

# The Strength of the Osteopathy: Application of the 5 Models of Osteopathic Approach

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[Plate 532, Key Figures to Cross Sections]

# Disclosures

- The following authors and presenters have no financial disclosures in relation to this presentation.
- Dr. Goodman did sit on the editorial review board for *Osteopathic Manipulative Medicine Review for Boards: A study guide for COMLEX and osteopathic certifying boards, 3<sup>rd</sup> edition*.

# Objectives

- Review 4 tenets of osteopathy.
- Describe the 5 models of the osteopathic approach.
- Discuss COPD pathophysiology and management.
- Apply the 5 models of the osteopathic approach to a clinical encounter.

# 4 Tenets of Osteopathic Medicine

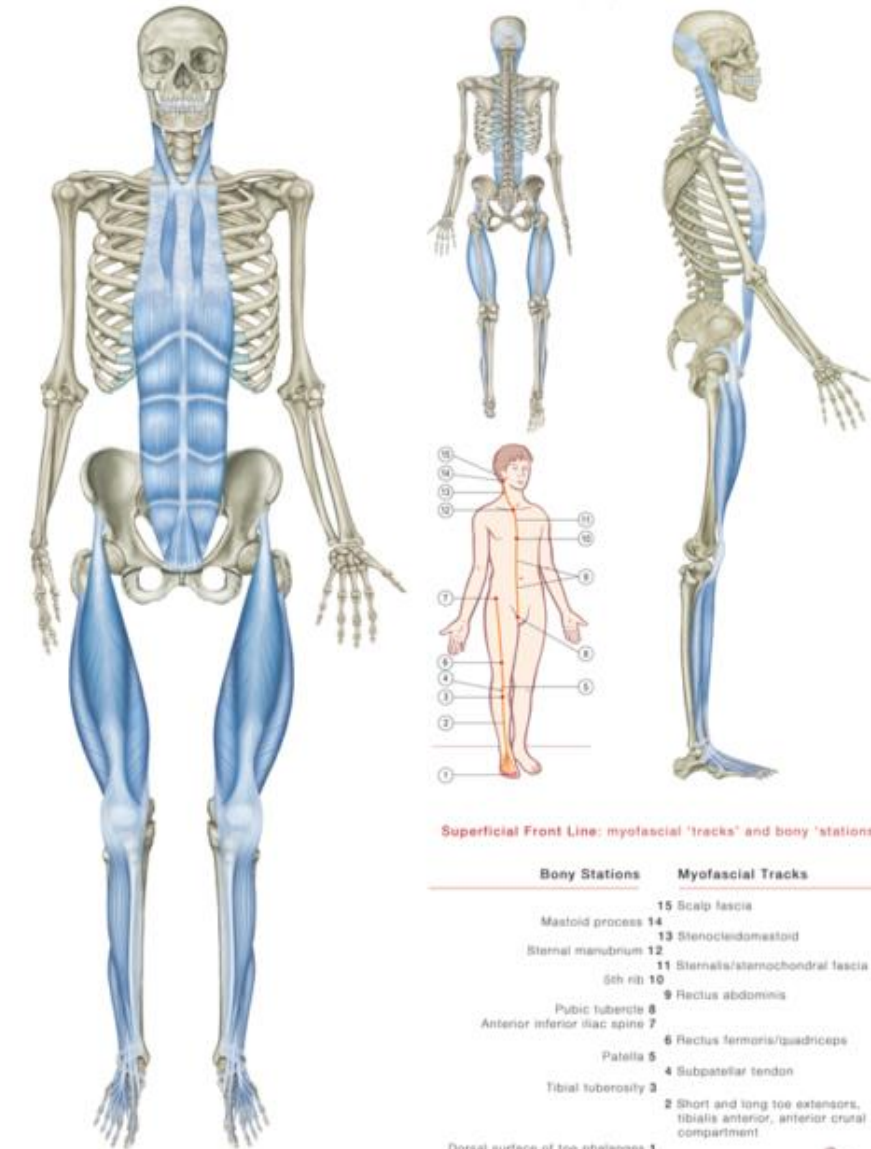
1. The body is a unit; the person is a unit of body, mind, and spirit.
2. The body is capable of self-regulation, self-healing, and health maintenance.
3. Structure and function are reciprocally interrelated.
4. Rational treatment is based upon an understanding of the basic principles of body unity, self-regulation, and the interrelationship of structure and function.

