

POLYVAGAL THEORY: ACTIVATION, COLLAPSE, AND THE TRAUMA GUT



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AGENDA

Anatomy and function of the vagal nerve

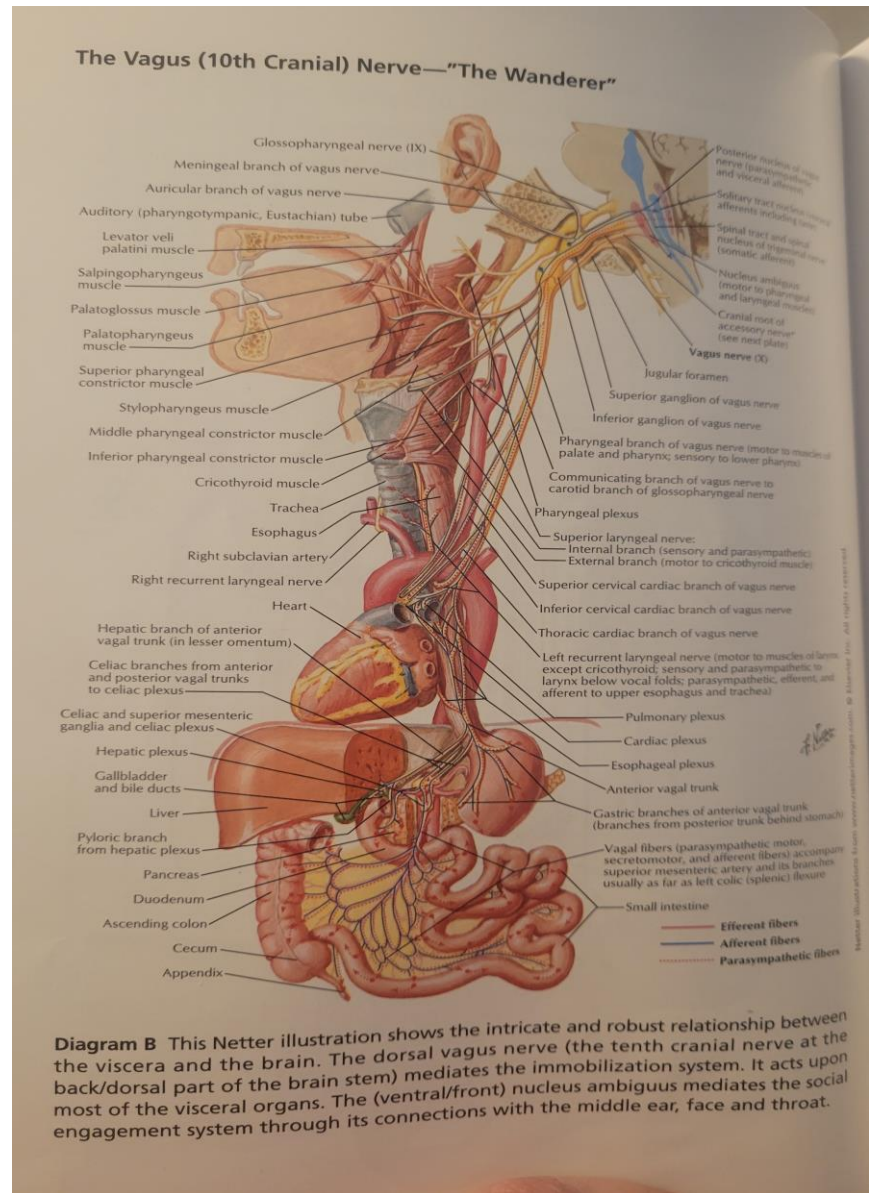
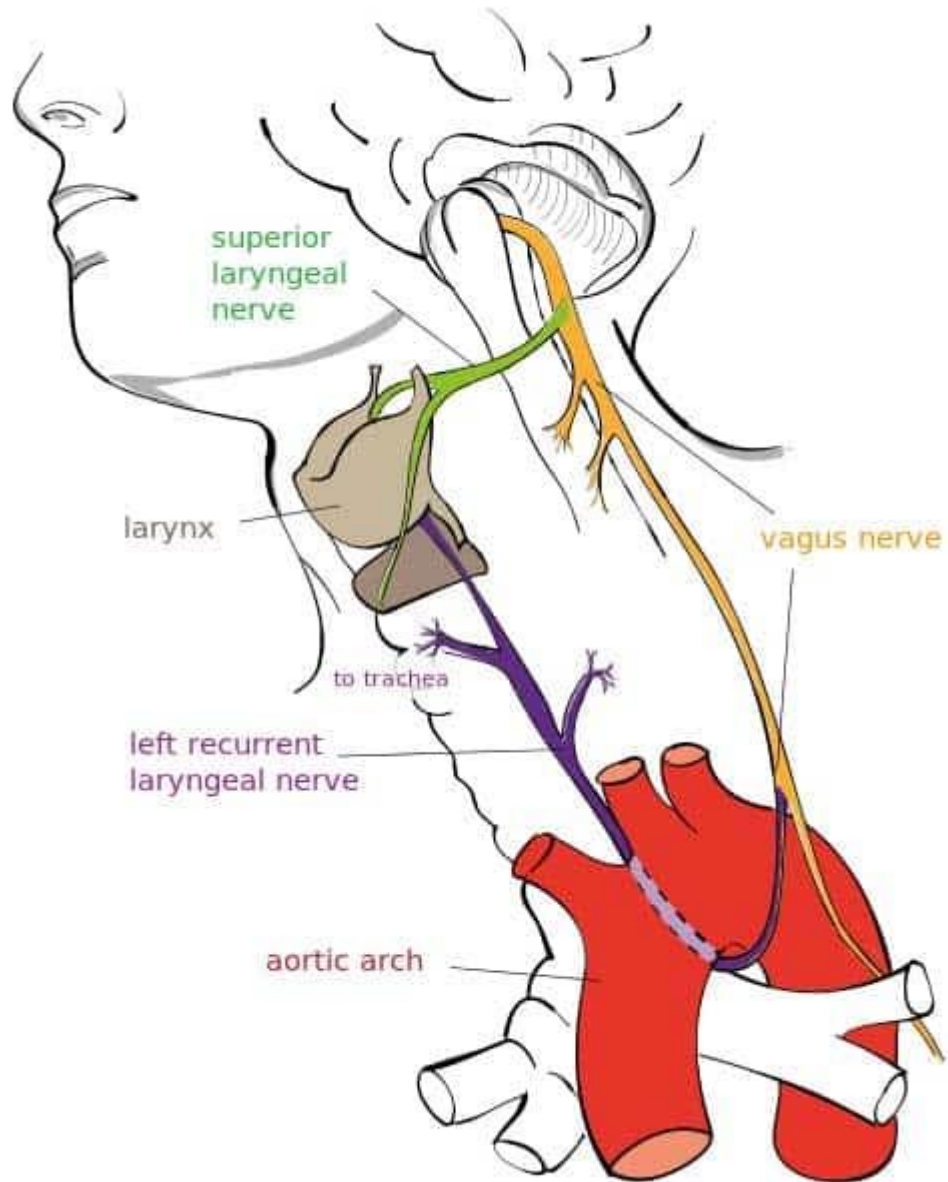
What is Polyvagal Theory?

