Anatomy day 7

Natalie Bavinck 2026

THE NERVOUS SYSTEM

What is the nervous system?

Central nervous system

Limbic system

Peripheral nervous system

Vagus nerve

Autonomous nervous system

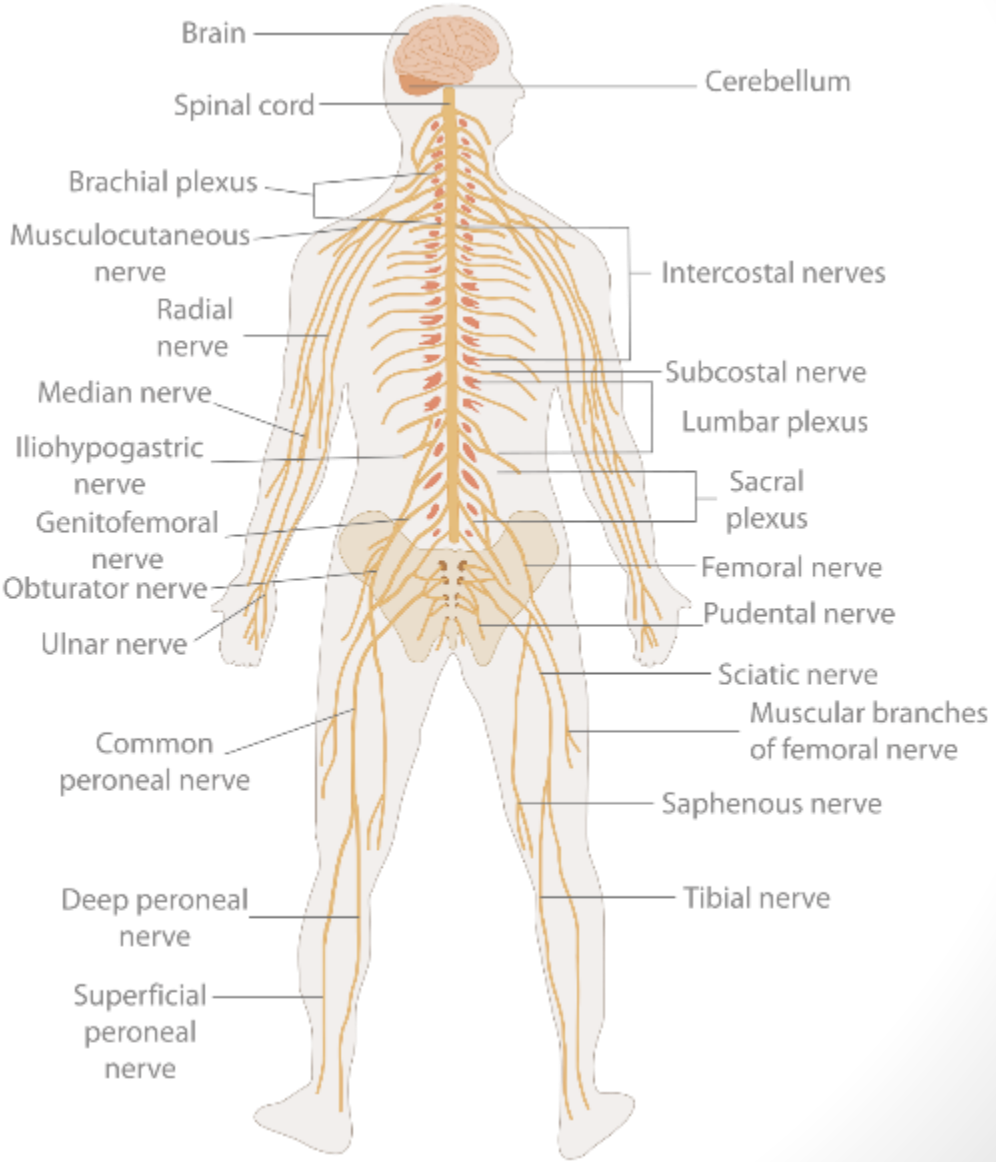
Polyvagal theory

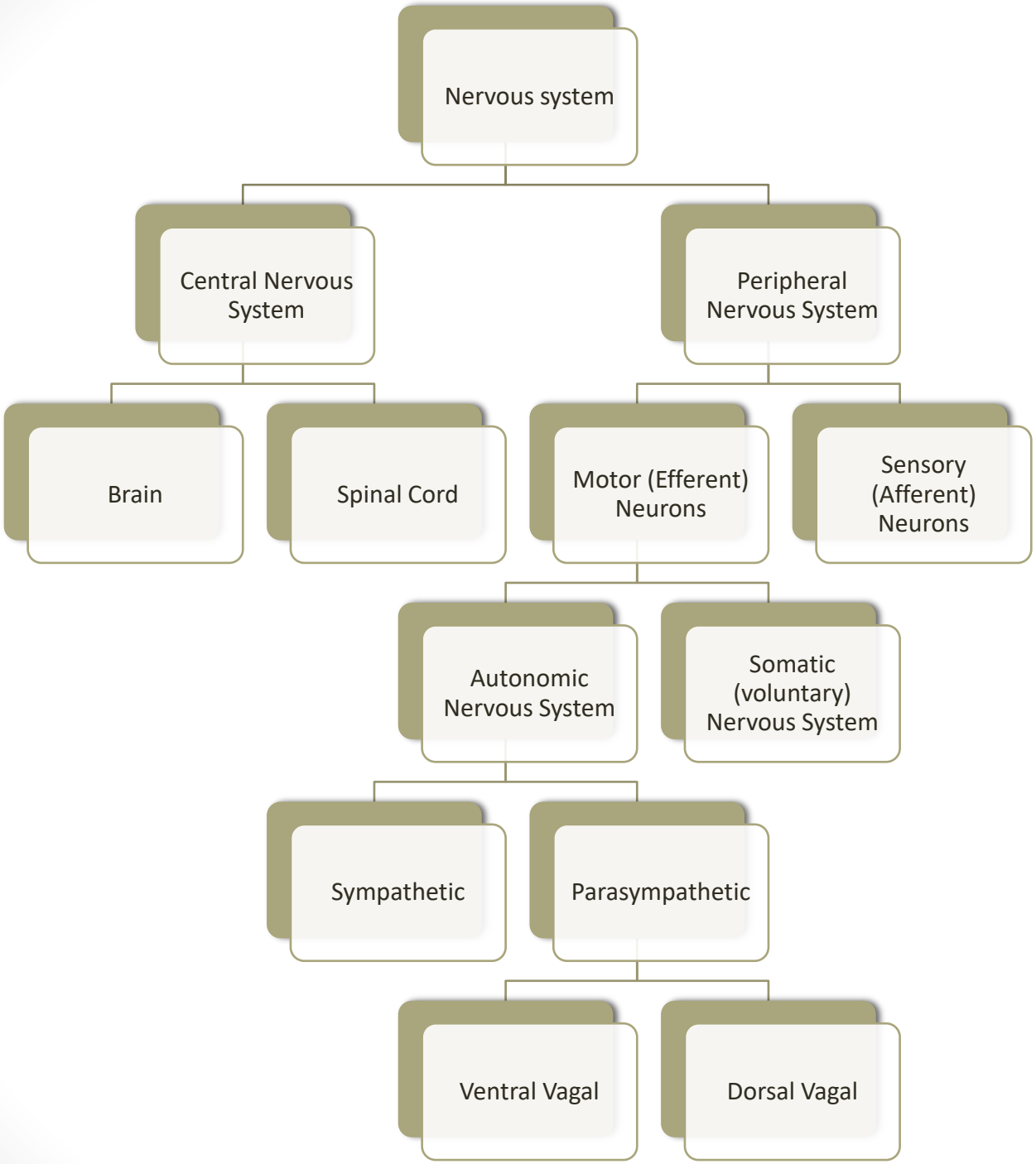
Nervous system in yoga

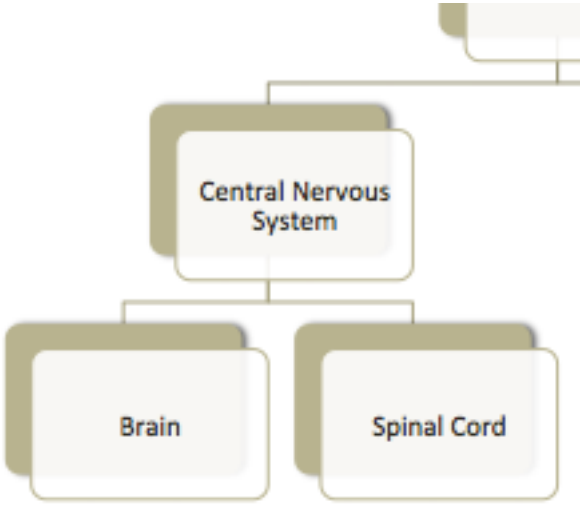
What is the nervous system?