# 5 Models of Osteopathic Treatment

- The 5 Types
  - Biomechanical
  - Respiratory-Circulatory
  - Neurological
  - Metabolic-Energy
  - Behavioral

# Biomechanical Model

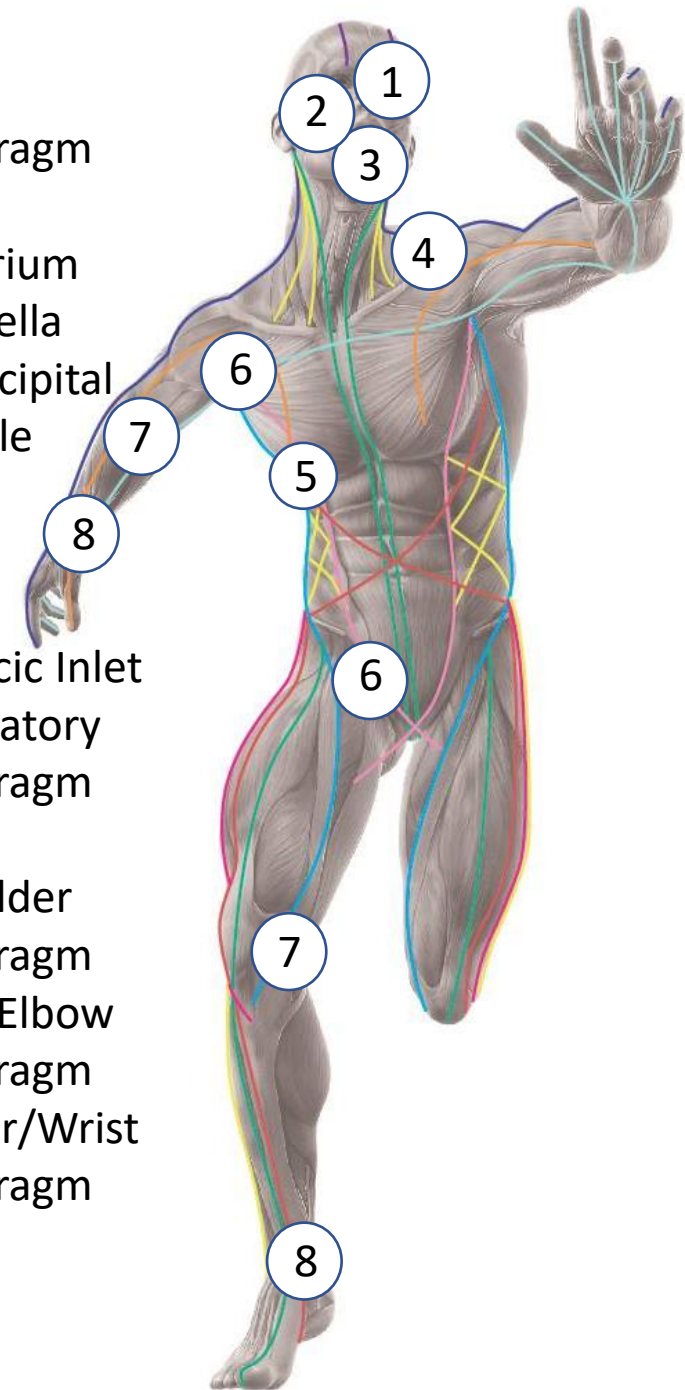
- Involves the musculoskeletal system—specifically skeletal anatomy, posture, and functional movement.
  - How does ineffective motion affect other models?
- Use OMT to re-establish normal function of musculoskeletal system, decrease energy expenditure and promote biotensegrity.
- Probably the most common approach utilized.
- Consider an integrative approach as indicated to promote fluid flow and decrease restrictions.



# Respiratory-Circulatory Model

- Goal to decrease restriction within 8 fluid diaphragms of the body to promote fluid flow.
- These affect mechanics of respiration, circulation, and lymphatic drainage.
  - Emphasis is on unimpeded delivery of oxygen and nutrients, and removal of waste products
- OMT helps decrease somatic dysfunctions in fascia, musculoskeletal system, or other tissues that can affect respiration, circulation, and lymphatic drainage.
- Consider an integrative approach as indicated to promote fluid flow and decrease restrictions.