Activation /Shutdown and the effect the gut

Nutritional/enzyme implications

The Vagal Nerve

- The vagal nerve, (10th cranial nerve) is responsible for the regulation of internal organ functions, such as digestion, heart rate, respiratory rate, as well as vasomotor activity, and certain reflex actions, such as coughing, sneezing, swallowing, and vomiting. It is known as the “wanderer”.
- It is a parasympathetic nerve with many branch offshoots responsible for the signaling of cardiac function, digestion, and the brain. It connects our brain to our gut, carrying important sensory and motor information.
- The Ventral Vagal (Social Engagement) is responsible for above the diaphragm actions (including larynx/sound) and facial expressions while the Dorsal Vagal is responsible for below the diaphragm and digestive processes.



WHAT DOES THE VAGAL NERVE DO?

The vagus nerve, (10th cranial nerve) is responsible for the regulation of internal organ functions, such as digestion, heart rate, respiratory rate, as well as vasomotor activity, and certain reflex actions, such as coughing, sneezing, swallowing, and vomiting



WHAT IS POLYVAGAL THEORY?

- PVT is the science of safety and social engagement--connection. It the bridge to understanding both physiological and psychological effects on the ANS. The theory introduces us to understanding the states of mobilization (sympathetic), engagement (ventral vagal), and disconnection (dorsal vagal). Safety or lack thereof is experienced in early childhood. This is when our nervous systems are trained to trust or be on the defense. Ideally, we should be able to easily shift between these states of stress or challenge. But what if there was early trauma and the nervous system has adapted to a certain response?

Trauma and the Body

- Early trauma and anxiety experiences shape how our nervous systems interact with the world.
- Connection to protection- scanning the environment for danger and threat

Perception vs. Neuroception

- Hypervigilance-fight or flight (the sympathetic nervous system)
- Shutdown- activation to collapse can lead to dissociation, brain fog, feeling out of body or checked out. Behaviors can include mindless social media use or alcohol abuse. This can also be called functional freeze.

WHAT IS THE PURPOSE OF SHUTDOWN?

- The unmyelinated, ancient part of our brain (500 million years old!) helps us to conserve energy and oxygen (think of reptiles and their natural defense system which is immobilization). Shutting down slows the body down to prepare for traumatic impact. Endorphins are released by the hypothalamus/pituitary glands to lessen the pain response. The dorsal vagal response is an extreme version of the parasympathetic nervous system response.

The Ladder

The Dorsal Vagus is 500 million years old.

The sympathetic nervous system is 400 million years old and is the mobilization response.

Social Engagement is 200 million years old known as the Ventral Vagus.

The goal is to stay in the window of tolerance and to train the body to move easily from one state to another, rather than get stuck in an activation state.