The nervous system is a complex network of nerves and cells that carry messages to and from the brain and spinal cord to various parts of the body

The nervous system includes the Central nervous system and the Peripheral nervous system




Nervous system
Central Nervous System
Peripheral Nervous System
Brain
Spinal Cord
Motor (Efferent) Neurons
Sensory (Afferent) Neurons
Autonomic Nervous System
Somatic (voluntary) Nervous System
Sympathetic
Parasympathetic
Ventral Vagal
Dorsal Vagal

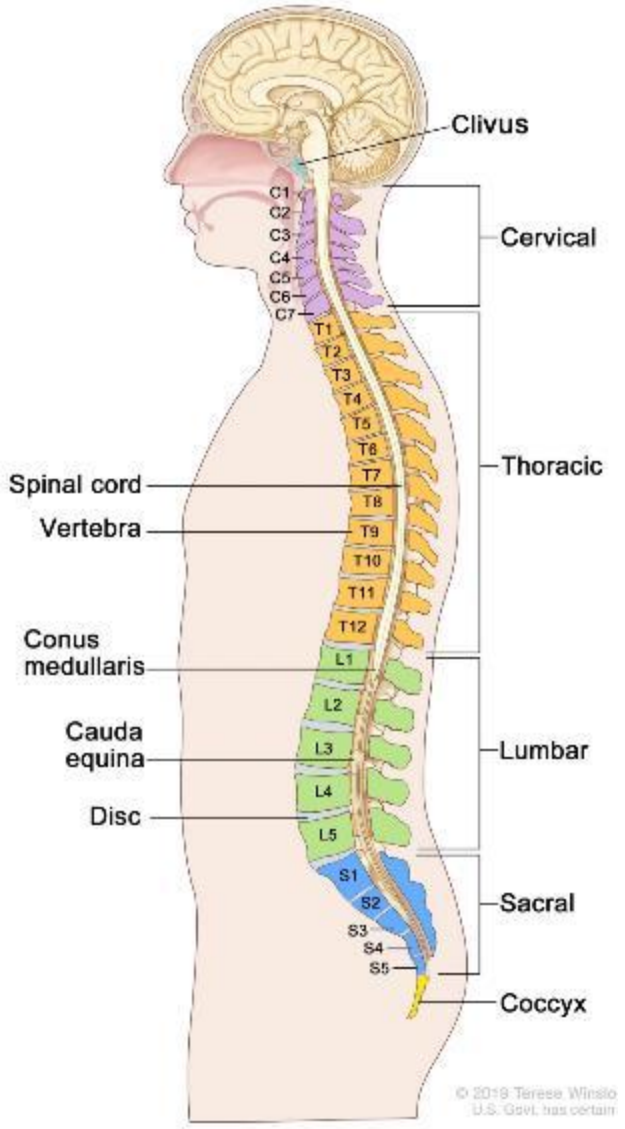


The brain

The spinal cord

THE CENTRAL NERVOUS SYSTEM

Spinal cord

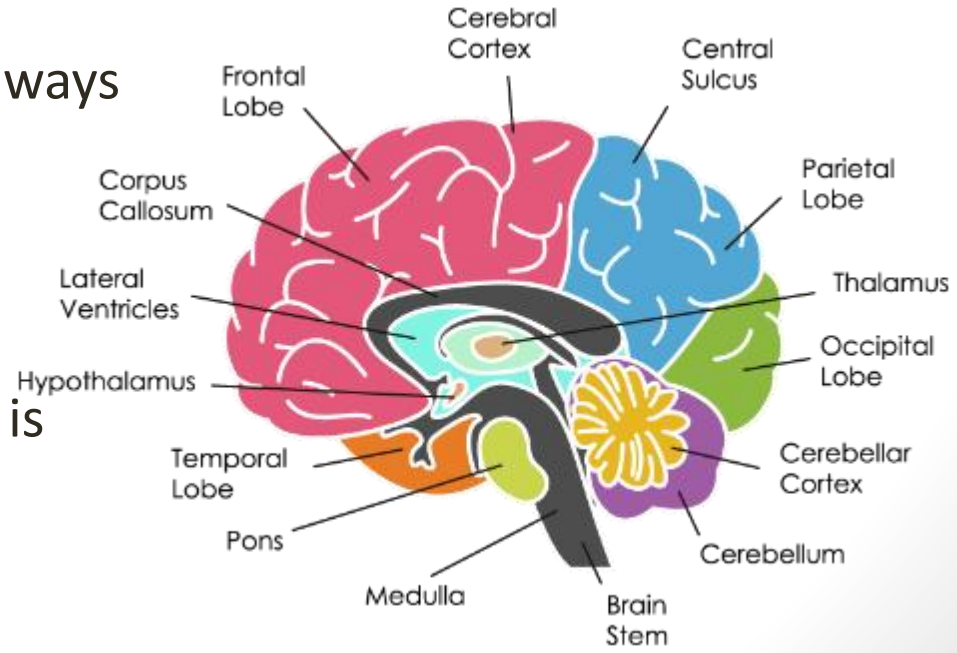


- A bundled network of nerve fibers that connect most parts of our body to the brain
- About 45 cm long and 1,25 cm thick
- Spinal nerves branch of the spinal cord and are extremely fragile
- Spinal nerves connect to the rest of our body and our organs