1. Diaphragm  
Sellae
2. Tentorium  
Cerebella
3. Suboccipital  
Triangle
4. Thoracic Inlet
5. Respiratory  
Diaphragm
6. Pelvic  
/Shoulder  
Diaphragm
7. Knee/Elbow  
Diaphragm
8. Plantar/Wrist  
Diaphragm



# Neurological Model

- Associated with CNS (Central Nervous System), PNS (Peripheral), ANS(Autonomic), and Viscerosomatics
- Responsible for coordination and integration of body functions, as well as maintenance of homeostasis
- OMT in this model helps to normalize neural function and decrease facilitation.
  - Facilitation - the enhancement of the response of a neuron following stimulation that affects physiological function.
- Consider an integrative approach as indicated to promote functional capacity and optimize functional neurological pathways



# Metabolic-Energy Model

- Associated with viscera, endocrine glands, biochemistry and nutrition.
  - Diets high in processed foods can cause higher systemic inflammation and persistent pain. <sup>2</sup>
- Optimize sleep function as a primary regulator of the above.
- Function is to maintain homeostasis
  - Most function for the least amount of energy used. <sup>3</sup>
- Foster immune and endocrine organ function enhancement. <sup>3</sup>
- OMM helps to remove somatic dysfunction that can cause an inefficient use of energy, promote sleep thereby regulating metabolic and endocrine processes.
- Consider an integrative approach as indicated to promote metabolism and healing.

# Behavioral Model

- Evaluating biological, mental, psychological, and spiritual considerations in a patient's social setting affecting lifestyle choices.
- Can health be affected by emotional states and behaviors?
- Musculoskeletal system and emotional states can reflect each other, where OMT can be utilized to indirectly treat the psychological state when a patient is medically stable.
- Consider an integrative approach as indicated to demonstrate understanding and consideration to the individual as being unique.

# Why is this not the common philosophy of practice?

- Standard of Care, the level at which an ordinary, prudent professional with the same training and experience in good standing in a same or similar community would practice under the same or similar circumstances.
  - Standard of care predates osteopathy.
  - Standard of care prevents legal entanglement.
  - Standard of care is simplified, widely published, and minimizes physician workload.
- Majority of providers are not osteopathic, and the current osteopathic providers do not all have education or training under solely osteopathic board-certified physicians.

# How do we integrate?

- "There is a tendency in medical practice, driven by social accountability, to think in terms of a single mechanism of action in selecting any treatment. Osteopathic medicine has a bias toward treating the patient as a whole, a dynamically functional complex unit. Used in the field of epidemiology, one general concept that many find useful in dealing with the pneumonia patient is the host disease model, in which all patient resources are considered." <sup>4</sup>

# Host+Disease=Illness

- Compared to standard of care, 5 models give you broader considerations to patient care and development of treatment plans.
- Fundamental question: What factors are playing into this patient's illness and how do we treat the patient?
- Host+DISEASE=ILLNESS (host inferior to Disease)
- HOST+DISEASE=ILLNESS (Host and Disease Equivalent – Stable Disease)
- HOST+disease=ILLNESS (Host superior to disease) [Goal]

# 5 Models of Osteopathic Treatment

- What is the point?
  - The 5 models represent possible considerations for a patient that, in total, make up the osteopathic approach.
  - Lifestyle modifications, medications, supplements, counseling, procedures, surgery, and other modalities are potential treatments within these models.
  - Consider an integrative approach, starting with least risk to benefit , and escalating as needed based on clinical decision making and evidence-based medicine.

# Patient Case

- HPI: 51yo female reports to FM clinic for breathing problem. She complains of chest tightness, cough, difficulty breathing, shortness of breath and wheezing all increasing in frequency. She states sputum has changed from yellow thick, to copious clear/white sputum, feels heaviness in chest. There is no frequent throat clearing, hemoptysis, hoarse voice. Denies fevers, chills, syncope. She states dysarthria has been more frequent and associated with shortness of breath but denies any other neurological signs. Steroid depot injection did not help last visit 2 weeks prior. Using tiotropium only when necessary because she has immediate back pain 15 mins following use. This is a chronic problem. The current episode started more than 1 year ago. The problem occurs constantly. Her symptoms are aggravated by any activity, change in weather, climbing stairs, emotional stress, exercise, exposure to fumes, exposure to smoke, allergies. Her symptoms are alleviated by beta-agonist, Mucinex, steroid inhaler, rest, Xanax. She reports moderate improvement on treatment, using nebulizer q2H. Her past medical history is significant for COPD with Pulmonary Emphysema, suspected CVA that was not evaluated by neuro due to viral pandemic.