Polyvagal Three Circuits

Social Engagement System

- Safe Connection
- Calm | Regulated
- Healthy Balance
- Resourced | Resourceful



Mobilization

- Cues of threat or danger
- Chronic stress or anxiety
- Fight or flight response
- Greater conflict in relationships

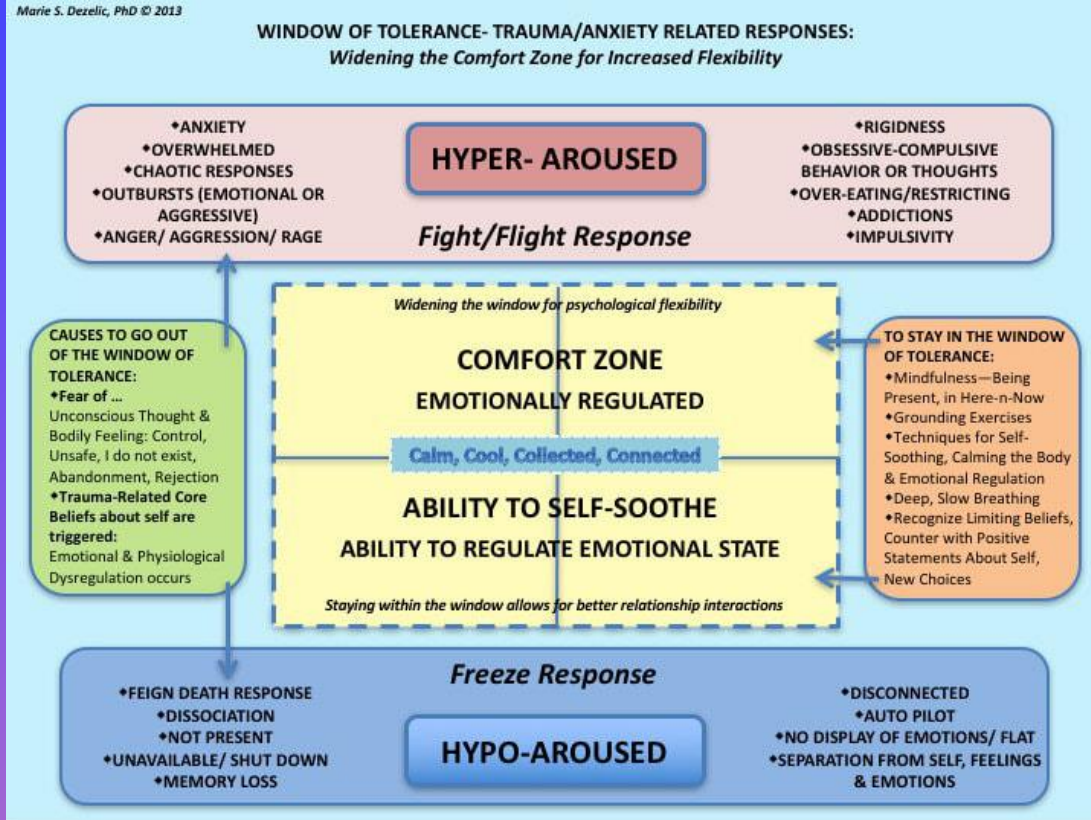


Immobilization

- Threat feels life-threatening
- Collapse | Shutdown
- Unhealthy coping behaviours
- Despair | Hopelessness



Credit: Stephen Porges and Carrie DeJong (carriedejong.com)



Polyvagal Theory

The Window of Tolerance



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Adverse childhood experiences, risk factors in the onset of autoimmune diseases in adults: A meta-analysis.

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Macarenco, M.-M., Opariuc-Dan, C., & Nedelcea, C. (2022). Adverse childhood experiences, risk factors in the onset of autoimmune diseases in adults: A meta-analysis. *Professional Psychology: Research and Practice*, 53(1), 69–79. <https://doi.org/10.1037/pro0000430>

