Neurovisceral Integration to Enhance OMT Outcomes

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Approaches that May Expand the Osteopathic Paradigm

Homeostasis & Allostasis
Neurovisceral Integration
Polyvagal Theory Application
Resonance Frequency Breathing
The Gut-Mind Connection
Marian University College of Osteopathic Medicine
PROGRAM GOALS
Lecture Objectives

- Relate Neurovisceral Integration theories related to emotional well-being & general triune health to OPP/OMT approaches
- Provide physiological rationale for OMT to correct somatic dysfunction at particular sites
- Expand rational options for more complete patient care within the osteopathic paradigm
Prep for Lab: OMT Basis

- Modulating CNX & HRV with Sub-Occipital Inhibition & OA Decompression
- Dural Diaphragm (Inion & Nuchal Line)
- Shock Release & Linea Alba & Zink’s Craniosternosacral Mechanism
- Upper GI Sphincter Release
- Link PMR with 2nd-ary Respiration & Heart-Breath Body-Mind Unity

Practical hands-on skills to implement osteopathic treatment paradigm
1. OPP PERSPECTIVES
Osteopathic Tenets & Models

- **Tenets:** *Focus on Body Unity*
- **Models:** *Integration of Neurological-Autonomic, Respiratory-Circulatory & Biopsychosocial Models*

**Blood Memorial Lecture (2009)**

- **OMT Access Sites:** Anatomy, Homeostasis & Allostasis
Analogy – Models for Understanding

◦ “Understanding” Light
  ◦ Particle
  ◦ Wave
  ◦ Quanta of Energy

◦ Good Models
  ◦ Plan Intervention Based on “Rules of the Model”
  ◦ Efficiently Carry-out Intervention
    (Often “Guidelines” Based on Model)
  ◦ What Planned & Did → Achieves Predicted Outcome
Osteopathic Healthcare Models

Biopsychosocial

Postural - Biomechanical

Metabolic - Hormonal

Neurological – Autonomic

Respiratory - Circulatory

Graphics from ATSU / ECOP
“Homeostasis emphasized that the body’s internal environment is held constant by the self-correcting (negative feedback) actions of its constituent organs.

Allostasis emphasizes that the internal milieu varies to meet perceived and anticipated demand. This variation is achieved by multiple, mutually reinforcing neural and neuroendocrine mechanisms that override the homeostatic mechanisms.

The allostatic model, in emphasizing the subordination of local feedbacks to control by the brain, provides a strong conceptual framework to explain social and psychological modulation of physiology and pathology.”

–Peter Sterling & Joseph Eyer, 1988
Links Structures to Function

Links Anatomy (foundational base) to Physiology (middle floor)

Inter-relates Homeostasis & Allostatic Load

Aids in Considering Patient Care Access & Goals
Stress-exacerbated disorders include:

- **Four (4) major causes of mortality**
  - Heart disease
  - Cancer
  - Diabetes
  - Stroke

- **Three (3) major causes of morbidity**
  - Anxiety disorders
  - Depression
  - Chronic pain
Biopsychosocial Model: Access Mind-Body Pathways & Environment

Goal: ↓ stress/allostastic load (each “wall” of the pyramid)

- **Biochemical Change:** ↑ cortisol, DHEA, adrenalin, noradrenalin
- **ANS Imbalance:** Polyvagal / Neurovisceral Integration / Primary Respiratory
Psychoneuroimmunology links stressors (including emotional-spiritual ones) to reduced immune function

Link between bidirectional communications among the nervous system, endocrine and immune systems.
OCMM Approach considers the impact of the primary respiratory mechanism (Sutherland’s PRM) &/or of stress on the PRM. The breath is often used adjunctively for access into the integrated mind-body-spirit system.
Neurovisceral Integration: Links emotional responses to ANS responses with negative impact on health (Applies Polyvagal Theory)
2. PERSPECTIVES on STRESS & ALLOSTASIS
Impact of Stressors