# Patient Case

- ROS : Negative except for HPI.
- PMHx: Pulmonary emphysema, Polyarthralgia, Suspected hx of CVA, Vertigo as late effect of cerebrovascular accident (CVA), Chronic allergic rhinitis, Cigarette nicotine dependence , Family history of heart disease, GERD with esophagitis, Mild major depression, PTSD
- PSHx: Breast augmentation 20yoa, Hysterectomy 40yoa
- Social Hx: No Etoh, or illegal drug use. Stopped smoking 4 weeks prior cold turkey. Does not work, relies on disability from PTSD and pulmonary emphysema, limited income. Soonercare insured.
- Medications: Albuterol Inh, Spriva(tiotropium), Dulera\*(mometasone, formoterol), Duonebs(albuterol, ipratoprium), Azithromycin every other day.
  - Dulera usage due to pulmonology recommendation.\*
- Allergies NKDA



# Patient Case

Vitals:	
BP:	138/92
Pulse:	116
Resp:	18
Temp:	36.4 °C (97.5 °F)
SpO2:	96%
Weight:	84.6 kg (186 lb 9.6 oz) 82.1 kg (181 lb) – from 6months prior
Height:	165.1 cm (5' 5")

# Patient Case

## Physical Exam

- Constitutional: Appearance: Normal appearance. She is normal weight.
- HENT: Head: Normocephalic and atraumatic.  
Nose: Nose normal.  
Mouth: Mucous membranes are moist.  
Pharynx: Oropharynx is clear.
- Eyes: Extraocular Movements: Extraocular movements intact.  
Conjunctiva/sclera: Conjunctivae normal.  
Pupils: Pupils are equal, round, and reactive to light.
- Neck: Musculoskeletal: Normal range of motion and neck supple.
- Cardiovascular: Rate and Rhythm: Normal rate and regular rhythm at rest.  
Pulses: Normal pulses.
- Pulmonary: Effort: Pulmonary effort is normal at rest; **tachypnea develops with movement.**  
Breath sounds: **Wheezing present b/l lower lung fields.**
- Abdominal: General: Bowel sounds are normal.  
Palpations: Abdomen is soft.  
Tenderness: There is no abdominal tenderness.
- Musculoskeletal: Normal range of motion. No swelling.
- Skin: General: Skin is warm.  
Capillary Refill: Capillary refill takes less than 2 seconds.
- Neurological: Mental Status: She is alert and oriented to person, place, and time. **Dysarthria**
- Psychiatric:  
Mood and Affect: Mood normal.  
Behavior: Behavior normal.