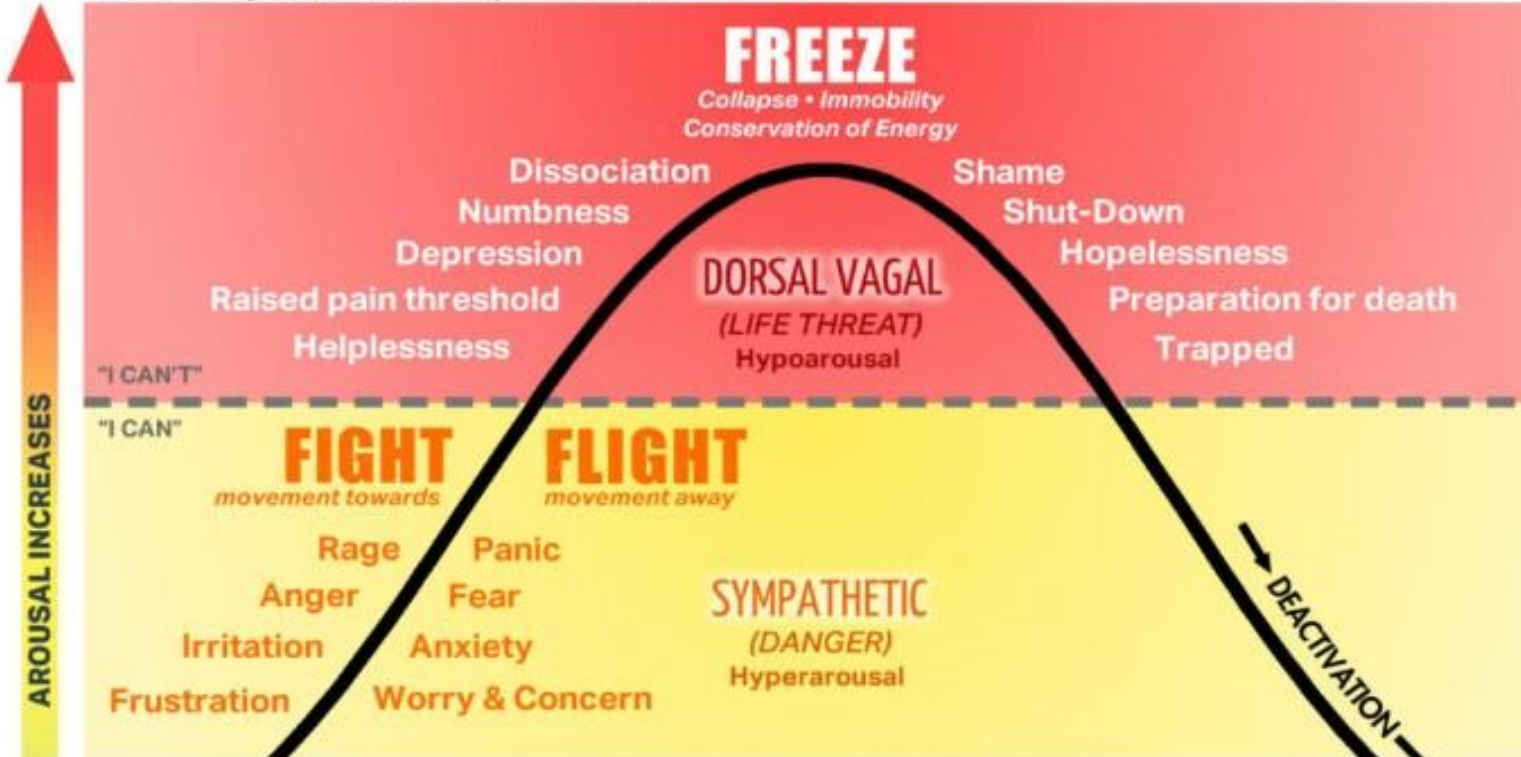
Adverse childhood experiences (ACEs) are potentially traumatic events with a major impact on health. Though many studies have been conducted on the association between ACEs and autoimmune diseases (ADs), no attempt has been made so far to summarize the results of these empirical studies comprehensively. The purpose of this meta-analysis is to provide the first and objective summary of research regarding the influence of ACEs on ADs and to analyze inconsistencies across studies, hoping to reach a unitary conclusion. Eighteen studies investigating the relationship between ACEs and ADs were included. A random-effects model was used for pooling the effect sizes (ESs). The findings indicate a statistically not significant overall effect, $g = .17$, 95% CI $[-.01 \text{ to } .34]$. Several potential moderator variables were examined and discussed. The findings of the subgroup analyses indicate an association with some specific variables. Small ESs were observed for emotional abuse, $g = .25$, 95% CI $[.22-.28]$, emotional neglect, $g = .27$, 95% CI $[.17-.36]$, and witnessing violence, $g = .29$, 95% CI $[.26-.33]$. The ES was only significant when ACEs were measured for localized ADs, $g = .30$, 95% CI $[.17-.43]$, in case-control, $g = .29$, 95% CI $[-.08 \text{ to } .66]$, cohort designs, $g = .21$, 95% CI $[-.07 \text{ to } .49]$, and when the comparison group was general population, $g = .34$, 95% CI $[.19-.48]$. The present meta-analysis suggests that ACEs are not significantly associated with ADs in adults. However, the findings of the subgroup analyses indicate an association with some specific variables. (PsycInfo Database Record (c) 2022 APA, all rights reserved)

The Dorsal Vagal Shutdown

When the amygdala is chronically activated in the presence of trauma or perceived threat through neuroception, the freeze/fawn response may occur. This looks like learned helplessness, giving up, and dissociation. This unconscious fear response cues the fear of original trauma activating the viscera (heart, lungs, stomach, colon) A chronic dorsal vagal response can lead to IBS, Colitis, and other autoimmune disorders due to weakening of vagal tone. Any oscillation between sympathetic and parasympathetic (dorsal vagal), these conditions will activate, subside and reactive which makes it challenging to diagnose.

POLYVAGAL CHART

The nervous system with a neuroception of threat:



PARASYMPATHETIC NERVOUS SYSTEM
DORSAL VAGAL COMPLEX

Increases

- Fuel storage & insulin activity • Immobilization behavior (with fear)
- Endorphins that help numb and raise the pain threshold
- Conservation of metabolic resources

Decreases

- Heart Rate • Blood Pressure • Temperature • Muscle Tone
- Facial Expressions & Eye Contact • Depth of Breath • Social Behavior
- Attunement to Human Voice • Sexual Responses • Immune Response

SYMPATHETIC NERVOUS SYSTEM

Increases

- Blood Pressure • Heart Rate • Fuel Availability • Adrenaline
- Oxygen Circulation to Vital Organs • Blood Clotting • Pupil Size
- Dilation of Bronchi • Defensive Responses

Decreases

- Fuel Storage • Insulin Activity • Digestion • Salivation
- Relational Ability • Immune Response

The nervous system with a neuroception of safety:



PARASYMPATHETIC NERVOUS SYSTEM
VENTRAL VAGAL COMPLEX

Increases

- Digestion • Intestinal Motility • Resistance to Infection
- Immune Response • Rest and Recuperation • Health & Vitality
- Circulation to non-vital organs (skin, extremities)
- Oxytocin (neuromodulator involved in social bonds that allows immobility without fear) • Ability to Relate and Connect
- Movement in eyes and head turning • Prosody in voice • Breath

Decreases

- Defensive Responses

A Gut Review


Primed to eat, we produce enzymes for breaking down foods and the stomach produces HCl to bathe food and kill off parasites and begin the break down process

The GB and pancreas release bile to break down/digest lipids in addition to digestive enzymes.