- Historical:
  - Selye’s General Adaptive Response
  - McEwen’s Allostatic Model
  - Sympathetic (“Fight-Flight”) vs Parasympathetic (“Rest-Digest”)

- More Recent:
  - Porges’ Polyvagal Theory
  - Thayer’s Neurovisceral Integration
  - Respiratory Resonance
Stress — Allostasis - Homeostasis

**Stress:** “a reaction to a stimulus that disturbs our physical or mental equilibrium”

- Mental-Emotional-Spiritual stressors initiate 2-way communication
  - Brain ↔ Cardiovascular, immune, metabolic (etc) systems
  - Communication via nervous system, endocrine system & hypothalamic–pituitary–adrenal (HPA) axis
- **General Adaptation Response** (Alarm → Resistance → Exhaustion)
Stress Induces Change or General Adaptation

- **Physiological**
  - increased blood pressure, heart rate, dry throat, heart rate variability, etc.

- **Immunological**
  - immune system dysfunction – suppression or sensitization

- **Behavioral/Psychological**
  - changes to eating, sleeping patterns, mood, etc.
  - Physiological links (neurotransmitters / ANS dysregulation, etc.)
Hans Selye (1936)

**General Adaptation Response**

- **Stage 1: Alarm**
  - A stressor is perceived. Slight drop in homeostasis occurs as the mind and body temporarily lose balance.

- **Stage 2: Resistance**
  - Adaptation resources are mobilized to combat stressor. Endocrine system comes into play.
  - All systems reacting to everyday stressors in a balanced and healthful manner.

- **Stage 3: Exhaustion**
  - Adaptation energy stores are depleted. Replenish them, and the body will return to homeostatic state.

**TIME**
**Stress — Allostasis - Homeostasis**

**Allostasis**: “the adaptive process of maintaining stability during conditions that are outside of the usual homeostatic range.”

- **Allostatic load** reflects the long-term pathophysiological “cost” (Allostatic Load Model, McEwen 1998)

**Optimal homeostasis**: Seeking the state in which meeting our immediate needs incurs the least possible long-term costs
The cardiovascular system is particularly sensitive to stress.

- When stimulated → needs extra reserves of oxygen and glucose → heart beats faster → repeated blood pressure surges → hypertension → increases risk of heart attack.

As part of the process for keeping the body supplied with fuel when under stress, adrenaline and cortisol work together to balance the energy supply.

- If a person remains under stress → cortisol levels stay high → energy stored as fat.
- Fat accumulates along blood vessel walls → atherosclerosis → increased risk of heart attack.
Consistently elevated cortisol and catecholamine levels →
- Diabetes, insomnia, myocardial infarction
- Infection, cancer, autoimmune diseases
- Impaired learning – atrophy in hippocampus
- Depression

Medical Circles talking most about Allostatic Load
With majority focused on HPA Axis & ANS Imbalance
The immune system is sensitive to stress → immune dysfunction

- Normal stress → immune system sends WBCs where needed.
- Ongoing stress (becomes allostatic load) → **immune system becomes suppressed** → increased risk of infection.
- In some people the opposite occurs → **immune system sensitized** → starts to attack threats that don’t exist. (This is the basis of many autoimmune diseases)
Linked Physical / ANS to Human Response (Phylogenetically)

We remember trauma less in words and more with our feelings and our bodies
[van der Kolk & Fisler, 1995]

How the Nervous System Helps Us Defend Ourselves

Brain scan research shows that, when we remember a traumatic event, memory centers in the frontal lobes shut down, and we get overwhelmed by feelings and impulses or driven to action.

The limbic system responds to memories with increased activity, especially in the amygdala, the brain’s and emotional memory center. The amygdala “sounds the alarm” as if we were in danger right now.

The reptilian brain reacts instinctively to the amygdala’s ‘alarm.’ Heart rate increases. We stop breathing or hyperventilate. Muscles tense. We either speed up or shut down.