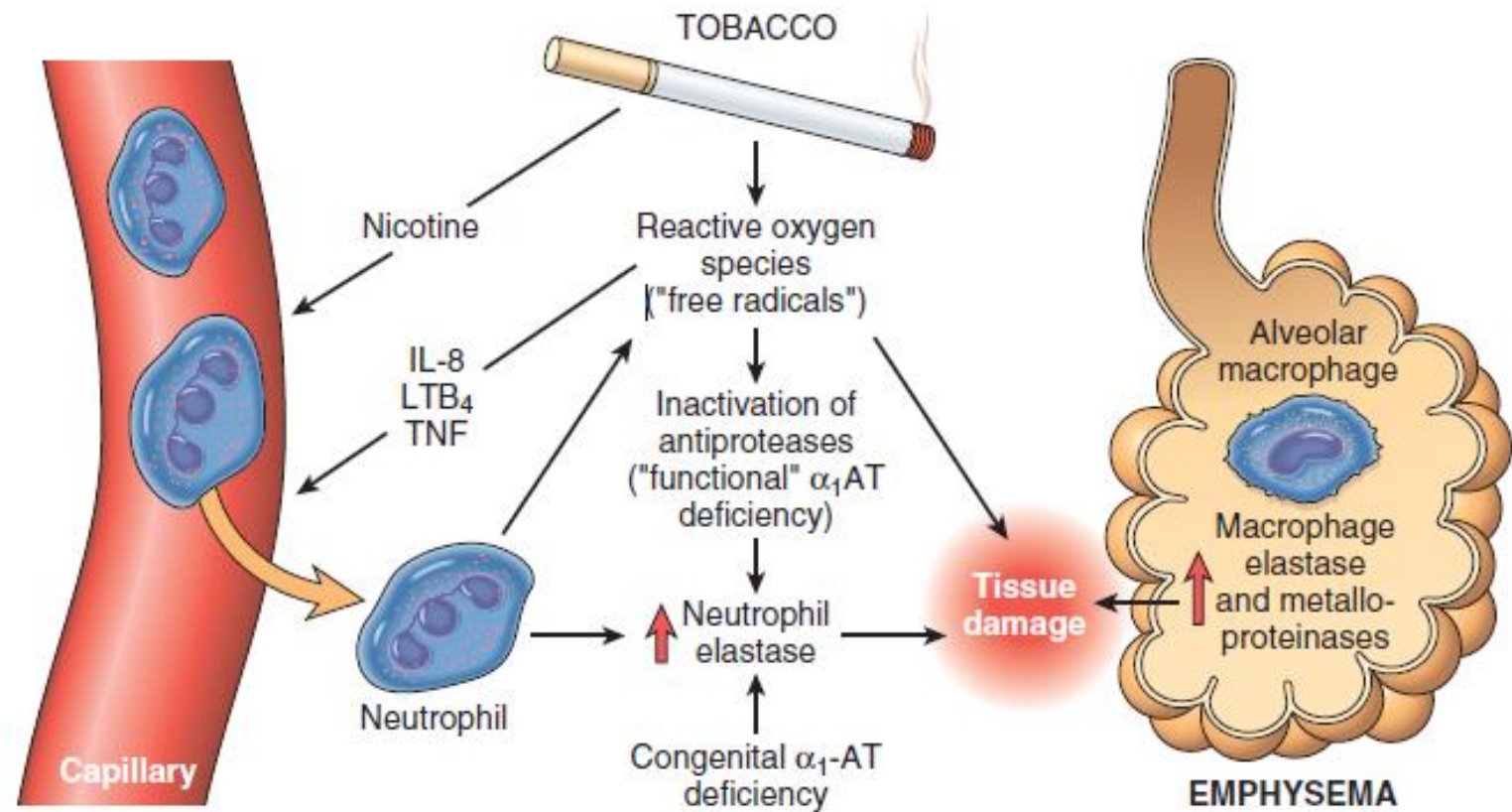
# Patient Case



- **IMPRESSION**
  - Lingular scarring. Stable hyperinflation. No acute abnormality.

# Pathophysiology of Emphysema <sup>5</sup>

**FIGURE 15-8** Pathogenesis of emphysema. Excessive protease activity and reactive oxygen species are additive in their effects and contribute to tissue damage.  $\alpha_1$ -antitrypsin ( $\alpha_1$ -AT) deficiency can be either congenital or "functional" as a result of oxidative inactivation. See text for details. IL-8, interleukin 8; LTB<sub>4</sub>, leukotriene B<sub>4</sub>; TNF, tumor necrosis factor.