As food gets passed into the SI, it is further broken down to pull out nutrients to be transferred to the rest of the body. Contractions (Peristalsis) in the intestinal walls moves food down the digestive tract

A Gut Review (con't)


Parts of the intestinal walls contract to steer food digested to the lining of the SI and it is here nutrients are absorbed.



Powerful waves of contraction in the large intestine move contents back and forth so it can extract the remaining water in the intestines.



A final wave moves the excess waste to the rectum and colon where it can be eliminated. This last wave triggers the urge to have a bowel movement.



Between meals the migrating motor complex is the gut's housekeeper. These are intense waves that further break down left over materials and sweep them into the small intestine/lg intestine and colon.

THE DIGESTIVE PROCESS

...in a Perfect World!

Food & Mood

- Whole, Fresh Food
- Mindful
- PSNS “rest & digest”
 - » Prepares digestive system

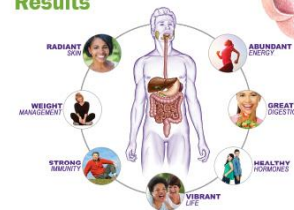
Esophagus, LES, Stomach

- LES opens & closes
- Gastrin hormone signals activity of stomach
 - HCL → pepsinogen to pepsin
 - Kills bacteria
 - Calcium absorption
 - Gastric lipase
 - Intrinsic factor – B12 absorption
- **Chyme** moves into small intestines

Large Intestines / Colon

- Bacteria
- Fiber / water
- **Stool** is eliminated

Results

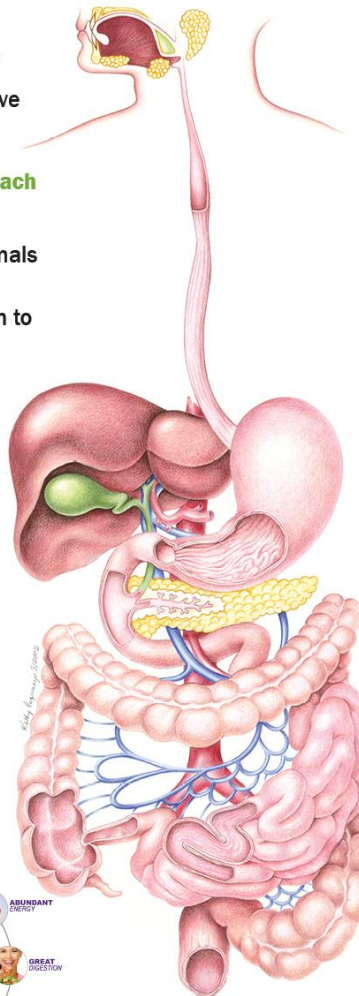


Mouth

- Chew 30-40x
- Salivary amylase & lipase
- **Bolus** moves into stomach

Pyloric Sphincter, Small Intestines

- Cholecystikinin (CCK) hormone
 - Pancreas → amylase, lipase, trypsin/ chymotrypsin
 - Gall Bladder → bile
- Secretin hormone
 - Pancreas → bicarbonate & water
- Brush Border Enzymes
 - Peptidases
 - Maltase, sucrose, lactase, glucosidase
- Microbiome - Bacteria
 - Enzymes
 - Vitamins / antioxidants
 - Antimicrobials
- **Waste** moves into Large Intestines



THE DIGESTIVE PROCESS

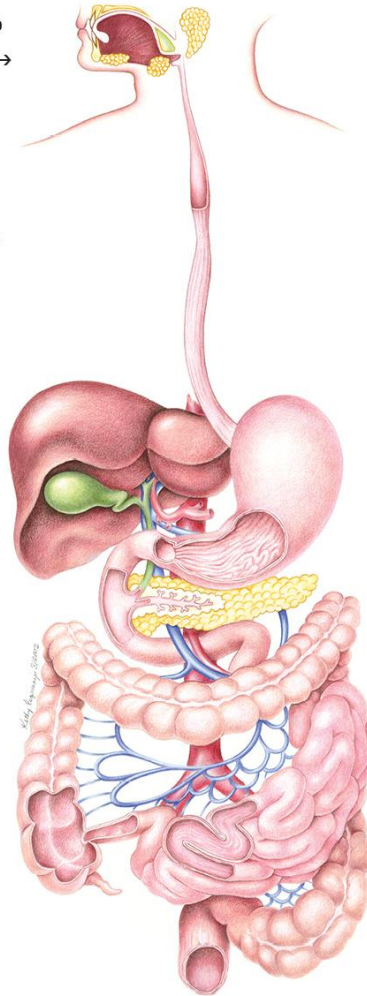
...in the REAL World!