Fight-Flight Responses: “Don’t just sit there—do something!”

Freeze-Submit Responses: “Don’t move—it’s not safe”

Sympathetic Nervous System: when the amygdala fires, the body uses an adrenaline rush to increase heart rate and respiration, causing muscles to tense and a surge of energy that prepares us for action. The frontal lobes shut down to increase speed of response.

Parasympathetic Nervous System: when it isn’t safe to flee or fight, or when ‘it’s over,’ other chemicals slow heart rate and respiration, leading to physical collapse, exhaustion, weakness, shaking and trembling, increased gastro-intestinal activity, and the survival responses of freeze and submit.
Myelinated Vagus (‘Mammalian” Response – “Smart Vagus”)  
- Moment to moment, immediate heart rate response to threat ("vagal brake") → Higher HRV  
- Advantageous (greatest flexibility of response) to use the most advanced level of the ANS  
- Linked to other cranial nerves involved with expressing emotion to foster social engagement response → feelings of “safety” and “support”  

Sympathetic Responses  
- When the fast myelinated response fails, the phylogenetically older SNS is recruited to regulate metabolic output in response to stress  
- Reduces flexibility & rapidity of response to threat (Lower HRV)  
- Delays return to calm, resting, reparative, anti-inflammatory state when the threat has ceased  

Unmyelinated Vagus (”Reptilian” Response)  
- Freeze to survive at all costs; least effective
If highest strategy fails $\rightarrow$ down to next strategy
If 2\textsuperscript{nd} strategy fails $\rightarrow$ down to lowest strategy
Neurovisceral Integration Model Links Mental-Emotional ⇔ HRV & Health Levels

- Proposes that dysfunctional psychological states are rooted in an impaired vagal inhibitory mechanism associated with low HRV.
- Suggests that ANS imbalance, particularly with underactivity of the PNS, may be the final common pathway between negative emotions and poor health.
Psychophysiological Coherence: Rhythmic activity in living systems reflects the regulation of interconnected biological, social & environmental networks.

McCraty proposed the heart rhythm coherence hypothesis which states that the pattern and stability of beat-to-beat heart rate activity encode information over “macroscopic time scales,” which can impact cognitive performance and emotional experience.
Social Engagement System in Managing Allostatic Load
Social Engagement System: (Facial expression, Vocalizations, Listening)

- Integrated system
  - Somatomotor component regulating striated facial muscles
  - Visceromotor component regulating the heart and bronchi
  - CN V, VII, IX, X & XI pathways (regulate the expression, detection, and subjective experiences of affect and emotion)

- Promotes positive social interactions in safe contexts
  - Calms viscera & regulates facial muscles
  - Down-regulates SNS & HPA-axis
  - Dampens physiological arousal & stress reactions
"Neuroception" describes how neural circuits distinguish whether situations or people are safe, dangerous or life threatening.

- e.g., explains why a baby coos at a caregiver but cries at a stranger
- e.g., explains why a toddler enjoys a parent's embrace but views a hug from a stranger as an assault

Social Engagement Strategies require neuroception interpretation of "safety" (1/3 of this shaped by experiences especially in childhood when CNS plasticity is high)

- Faulty neuroception linked to several psychiatric disorders, including autism, schizophrenia, anxiety disorders, depression & Reactive Attachment Disorder

NOTE: Several "Body Unity" elements facilitate the link between neuroception & the social engagement process (e.g., cranial nerves of facial expression, non-verbal clues from gut, heart, breath, muscles, etc)
Basic Science Considerations: Anatomy – Physiology Overview

A Specific Neurotransmitter Involved in Homeostasis & Relationship to Vagus

- GABA
GABA
(gamma-Aminobutyric acid)

