPFB)**
Release fascial restrictions in the musculoskeletal system, viscera, and vital structures to restore function and pain-free movement.
 - **Joint Balancing (SPJB)**
Restore joint mobility, optimize biomechanics, and improve function and pain-free range of motion.
- **Lymphatic Focus**
 - **Lymphatic Balancing (SPLB)**
Reduce tissue congestion, joint and cavity effusion, and support optimal healing.

Phase 3: Advanced Integrative Training

This invitation-only phase focuses on integrating systemic and specific treatment approaches based on clinical evaluation.

Practitioners learn how to sequence systemic and specific treatments effectively in more complex cases while refining clinical reasoning and treatment precision through mentorship and case-based learning.

OMT Course Descriptions

OMT-I: Introduction (Free)

An overview of DAI Philosophy and Clinical Decision-Making.

This one-hour course introduces the D'Ambrogio Institute's principle-based approach to Orthopedic Manual Therapy (OMT). You'll explore how the Total Body Screening Evaluation (TBSE) helps determine whether to treat systemically or specifically anchored in the core model of evaluation, treatment, and re-evaluation.

Case-based examples illustrate how clinical decisions are guided by this method. Ideal for practitioners new to DAI, this class provides a clear introduction to its teaching framework and is the first step in the OMT Track.

OMT-F: Foundations

Develop a structured, principle-based approach to clinical decision-making.

This course teaches the essential evaluation methods that guide all Orthopedic Manual Therapy (OMT) treatments. You will learn how to perform the **Total Body Screening Evaluation (TBSE)** to determine whether a **systemic** or **specific** treatment approach is indicated.

If systemic, you will apply a **Systemic Evaluation (STEV)** to assess whether **orthopedic** or **lymphatic balancing** is appropriate.

If specific, you will use a **Specific Evaluation (SPEV)** to identify whether **muscles, fascia, joints, or lymphatic structures** require treatment.

By the end of this course, you will not only know **where** and **what** to treat, but also **why**, ensuring a precise and intentional treatment plan grounded in clinical reasoning.

OMT-ST: Systemic Orthopedic Balancing (STOB)

Restore Structural Integrity Through Global Orthopedic Techniques

This course teaches a five-phase treatment approach to release global lines of tension throughout the musculoskeletal system. Using gentle, rhythmic long-lever techniques, you'll mobilize the lower extremities, torso, transverse diaphragms, upper extremities, and cranio-cervical region, from the feet to the cranium. These techniques help restore structural balance, modulate autonomic nervous system function, and enhance overall physiology, creating an internal environment more conducive to healing.

OMT-ST: Systemic Lymphatic Balancing (STLB)

Optimize Circulation and Restore Fluid Dynamics

This course teaches a five-phase treatment approach designed to enhance lymphatic and venous circulation throughout the body. Following a heart-to-extremity and top-down sequence, you'll use rhythmic, long-lever techniques to release lines of tension, mobilize transverse diaphragms, and optimize flow to the heart.

By addressing fascial and musculoskeletal restrictions in the extremities and craniocervical region, these techniques improve thoracic cavity function and fluid return. The course also includes specialized manual lymphatic drainage and active lymphatic pumping techniques to relieve systemic congestion, joint and cavity effusion, and support autonomic regulation.

OMT-ST: Systemic Manual Therapy (STMT)

Restore systemic balance by integrating orthopedic and lymphatic treatment strategies together.

This course combines Systemic Orthopedic Balancing (STOB) and Systemic Lymphatic Balancing (STLB) to address total-body dysfunctions affecting movement, circulation, and healing. You'll learn a five-phase treatment approach using long-lever techniques in various positions to release tension in muscles, fascia, joints, and ligaments. Additionally, specialized lymphatic drainage techniques will help improve venous and lymphatic circulation, reducing systemic fluid congestion and restoring autonomic balance. STMT

provides a comprehensive framework for treating global restrictions and optimizing the body's natural healing processes.

OMT-SP: Muscle Balancing (SPMB)

Relieve protective muscle spasms and restore optimal function.

Rooted in Positional Release Therapy and Strain-Counterstrain principles, this course teaches targeted techniques to release tender points and interrupt the cycle of muscle guarding. By reducing excessive neural input, SPMB promotes muscle relaxation, improves joint mobility, and enhances postural alignment. Techniques are applied to the craniocervical, upper quadrant, and lower quadrant regions for precise and effective treatment.

OMT-SP: Fascial Balancing (SPFB)

Release fascial restrictions to restore movement and function.

This course teaches targeted techniques to mobilize the superficial, deep, visceral, and meningeal fascia. You will learn mechanical soft tissue techniques, long-lever mobilization, and fascial listening & following to release adhesions and improve tissue mobility. By addressing fascial restrictions and scar tissue, SPFB enhances movement efficiency, reduces pain, and prevents compensatory dysfunctions.

OMT-SP: Joint Balancing (SPJB)

Restore joint mobility and optimize biomechanics.

This course teaches Muscle Energy Techniques (MET) to address joint hypomobility, muscle hypertonicity, and fascial restrictions. You will learn how to use the stretch reflex to promote muscle relaxation and restore proper joint function. SPJB techniques provide precise, segmental treatment for specific joint dysfunctions, improving movement and reducing pain.

OMT-SP: Lymphatic Balancing (SPLB)

Reduce tissue congestion, joint, and cavity effusion to restore pain-free movement and support optimal healing.

This course applies osteopathic lymphatic pumping techniques within an orthopedic framework **to** improve venous and lymphatic circulation, reduce swelling, and optimize fluid dynamics. By addressing joint and tissue congestion, SPLB promotes faster healing, reduces inflammation, and enhances movement efficiency.

OMT-AI: Advanced Integrative Training Advance Integration Through Mentorship and Applied Learning.

This advanced phase is designed for experienced OMT clinicians seeking to deepen their clinical expertise. Through personalized mentorship, immersive learning experiences, and case-based studies, participants refine their ability to integrate systemic and specific evaluation and treatment approaches. The program adapts to the evolving needs of clinicians, offering flexible opportunities for growth and mastery in complex clinical scenarios.

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Thank You

Thank you for being part of the D'Ambrogio Institute (DAI) community.

We appreciate your commitment to learning, professional growth, and principled clinical practice. At DAI, our mission is to provide clear, structured education that strengthens clinical decision-making and improves patient outcomes.

We look forward to supporting your continued development as you integrate these principles into your practice and advance your training with us.

With appreciation,
Dr. Kerry D'Ambrogio
D'Ambrogio Institute