Food & Mood

- Fast food, processed, GMO's
- Stressed & on-the-go
- SNS "fight or flight" → cortisol shuts down digestion

Esophagus, LES, Stomach

- LES opens & closes?
- Gastrin hormone signals activity of stomach
 - ↑ HCL → pepsinogen to pepsin
 - Kills bacteria
 - Calcium absorption
 - ↑ Gastric lipase
 - Intrinsic factor - B12 absorption
- Food sits longer, increases pressure, LES opens
- Reflux / Rx PPI's decrease acid inhibits protein digestion
- Undigested food, protein, bacteria move into small intestines



Mouth

- Chew 3-4x
- Salivary amylase & lipase
- Large *Bites* move into stomach

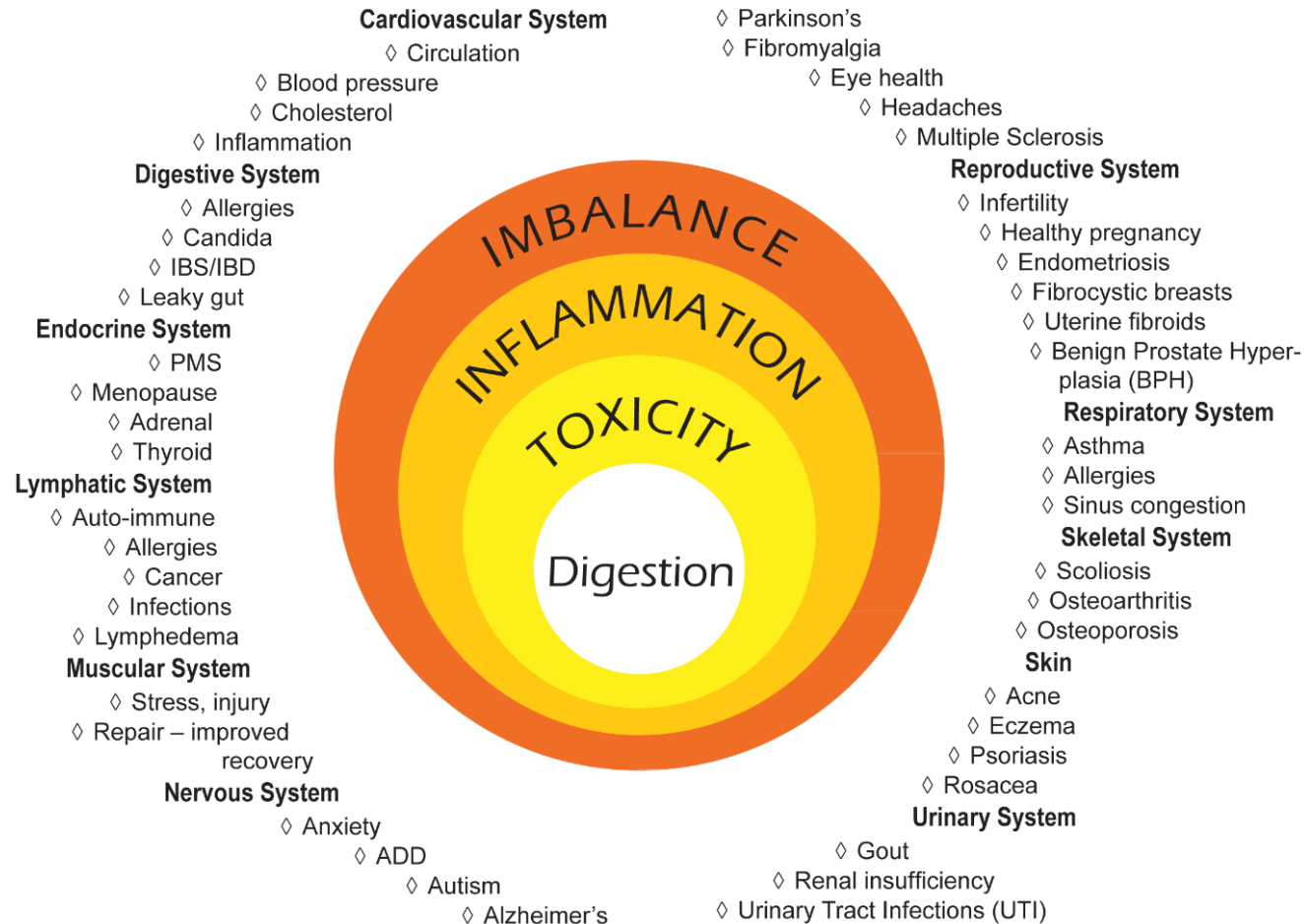
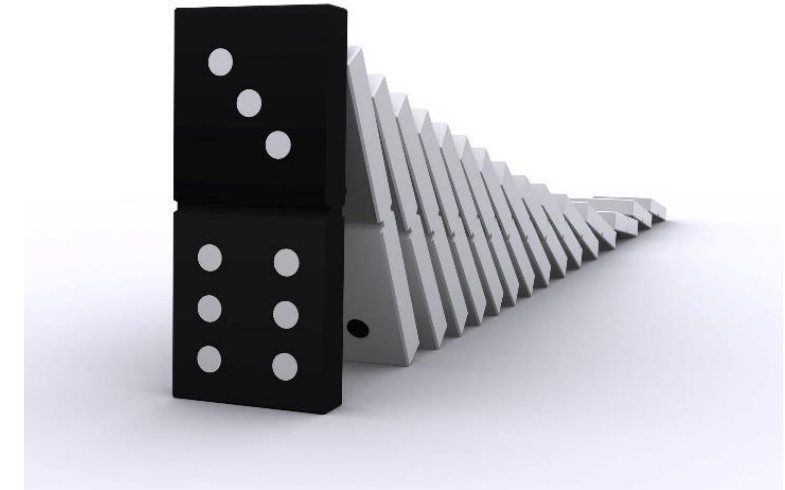
Pyloric Sphincter, Small Intestines

- ↑ Cholecystikinin (CCK) hormone
 - ↑ Pancreas → amylase, lipase, trypsin/chymotrypsin
 - ↑ Gall Bladder → bile
- ↑ Secretin hormone
 - ↑ Pancreas → bicarbonate & water
- Brush Border Enzymes
 - ↑ Peptidases
 - ↑ Maltase, sucrose, lactase, glucosidase
- Imbalance in Microbiome - Bacteria
 - Gas
 - SCFA
 - Inflammation
- **Waste** moves into Large Intestines

Large Intestines / Colon

- Bacteria
- Fiber / water
- **Stool** is eliminated

THE RIPPLE EFFECT



How Stress Drives Leaky Gut & Effect Resiliency?