- **Chief inhibitory neurotransmitter** in mammalian CNS
  - Principal role in **reducing** CNS neuronal excitability
    - Sedative; Anxiolytic; Anticonvulsant
  - Neurons that produce GABA = “GABAergic neurons”
  - Synthesized in the brain from glutamate (normally an excitatory neurotransmitter) using cofactor from Vit B6
- Also directly responsible for the **regulation of muscle tone**
Intrinsic GABA vs The Extrinsic “Drugstore”

Agonists or Positive Allosteric Modulators
  ◦ **Usually sedating or anxiolytic effect**
  ◦ Include: Ambien, barbiturates, benzodiazepines (eg: Valium), chloral hydrate, neuroactive steroids (eg: progesterone), Xanax
  ◦ Also include: ethanol, muscimol (mushroom), kava, valerian
  ◦ **NOTE: Allosteric modifiers don’t work without co-existing presence of GABA**

Antagonists or Negative Allosteric Modulators
  ◦ Include: furosemide, thujone
Demonstrated in various peripheral tissues and organs

- eg: intestine, stomach, liver, pancreas, uterus, gonads, kidney/bladder, lung
- Recently an excitatory GABAergic system was described in the airway epithelium that is activated by allergens and may participate in the mechanisms of asthma
GABA also from gut microflora!
ANS Central Role in Stress Associated with Low GABA Activity

- GABA imbalances traced to decreased PNS activity and increased SNS activity.
  - Increased HRV indicates better PNS/SNS physiology (homeostasis)
- Stress exacerbates symptoms in disorders associated with low GABA activity
  - eg: Epilepsy; Depression; PTSD; Chronic Pain.
  - These stress exacerbated disorders are marked by PNS underactivity
  - Have low HRV, increased HPA Axis activity as indicated by increased cortisol, and reduced GABA-ergic activity in the CNS

Aside: GABA from gut microflora may be one additional explanation regarding recognized link between interrelated emotional and gut functions
Stress induces:
1. ANS imbalance (⇓ PNS / ↑ SNS activity)
2. GABA underactivity (GABA is an inhibitory neurotransmitter)
3. Reduced intersocial / emotional responses
4. ↑ allostatic load ("price self pays long-term for maintaining homeostasis")

Proposed OMT stress reduction outcomes (LAB LATER):
1. Corrects PNS & GABA underactivity through vagal stimulation
2. Improves brain function in regions regulating response to threat perception, interoception, fear processing, emotion regulation & defensive reactions
3. Enhanced central regulatory system function → ↓ allostatic load → ↑ health
4. Improves heart rate variability (a known measure related to positive health outcomes)
Has not nature’s God been thoughtful enough to place in man all the elements and principles that the word “remedy” means?

-- Autobiography of A. T. Still

The body of man [is] God’s drug-store and [has] in it all liquids, drugs, lubricating oils, opiates, acids, and anti-acids, and every sort of drug that the wisdom of God thought necessary for human happiness and health.

-- Autobiography of A. T. Still

Back to Osteopathy & Its Tenets …
"Talk is talk, but the biscuit speaks for the cook."
3. HEART RATE VARIABILITY
Basic Science Considerations: Anatomy – Physiology Overview

The Central Autonomic Network & A Key Coherence Measure

- *Heart Rate Variability (HRV)*
Central Autonomic Imbalance in Stress

Stress causes ANS imbalance

- Can roughly measure with heart rate variability (HRV)
- Higher sympathetic activity with lower psym means psym/symp ratio is reduced
- This creates lower HRV

ANS output through:

- Stellate ganglia
- Vagal nerve

HRV: a central indicator of central-peripheral feedback and CNS-ANS integration
Afferent fiber groups (3)

1. General Visceral Afferents (GVA) – majority of fibers
   - From pharynx, larynx, trachea & thoracoabdominal viscera
   - To the nucleus tractus solitarius (NTS)
     - Important relay station (provides info re the body’s internal milieu)
     - Has connections to autonomic, reticular & limbic structures