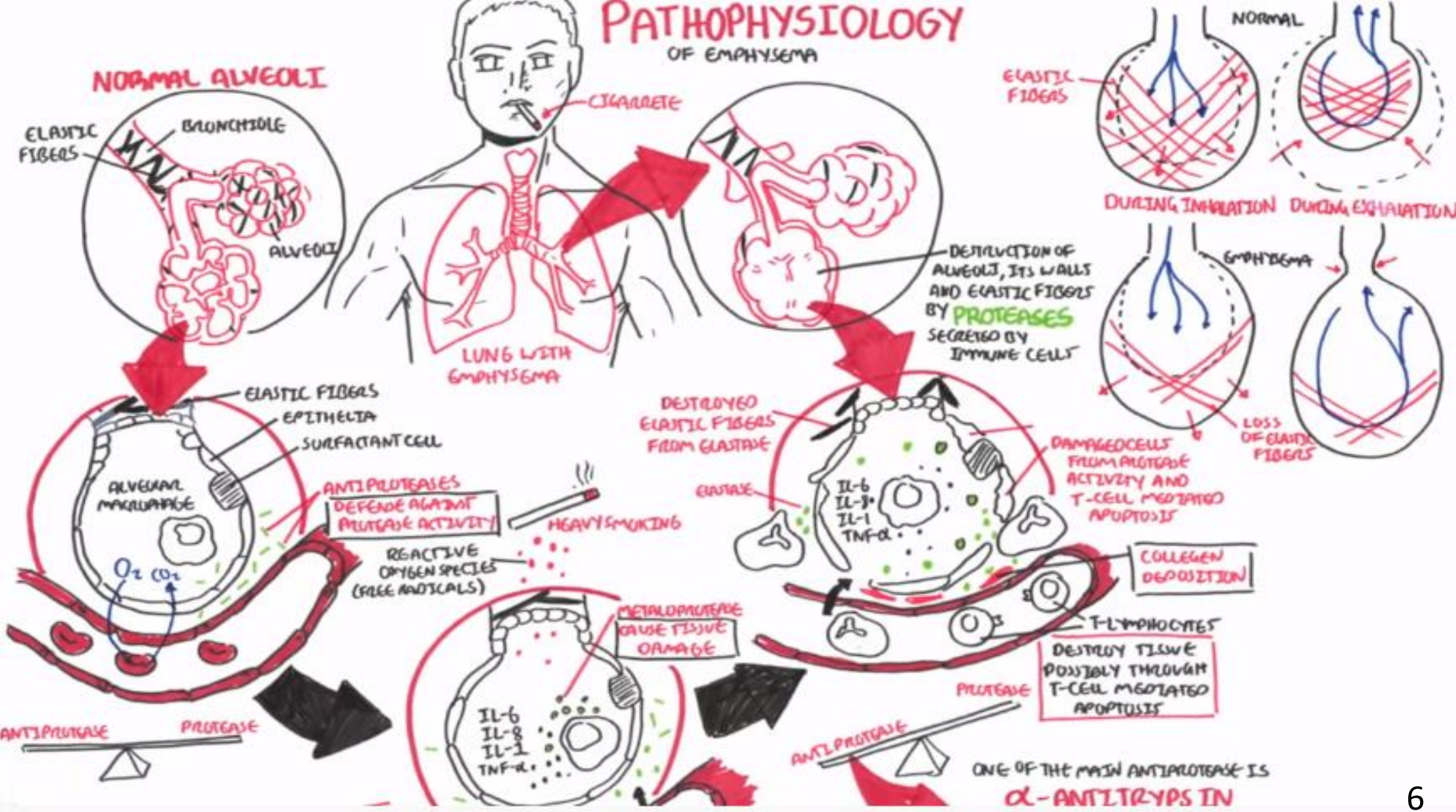


# Pathophysiology of Emphysema <sup>5</sup>

TABLE 15-4 Emphysema and Chronic Bronchitis		
	Predominant Bronchitis	Predominant Emphysema
Age (yr)	40–45	50–75
Dyspnea	Mild; late	Severe; early
Cough	Early; copious sputum	Late; scanty sputum
Infections	Common	Occasional
Respiratory insufficiency	Repeated	Terminal
Cor pulmonale	Common	Rare; terminal
Airway resistance	Increased	Normal or slightly increased
Elastic recoil	Normal	Low
Chest radiograph	Prominent vessels; large heart	Hyperinflation; small heart
Appearance	<i>Blue bloater</i>	<i>Pink puffer</i>



# PATHOPHYSIOLOGY OF EMPHYSEMA



## Multidimensional assessment of COPD

GOLD "ABCD" grading: Assessment of symptoms and risk of exacerbations for initiation of COPD therapy		
Assess exacerbation risk: Exacerbations/Hospitalizations	Assess symptoms	
	mMRC* 0 to 1; CAT <10 <sup>¶</sup>	mMRC ≥2; CAT ≥10
0 or 1 exacerbations without hospitalization	A	B
≥2 exacerbations or ≥1 hospitalization	C	D
GOLD: Severity of airflow limitation (based on postbronchodilator FEV <sub>1</sub> )		
Stage	Severity	FEV <sub>1</sub> (percent predicted)
In patients with FEV <sub>1</sub> /FVC <0.7: <sup>Δ</sup>		
GOLD 1	Mild	≥80
GOLD 2	Moderate	50 to 79
GOLD 3	Severe	30 to 49
GOLD 4	Very severe	<30

COPD: chronic obstructive pulmonary disease; GOLD: Global Initiative for Chronic Obstructive Lung Disease; mMRC: modified Medical Research Council dyspnea scale; CAT: COPD Assessment Test; FEV<sub>1</sub>: forced expiratory volume in one second; FVC: forced vital capacity.

\* mMRC dyspnea scale: Refer to UpToDate graphic.

¶ <http://www.catestonline.org>.

Δ The GOLD guidelines ([www.goldcopd.org](http://www.goldcopd.org)) prefer the threshold of <0.7 to the alternative of the fifth percentile lower limit of normal (LLN) for FEV<sub>1</sub>/FVC.

From the Global Strategy for the Diagnosis, Management and Prevention of COPD 2017, © Global Initiative for Chronic Obstructive Lung Disease (GOLD), [www.goldcopd.org](http://www.goldcopd.org). Adapted with permission. The content within this table is still current as of the 2019 GOLD report.



# Biomechanical Interventions <sup>4</sup>

- "*Articular*: For the thorax to function, the complex of costovertebral contacts and intervertebral facet joints, as well as mobility of the spinal column, needs to function normally to accommodate lung expansion. Additionally, the costochondral and chondrosternal joints must be flexible. Articulations of the clavicle and first rib cooperate in mobility of the dome of the lung."
- "*Myofascial*: Distensibility of the horizontal diaphragms, tentorium cerebellae, thoracic inlet, thoracoabdominal and pelvic floor, and the fascial elements of the accessory muscles of respiration is required for optimal respiration. "



# Biomechanical Interventions <sup>4</sup>

- *"Postural reflexes:* The pattern of postural reflexes has led some scientists to postulate postural pattern generators distal to the brain stem and cerebellum. From the osteopathic point of view, these underscore the importance of evaluation and treatment of integrated body regions, not isolated parts or articulations."