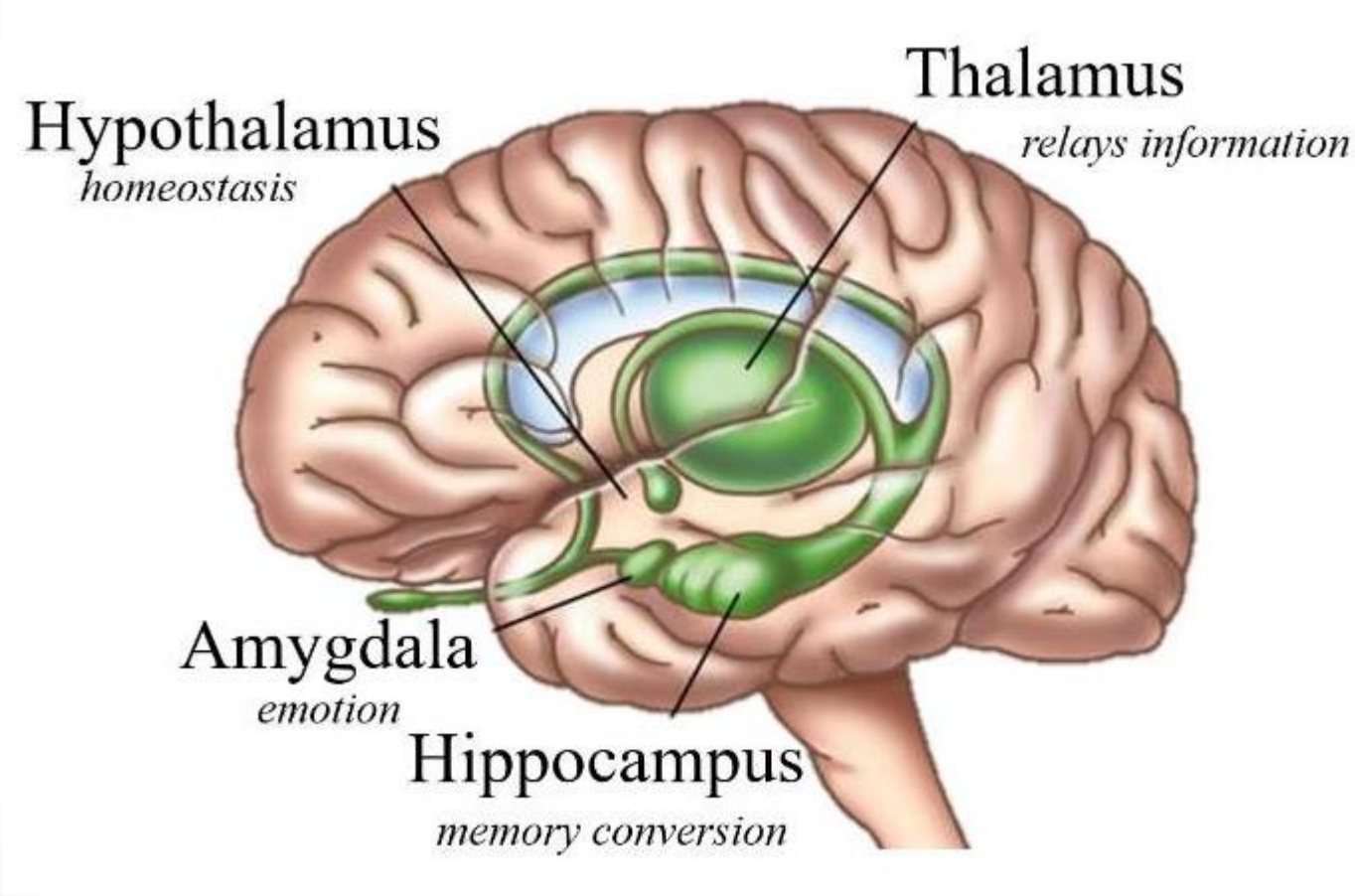
The brain

- The brain controls what we think and feel, how we learn and how we remember, they way we talk and the way we move.
- It ALSO controls everything we're not as aware of like our inner organs.
- In young children the brain is highly adaptable and parts can take over for each other
- As we age the neural pathways are harder to change

We don't go too much In depth on the brain, but it is very interesting!



A closer look: The Limbic System

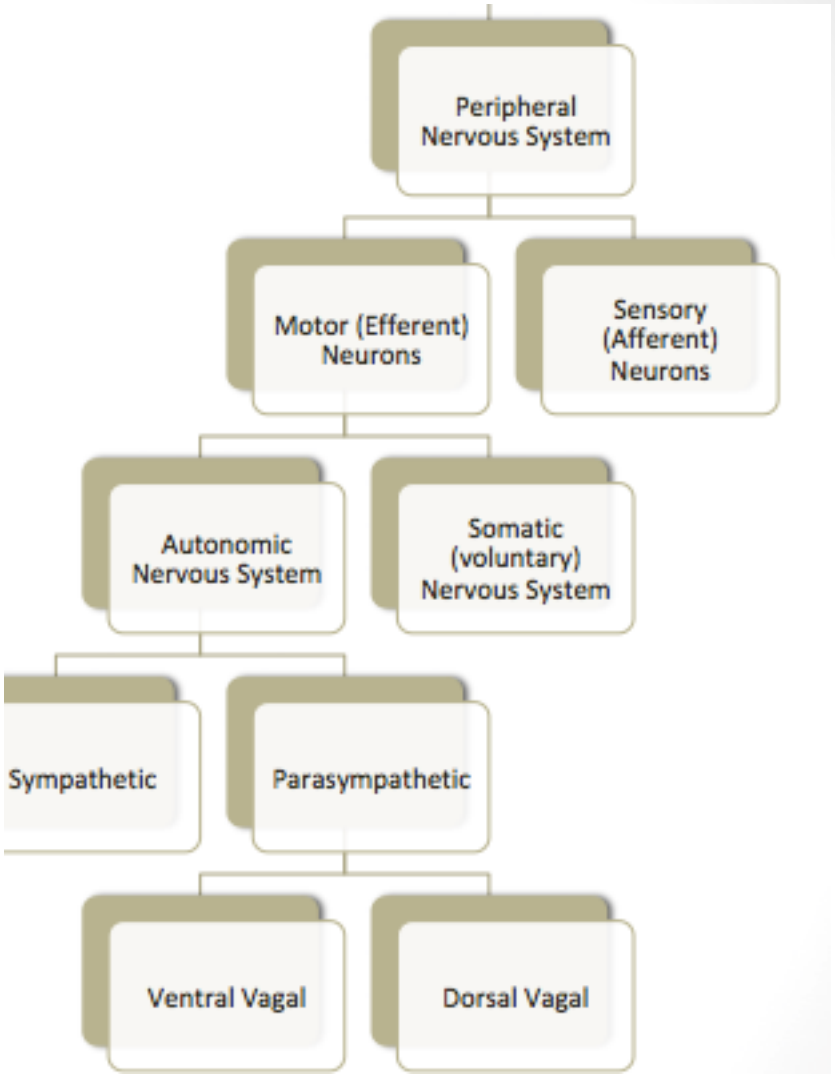


https://youtu.be/v9dnM3AEd_Y

Limbic system

The paleomammalian cortex (reptillian brain for primitive survival instincts) helps us emotionally bond to other creatures

- **Hippocampus**: comes as a pair of curvy seahorse like structures and is the memory center or our brain, our memories are filed away here for long-term storage. Also helps with spatial navigation and helps us learn new skills
- **Amygdala**: Shaped like two lima beans and plays a role in our emotional responses, attaches emotional content to memories and thus plays an important role in how memories are stored