2. General Somatic Afferents (GSA)
   - From the skin in the auditory meatus and taste receptors
   - To synapse in the spinal trigeminal (CNV) tract

3. Special Visceral Afferents (SVA)
   - Carries sensory taste information to the NTS
Vagal afferents influence

- The locus ceruleus -- noradrenergic
- The dorsal raphe nuclei -- serotonergic
- The nucleus tractus solitarius (NTS) -- GABA release

CNX conveys information to the CNS structures that mediate interoception (perceptions of the internal state of the body), threat perception and affective states → influences emotional states & thought processes as well as their somatic expression
Bidirectional Vagus Nerves: Efferent Structure

- Efferent fiber groups (2)
  1. Efferent General Visceral (GVE) fibers (unmyelinated)
     - From dorsal motor nucleus (DMN)
     - Innervate thoracic/abdominal viscera (non-cardiac)
  2. Visceral Efferent (SVE) fibers (myelinated)
     - From nucleus ambiguous (NA)
     - Innervate pharynx, larynx, lungs, heart & other viscera
     - Inhibitory to SA Node (slows heart)
Low HRV is associated with pathological conditions, premature aging, death

- Production of proinflammatory cytokines
- Obesity (Chicken or egg)
- Diabetes & cardiovascular disease (as age, predictive value of obesity-cholesterol-hypertension lose predictive value but HRV remains predictive)
- Immune dysfunction
- Negative emotions: depression, anxiety, hostility leading to prolonged state alarm (chicken or egg?)
- Hypervigilence, less stress tolerance & heightened negative responses (defensive behaviors) to neutral situations
- Poor sleep maintenance / less restful sleep
- Ability to learn (stress-related cognitive impact)

Neurovisceral Integration Model, Thayer
HRV is a measure of neurocardiac function that reflects heart–brain interactions & ANS dynamics.

- **High HRV**
  - Implies vagal dominance
  - Sign that the stress response system has greater flexibility to respond to challenges.

- **Low HRV**
  - Indicates more restricted responsiveness to stress
  - Associated with increased risk of all-causes of mortality related to cardiac disease

- An organism’s response to internal and external challenges is limited by the need to maintain stability.
  - When stability is maintained through allostasis, flexibility of the system declines and leads to pathological states and damage to the organism
Relation heart & respiratory system

- ANS balance interacting with renin-angiotensin system → Decrease stress; alter respiration & other physio

- *British Medical Journal* study showed THM @ 6-cpm → enhanced HRV and baroreflex sensitivity. *(Study compared the positive effects of reciting “Ave Maria” rosary in Latin or a yoga mantra on breathing rate, R-R HVR intervals, blood pressure & cerebral circulation).*  
  *BMJ.* 2001;323:1446-1449

- OMT impacts THM (*JAOA*) & modulates Beat-to-Beat Variability

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Something efficacious in a rhythmic oscillation of around 6 cpm, manifested by the human nervous and vascular systems? Example in CHF, a respiratory rate of 6 cpm reduces exaggerated sensitivity of the respiratory chemoreflex & improves irregular breathing.
Body Unity: Physiological Coherence
Systemic Response to Stressors

“Physiological Coherence”

- Unified orderly & stable rhythms generated by living systems
- Specific approaches for quantifying coherence include identifying & measuring:
  - **Cross-Coherence**: frequency entrainment (e.g., respiration, BP & heart rhythms)
  - **Systems Synchronization**: (e.g., synchronization between various EEG rhythms and the cardiac cycle)
  - **Auto-Coherence**: stability of a single waveform such as respiration or Heart Rate Variability (HRV) patterns
  - **System Resonance**
4. BREATH
Basic Science Considerations: Anatomy – Physiology Overview

Diaphragm(s) & Breathing
Intervention: Breath

- **High Priority**: Because breathing is vital to survival, information from the respiratory system must be noticed and attended to immediately
  - **Intervention model** suggests that signals from vagal afferents carrying information about changes in the rate, depth or pattern of breathing receive the highest priority and have rapid, widespread effects on brain functions.