# Respiratory-Circulatory Interventions <sup>4</sup>

- "*Lymphatic*: The major route of lymph drainage from the lower body is through the posterior of the thoracic cavity, to return to the left subclavian vein. Lymphatic flow is often considered to be passive, totally dependent on the thoracic pressure gradients generated by respiration. This dynamic is important but complements a measurable lymphatic vasomotor oscillation of between 0.04 and 0.10 Hz."
- "*Venous*: Much of venous return relies on the activities of daily living. Acute illness suspends these activities. The vena cava, under activation of the thoracoabdominal diaphragm, acts as a low-pressure pump to expedite return of waste-laden blood to the heart, and then the lungs for re-oxygenation. The venous stasis of pulmonary disease in conjunction with inactivity from hospitalization may benefit from manipulative assistance. Adjunctive treatments to increase venous return, if not contraindicated in conditions such as heart failure or pulmonary edema, may assist homeostatic balance."

# Respiratory-Circulatory Interventions <sup>4</sup>

- *"Interstitial:* To clear tissue edema, fluids must find their way to one of the previously mentioned components of the vascular system."
- *"Respiratory:* An unobstructed respiratory cycle assists bronchial ciliary clearance of debris in the mucous layer, resorption of transudates, gas exchange, and the other processes dependent on the alternating positive and negative intrathoracic pressures."

# Neurological Interventions <sup>4</sup>

- "*Sympathetic*: Stress, including that of acute illness, may cause increased pulse, ineffective tachypnea, and constriction of blood vessels, impeding tissue oxygenation and removal of waste. The proximity of the sympathetic chain ganglia to the rib heads presents an opportunity for external inhibition of sympathetic hypertonicity. The pneumonia patient is often emotionally and physically stressed."
- "*Facilitation*: A classical osteopathic concept stating that previously acquired segmental dysfunction may lead to a decreased threshold of reactivity to nociception, resulting in increased myotonia, possibly mediated by sympathetic hyperarousal; facilitation may result in somatovisceral or viscerosomatic reflexes."
- The above, combine to create deficient lung function by increase mucus secretions from goblet cells, which are not cleared significantly in tobacco users due to cilia escalator paralysis.

# Neurological Interventions <sup>4</sup>

- "*Viscerosomatic/somatovisceral reflexes*: Attributed to commonalities in interneuronal communication in the posterior horn of the spinal column, these concepts suggest that dysfunction in the visceral organs can cause segmental somatic dysfunction or that somatic dysfunction may demonstrate itself through visceral pathology. The reciprocal relationships in the pulmonary area would involve thoracic segments T2-6."
- "*Postural reflexes*: The pattern of postural reflexes has led some scientists to postulate postural pattern generators distal to the brain stem and cerebellum. From the osteopathic point of view, these underscore the importance of evaluation and treatment of integrated body regions, not isolated parts or articulations. In this context, the importance of optimizing thoracic expansion."

# Metabolic-Energy Interventions

- “The body is a dynamic unit of function.” – AT Still
- The goal of addressing the biomechanical, respiratory-cardiovascular, and neurological models is to optimize homeostasis while decreasing the energy expenditure cost, specifically work of respiration in this case.
- Foster immune and endocrine organ function enhancement would be optimized by addressing autonomic pathways through a combined neurological and metabolic-energetic approach.

# Metabolic-Energetic Interventions

- “The results of this review showed that various vitamins (vitamin C, D, E, A, beta and alpha carotene) are associated with improvement in features of COPD such as symptoms, exacerbations and pulmonary function. High vitamin intake would probably reduce the annual decline of FEV1. There were no studies that showed benefit from vitamin supplementation in improved symptoms, decreased hospitalization or pulmonary function.” <sup>8</sup>
- “Serum 25(OH)D concentration is associated with improved lung function markers but not with the prevalence of asthma, emphysema, and chronic bronchitis.” <sup>9</sup>

# Behavioral Interventions

- Patient dependent, but can be considered based around these considerations:
  - Physical Ability – Can the treatments and lifestyle modifications you're requesting be completed by the functional capacity of the patient in front of you?
  - Mental State – Does the patient have the cognitive ability to understand and implement a treatment plan without assistance?
  - Psychological – Are the physical ability and mental state congruent with the emotional or perceived behaviors?
  - Spiritual – Does the patient have beliefs that should be considered?
  - Resources – Financial, living situation, social support structures?