Autonomic nervous system

Somatic nervous system

PERIPHERAL NERVOUS SYSTEM

The vagus nerve

- Pneumogastric nerve
- The 10th (out of 12) cranial nerves and runs all the way from the brain stem to the colon (gut-brain connection)
- The vagus nerve is part the the parasympathetic nervous system
- Serves as a break or ‘sacred pause’ for the sympathetic nervous system
- Sends signals to the muscles of the throat, circulation, respiration, digestion and elimination
- 80% is sensory which means it’s critical for homeostasis
- Two sides of the vagus nerve; dorsal (back) and ventral (front)

Autonomic nervous system

- Involuntary nervous system
- How we perceive external stimuli and maintain internal balance
- Refers to collections of motor neurons (ganglia) in the head, neck, thorax, abdomen and pelvis
- Emotions are linked with internal organs
- Within the ANS the sympathetic system is viewed as quickly responding and mobilizing for action and parasympathetic system is seen to act slower and interact with the vagus nerve
- When there is disfunction of the ANS this may affect any of the associated organs (e.g. Parkinson's, HIV, Ehlers-Danlos, multiple system atophy)

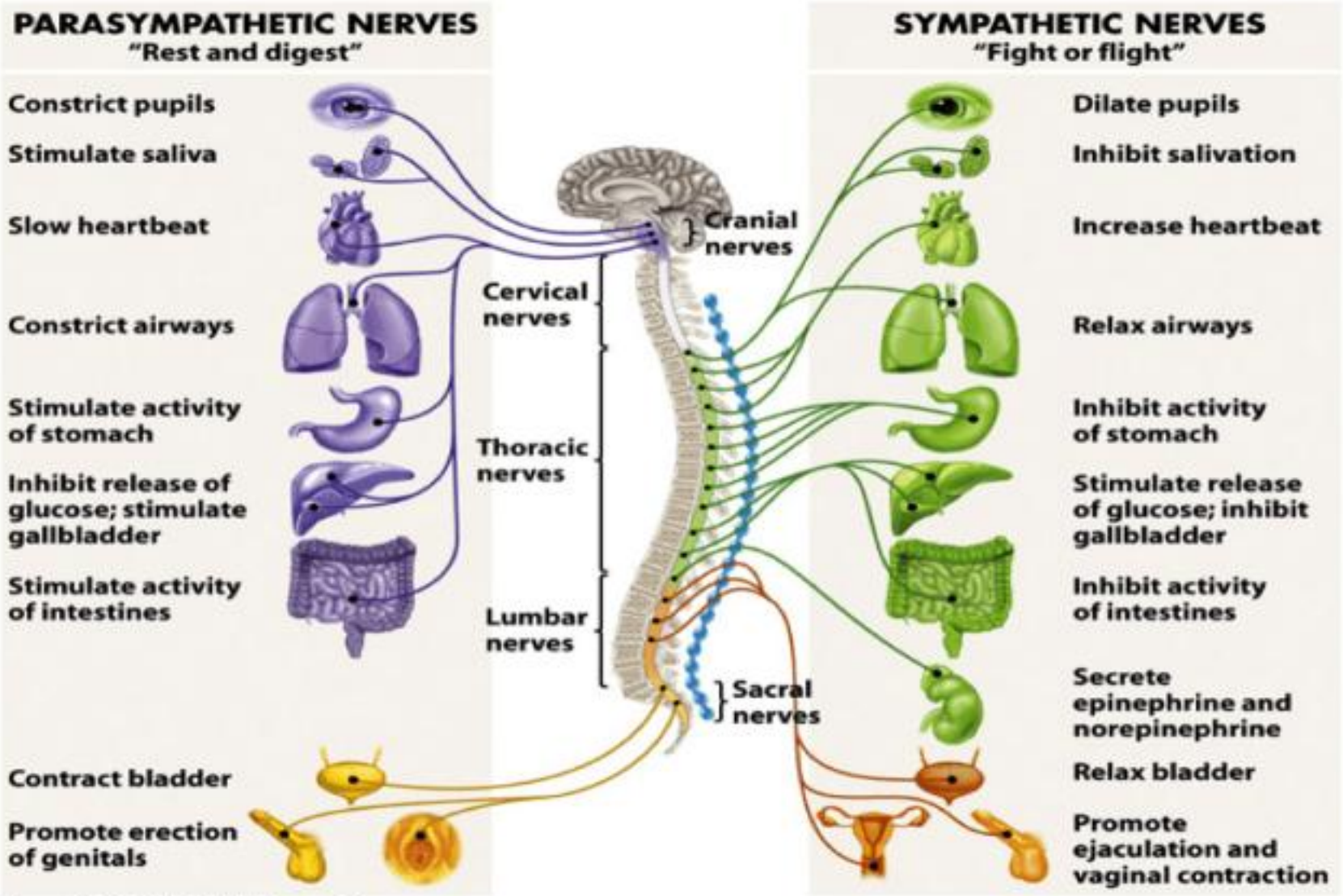


Figure 45-20 Biological Science, 2/e
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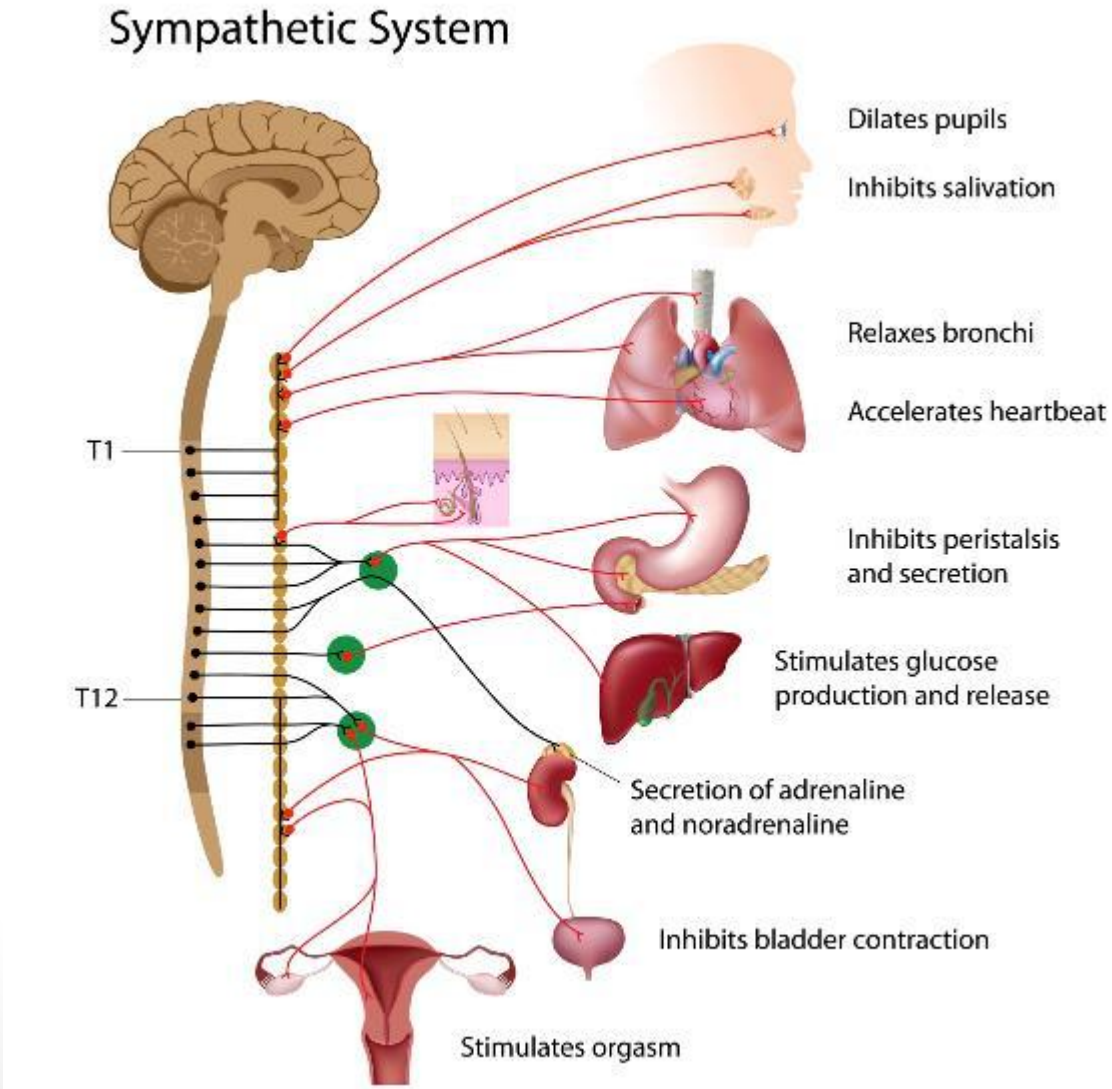
Sympathetic nervous system