- **Unique in ANS Function**: Breathing is the only autonomic function that can easily be voluntarily controlled so provides a portal through which specific selected breathing patterns
  - Can be used to send messages through PNS, SNS and interoceptive systems to affect how the brain perceives, interprets, and responds to stress or threat
**Intervention: Breath**

- **Resonance Breathing “exercises” the baroreceptors:**
  - Increased baroreflex gain is analogous to a more sensitive thermostat, allowing the body to regulate BP and gas exchange more effectively.

- **Structured breathing (e.g., yoga breathing) has neurophysiological effects**
  - Stretch receptors in the alveoli, baroreceptors, chemoreceptors & sensors throughout the respiratory structures send information about the state & activity of the respiratory system through vagal afferents & brainstem relay stations to other CNS structures.
  - Input influences perception, cognition, emotion regulation, somatic expression & behavior.

- Consider as adjunctive to OMT or prescribe as exercise.
Rapid Shallow Breathing when stretch receptors perceive alveoli to be “full of air”
- Misled by alveoli full of fluid
- Misled by somatic dysfunction (CNX afferents)
- “Ear cough”

Correct Somatic Dysfunction Contribution to Stopping Chronic Nagging Cough

CSF Chemoreceptor MOA?
Structured Breathing Practices - Types

- **Paced Breathing**: Specific rate (usually listen to a pacing sound)
  - Resets synchrony hypothalamus & brain-stem to enhance PNS response and reduce overall neural excitability
  - Slow → stretch vagal stretch receptors in alveoli & fibroblasts
    - Definition of “slow” pace = 3-7 / min
    - Strongest ECG correlation to HRV with Paced Breathing at 6bpm
  - Adding music enhances experience & compliance

- **Coherent Breathing**: 4.6-6/min with equal in-out
  - Coherent at 6 maximizes baroreceptor sensitivity and O2 to brain

- **Resonant Breathing** = Coherent Breathing with Lips Pursed to create resistance (usually on exhalation phase)
  - Strongest HRV outcome at 4.5 – 6 / min

- **Slow unilateral nostril breathing** improves spatial memory

- Other types of breathing: Breathing with movement; Moving the breath to directed sites; etc
Voluntary Breathing Practices

- **General Advice**
  - Slow breathing with eyes closed best
  - Enhanced outcome if 1st relieve physical tension
    1st (qi gong, yoga, tai chi)

- **Different Rates for Different Goals**
  - Rate 4.5 – 6 optimal for ANS, cognitive & stress reduction
  - Rate<3bpm more sedating/meditative
Alternative reason for large sigh at end of CV4 ???
Breathing in Polyvagal Theory

Physiologically, breathing “gates” the influence of the myelinated vagus on the heart

- **Inhale** → influence of vagus attenuated → heart rate increases
- **Exhale** → influence of vagus increased → heart rate decreases

Simple mechanical change in breathing increases the calming impact & health benefits of the myelinated vagus
Many HRV Biofeedback (HRVB) training protocols incorporate a 6 breath/min component

- Reflects total cardiac vagal tone (summed influence of both myelinated and unmyelinated efferent vagal pathways)
- “Exercises” the baroreflex … HR and BP oscillations are 180° out of phase → HRV amplitude is maximized
- The 6/minute phase relationship between HR, respiration, and BP results in the most efficient gas exchange and oxygen saturation
Example of Shock = “Gasp” as See Car in Rear View Mirror About to Hit You

**OMT Example: “Shock Release” #1**

- Pt knees bent to relax abdomen
- Contact costal margin on left
- Take enough soft tissue to travel up to diaphragm at Rib 6
- Compress to resistance
- Have patient breathe slowly (½ breath in; hold; blow out)
- As blow out, *slightly* increase resistance
- Continue until release

*Intention can be important*

**Site of Restriction from “Gasp”**
OMT Example: Linea Alba Inhibition
(Somatoemotional Site: East = Solar Plexus; West = Collateral Ganglia)

- Make all fingers the same length
- Contact midline & compress to resistance
- Have patient breathe slowly (½ breath in; hold; blow out)
- As blow out, slightly increase resistance
- Continue until release
- Intention can be important
Collateral Ganglion or Linea Alba?