- Stress shuts down that parasympathetic regulatory place...
 - where a lot of the immune system is optimized and we can see nutritional influence.
- Stress can influence that secretory IGA and also LPS which can literally drill holes in our epithelial lining.
 - So we can see gut damage in relationship to emotional and mental stress.
- Remember, 70-80% of the immune system is in our gut
 - Loss of immune resiliency will occur.

MAJOR CAUSES OF POOR VAGAL TONE

- ▶ Chronic Stress and Poor Sleep
- ▶ Early Childhood Traumatic Experiences
- ▶ Head Injuries
- ▶ Poor Breathing Mechanics
- ▶ Chronic Infections
- ▶ Blood Sugar Imbalances
- ▶ High Toxic Load



A Good Time in Vagas

- **Good Vagal Tone**

- Lowers blood pressure
- Lowers heart rate
- Regulates mood, stress, and anxiety
- Decreases pain and inflammation
- Keeps information highway operational
- Regulates speech and swallowing

- **Sx's of Poor Vagal Tone**

- Nausea
- Bloating and abdominal pain
- Vomiting
- Arrhythmia
- Loss of gag reflex
- Loss of voice/pharynx injury
- Low HCl
- Cold baths

Irritable Bowel Syndrome

And the Emergence of “Trauma Gut”

- Symptoms include alternating loose stools/constipation, mucous in stool, gassiness, bloating
- Triggered by certain foods, hormones, and stress
- Co-morbidity is common with the “trauma gut” including fibromyalgia, CFS, and depression.
- There is a communication problem between CNS and the gut.
- Look for-poor gut motility (peristalsis), visceral sensitivity in the nerve endings, poor absorption, anxiety, intolerance to gluten and dairy, and carbohydrates, and genetic factors

Clinical Pearls

- Take a Trauma History!
- All patients should do an ACE Assessment
- Give your patients Vagal Toning Exercises and teach them about Polyvagal Theory. Use the Window of Tolerance graph as a teaching tool.

What Happens in Vagas...

Ways to Support
Vagal Tone

1. Use an HRV

2. The proper
nutrition and
diet (food
sensitivities)

3. Meditation

4. Kundalini
Yoga (alternate
nostril
breathing)

5. Cold Therapy

6. Essential Oils
(lavender,
peppermint)

7. Pets!

8. Vagal Nerve
Stimulation
Devices

9. Beneficial
Bacteria
(Probiotics and
Enzymes!!!!)

Diet & Lifestyle for Healthy Vagal Tone

DIET

- Whole foods
- Fresh
- Locally grown
- Organic
- Nutrient dense
- Antioxidant rich
- Fiber
- Water

LIFESTYLE

- Chemical free
- Exercise
- Hobbies
- Rest
- Manage stress
- Read, pray, meditate
- Positive self talk

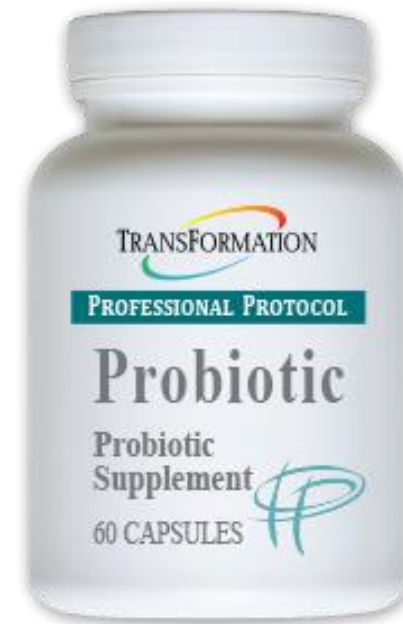
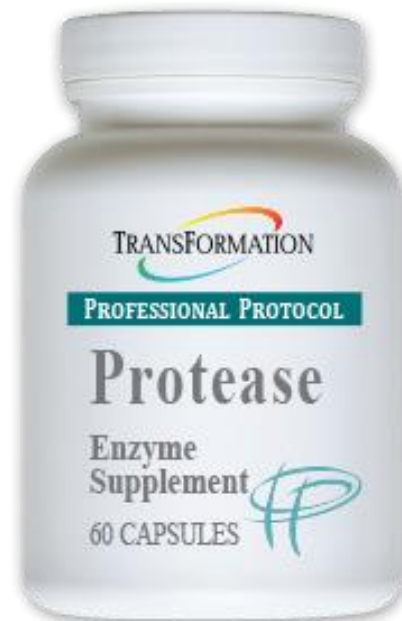
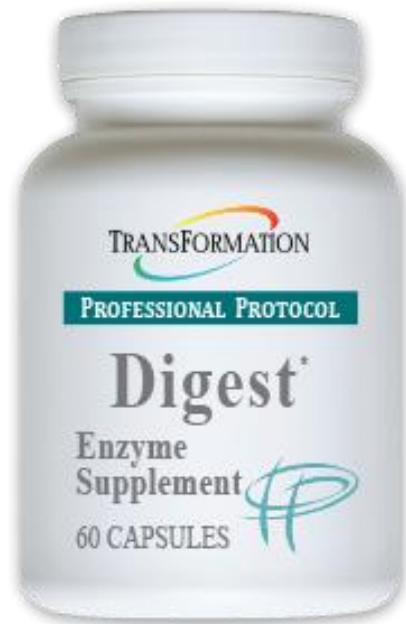
How Enzyme Therapy Can Support Vagal Tone