# Behavioral Interventions

- “The presence of anxiety and/or depression in COPD patients is associated with increased mortality, exacerbation rates, length of hospital stay, and decreased quality of life and functional status.” <sup>10</sup>
- As upper respiratory infections and chronic diseases such as asthma and Chronic Obstructive Pulmonary Disease (COPD) are correlated, these comorbid conditions correspond with an increase in anxiety and depression <sup>11</sup>

Behavior	Technique	Description
All	SMART goal setting	Ensure that goals are specific, measurable, attainable, relevant, and timely.
	Problem-solving barriers	Identify possible barriers to change and develop solutions.
	Self-monitoring	Have patients keep a record of the behavior they are trying to change.
Physical inactivity	Physical activity prescription	Collaboratively work with the patient to pick an activity type, amount, and frequency.
Unhealthy eating	Small changes	Have patients choose small, attainable goals to change their diets, such as reducing the frequency of desserts or soda intake or increasing daily fruit and vegetable consumption.
	Plate Method	Encourage patients to design their plates to include 50 percent fruits and vegetables, 25 percent lean protein, and 25 percent grains or starches.
Lack of sleep	Brief behavioral therapy	After patients complete sleep diaries, use sleep restriction (reducing the amount of time in bed) and sleep scheduling (daily bed and wake-up times).
Medication nonadherence	Provide education	Instruct patients on drug therapy: indication, efficacy, safety, and convenience.
	Make medication routine	Add taking the medication to an existing habit to increase the likelihood patients will remember (e.g., use inhaler before brushing teeth).
	Engage social network	Close family members or friends can help fill pillboxes or remind patients to take their medications.
Smoking	Address the 5 Rs	Discuss the relevance to the patient, risks of smoking, rewards of quitting, roadblocks, and repeat the discussion.
	Set a quit date	Patients who set a quit date are more likely to stop smoking and remain abstinent.

# Initial Management

- CXR – No acute cardiopulmonary abnormality. - Workup (**Respiratory-Circulatory Model**)
- EKG – NSR, normal intervals, no ST/T wave changes, no axis deviation. - Workup (**Respiratory-Circulatory Model**)
- New referral to Neurology - Consultation for CVA component (**Neurological, Behavioral Model**)
- Encouraged continued smoking cessation - Treatment (**Respiratory-Circulatory and Metabolic-Energetic Model**)
- Encourage stretching routine (**Biomechanical and Respiratory-Circulatory Model**)
- Stop Spiriva(tiotropium), start Incruse(umeclidinium) (**Respiratory-Circulatory and Neurological Model**)
  - Spiriva - Neuromuscular & skeletal: Arthralgia ( $\leq 4\%$ ), arthritis ( $\geq 3\%$ ), limb pain ( $\leq 3\%$ ), myalgia (4%), skeletal pain (1% to 3%)
  - Incruse - Neuromuscular & skeletal: Arthralgia (2%), myalgia (1%)

# Osteopathic Exam

Somatic Dysfunction Region	TART Finding(s)	Localized Finding(s)	Special Test	OMT	
Thoracic	TART	T4 NSrRI, T5 NSrRI, T6 NSrRI	Adam's Forward Bending - Neg	Myofascial Release	Improved
Lumbar	TART	Muscles: Left and right paraspinal muscles myofascial restriction	Adam's Forward Bending - Neg	Myofascial Release Articulatory	Improved
Ribs	TART	Ribs: Left Rib 7 and Left Rib 8 Inhaled		Muscle Energy	Improved
Abdomen	TART	Hyperinflated diaphragm		Myofascial Release	Improved

# Initial Management

- OMT
  - Rib-raising and suboccipital release (**Biomechanical, Respiratory-Circulatory, Neurological, Metabolic-Energetic, Behavioral Models**) <sup>10</sup>
  - Sternal myofascial release (**Biomechanical, Respiratory-Circulatory and Neurological Model**) <sup>10</sup>
  - Muscle energy technique to ribs (**Biomechanical, Respiratory-Circulatory and Metabolic-Energy Model**)
  - Thoracic inlet release followed by Miller lymphatic pump (**Biomechanical, Respiratory-Circulatory, Neurological, Metabolic-Energy**)
  - Diaphragm Doming (**Biomechanical, Resp-Circulatory, Neurological, Metabolic-Energetic**)

# Wrap-Up

## Key-Points

- Compared to standard of care, 5 models give you a more comprehensive approach to patient care and development of treatment plans.
- Osteopathic models of treatment can be applied broadly to treatment plans and are not specific to the use of OMT.
- Encourage physician partners to consider an osteopathic approach to treatment when discussing patient cases.

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Questions?