**COLLATERAL GANGLIA**

- Splanchnic nerve (preganglionic fibers)
- Postganglionic fibers
- Collateral ganglion
- Lateral gray horn
- White ramus
- Innervates visceral organs in abdominopelvic cavity

Sympathetic Only, Parasympathetic Only, or Both?
5. GUT-MIND CONNECTION
Basic Science Considerations: Anatomy – Physiology Overview

Enteric Nervous System (ENS)
- Dialog between ANS & ENS
- Role of Microflora in each
Decisions Based on “Gut Feelings”

Interoceptive input from gut (& other structures) to frontal lobes learned & refined from infancy

Intuitive decision making can be defined as the rapid assessment of the probability of a favorable or unfavorable outcome of a planned behavior in a situation of uncertain outcomes, which is dependent on previous experiences rather than on serial processes of inductive and or deductive reasoning

“... trust your gut ...”
“... follow your heart ...”
“... takes my breath away...”
Gut as a “neurological organ”

- Has as many nerve cells as the spinal cord
- Lies within the gut wall & acts like a “little brain” that can function independently of the CNS
  - Despite ENS, efferent vagal neurons provide a profuse, widespread input to the myenteric plexus of esophagus & stomach whereas input to small intestine is less extensive
  - Means drugs used in neurology, psychiatry & anesthesiology can disturb ENS function, because many of the transmitters and transmitter receptors present in the brain have also been localized to the ENS
Based on close bidirectional connections with limbic & autonomic regions of the brain, the **ENS can be viewed as a peripheral extension of the limbic system into the gut** with interoceptors registering powerful mechanical, chemical & microbial input.

Alternatively, **parts of the CNS viewed as an encephalized portion of the ENS** (in particular, pontine, autonomic and limbic circuits)

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**Top-down modulation** of gastrointestinal function by stress & emotions

**Bottom-up signaling** from visceral afferents to the brain in abdominal pain syndromes & in emotion regulation
Mucosal immune modulation and modulation of interactions between the microflora & the mucosa
Possible additional therapeutic targets

- OMT: Target sphincters sites which are rich in mechanoreceptors
- Diet: Consider probiotics / diet
- Changes in microflora
6. OMT APPLICATION ...
RATIONAL OSTEOPATHIC TREATMENT
Perspectives Today on Proposed Mechanisms: Neurovisceral Integration - Polyvagal Theory - Resonance Frequency Breathing

- Understand the Impact / Pathophysiological consequences of stress (allostatic load) on health & homeostasis ...

- Value in Integratinge Neurovisceral Perspectives Using OMT & Breathing Strategies
  - How to Make the Prediction in each MOA
  - How to Plan and Implement the Intervention
  - Expected Outcomes

- Hands-On Workshop: Implementation Skills for this Osteopathic Neurovisceral / Body Unit Paradigm
Body-Mind Unity Paradigm

Link neuromusculoskeletal self to the emotional self in H&P

Screen for each of 5 Osteopathic Models; Assess Key Access Sites for Dysfunction; PRM – Vitality, Inherent Rhythms, Coherence, Self
Body-Mind-Spirit Coherence: The osteopathic paradigm embraces body unity & unified physiological coherence in inherent forces and both neurological-biochemical and respiratory-circulatory synchrony

- Metaphorically: We can link “pneuma” (meaning both “breath” and “spirit”); “spirae” (root in both spirit and respiration); “anemos/anima” (puts the wind/breath into animation) → “Breath of Life” … these represent important body unit principle; inhalation takes in new life while exhalation breathes out the old negatives. “That took my breath away.”