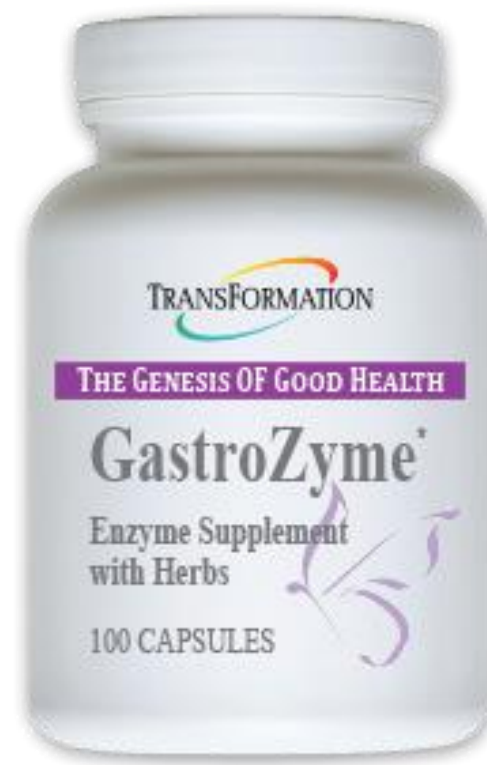
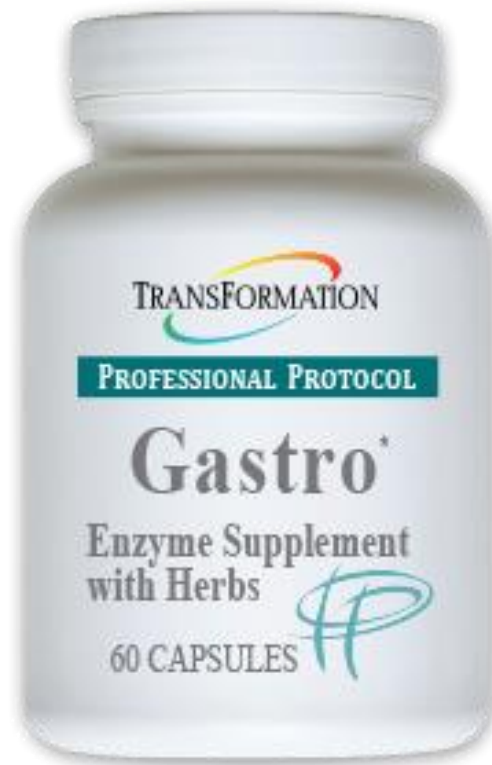
HEALTHY GUT = NUTRIENTS, REPAIR, & WELLNESS



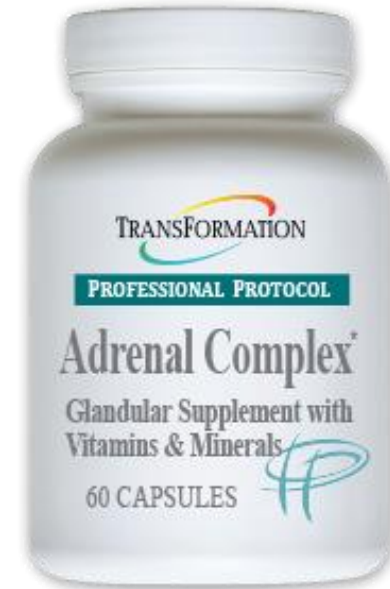
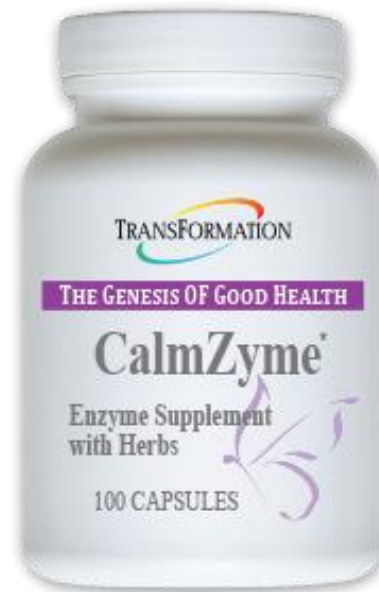
DIGESTIVE WELLNESS PROGRAM



GUT LINING & REPAIR



STRESS RESILIENCE SUPPORT PRODUCTS





Supporting the VN (con't)

- Gargling
- Chanting
- Singing
- Meditation and Breath
- Cold Showers
- HIIT, interval training and endurance
- Massage
- Music
- Cold Water Immersion/ice baths
- Creativity/expressive arts
- Eating fiber fills us/slows gut movement
- Laughter!
- Omegas
- Enzymes-Psychobiotics!
- Socializing and Connection



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THANK YOU

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