- Metaphorically: “Love you with all of my heart” … “he is hard-hearted” … “can you find it in your heart to forgive” …

Osteopathy and Body Unity: Progressive focusing from skeletal → visceral → bioenergetic or from physical → mental → emotional → spiritual are strategies that can be useful. Other progressions include bone → fluid → energy and another is skin outside →”self” inside. Yet another “as above ↔ → so below.”
**Vagal Target:** Now a paradigm shift in the medical treatment of diverse disorders like depression, epilepsy & pain using vagal nerve stimulation/balance-regulation ... adds rich layer to osteopathic understanding in the neurological-ANS model

- Instead of exclusively targeting sympathetic activities, physicians should also **attempt to modulate/increase myelinated vagal tone**.
  - Metaphorically: can no longer base treatment decisions based solely on the concept of a ‘sticky accelerator’ (sympathetics) while overlooking the possibility of ‘bad brakes’ (parasympathetics).
- Behavioral interventions like **HRV Biofeedback** and **emotional self-regulation strategies** represent non-invasive methods of restoring homeostasis.
Gut-Mind: Paradigm recognizes an important gut-emotion / gut-physiological link. Whether linked neurologically through the vagus or linked to GABA (vagal or microflora connection or both), enhancing the function of one is empirically linked to the function of the other

- Metaphorically: “Gut-wrenching” … “can’t stomach that”… need to “vent my spleen” “got butterflies in my stomach”

Visceral OMT may help homeostasis of the bowel directly. Vagal innervation of much of bowel (especially mechanoreceptor rich sphincter areas) may play a role through the vagus. Visceral OMT may provide a non-invasive method of modulating emotion and psychological health by linking biopsychosocial & neurological-ANS models.
Breathing/Rhythm Coherence: This part of the paradigm embraces body unity & unified physiological coherence in inherent forces. Reinforces neurological-biochemical synchrony: Value in pain reduction & markers (eg HRV). Important in social interaction & interpersonal synchrony. It is also ... “Intentional”

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Respiratory intervention represents a non-invasive method of restoring homeostasis and enhancing social engagement by linking biopsychosocial & respiratory-circulatory models.

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Respiratory intervention represents a non-invasive method of restoring homeostasis and enhancing social engagement by linking biopsychosocial & respiratory-circulatory models. → Other applications for example ...
One More Perspective: Stay Open to Considering Other Possible Access to the Body-Mind Connection

Examples ... No detail today but ...

- Music Therapy
- Tomatis Therapy
- Aromatherapy
- Probiotics
- Others!
ANS regulation is linked to neural regulation of the muscles of the face & head

- Muscles used to signal our emotional state are involved in the production of vocal and instrumental music (i.e., via wind instruments).
- Muscles also involved in the active process necessary to actively listen to music (i.e., the modulation of our middle ear muscles).

Also exercises the Social Engagement System
Music Therapy & Social Engagement System

Music therapy exercising the Social Engagement System

- Frequency content of melodies in most musical compositions duplicates the frequency band of human voice.
- Music phrasing is also important (Phrasing of music, especially when singing or playing a wind instrument, results in short inhalations & extended durations of exhalations)
- Melodies $\rightarrow$ middle ear muscles $\rightarrow$ tense the ossical chain
- Vocal music triggers neural mechanisms that regulate the entire Social Engagement System $\rightarrow$ resultant changes in facial affect & autonomic state.
- RESULT: We look and feel better when we listen to melodies! Enhances learning and memory … etc … etc …
Oath of Hippocrates ...

“The regimen I adopt shall be for the benefit of my patients according to my ability and judgement ...

Loose translation ... “Dig On!”
“Anything I can clean up later?”

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