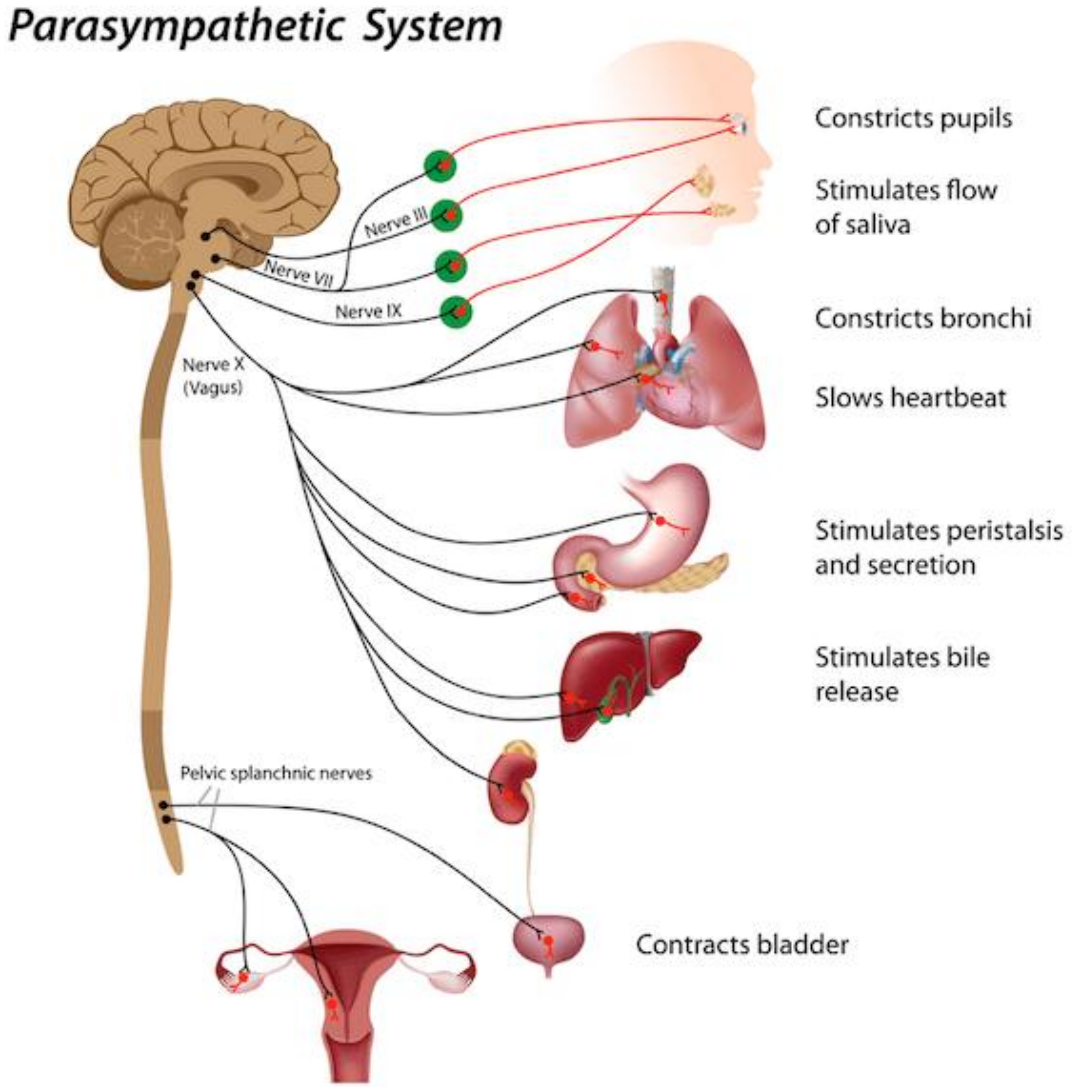


Sympathetic nervous system

- The system that controls our fight our flight response
- The brain gets a signal from the amygdala which pings the hypothalamus, the hypothalamus signals the SNS which goes to the adrenal glands that produce adrenaline and the hormone triggers the response that we associate with fight or flight
- Imagine you're in danger, what happens to the body?

- The SNS can't calm itself down, it needs the ANS to help relax
- To counter fight-or-flight response the ANS kicks into rest and digest

Paraympathetic nervous system

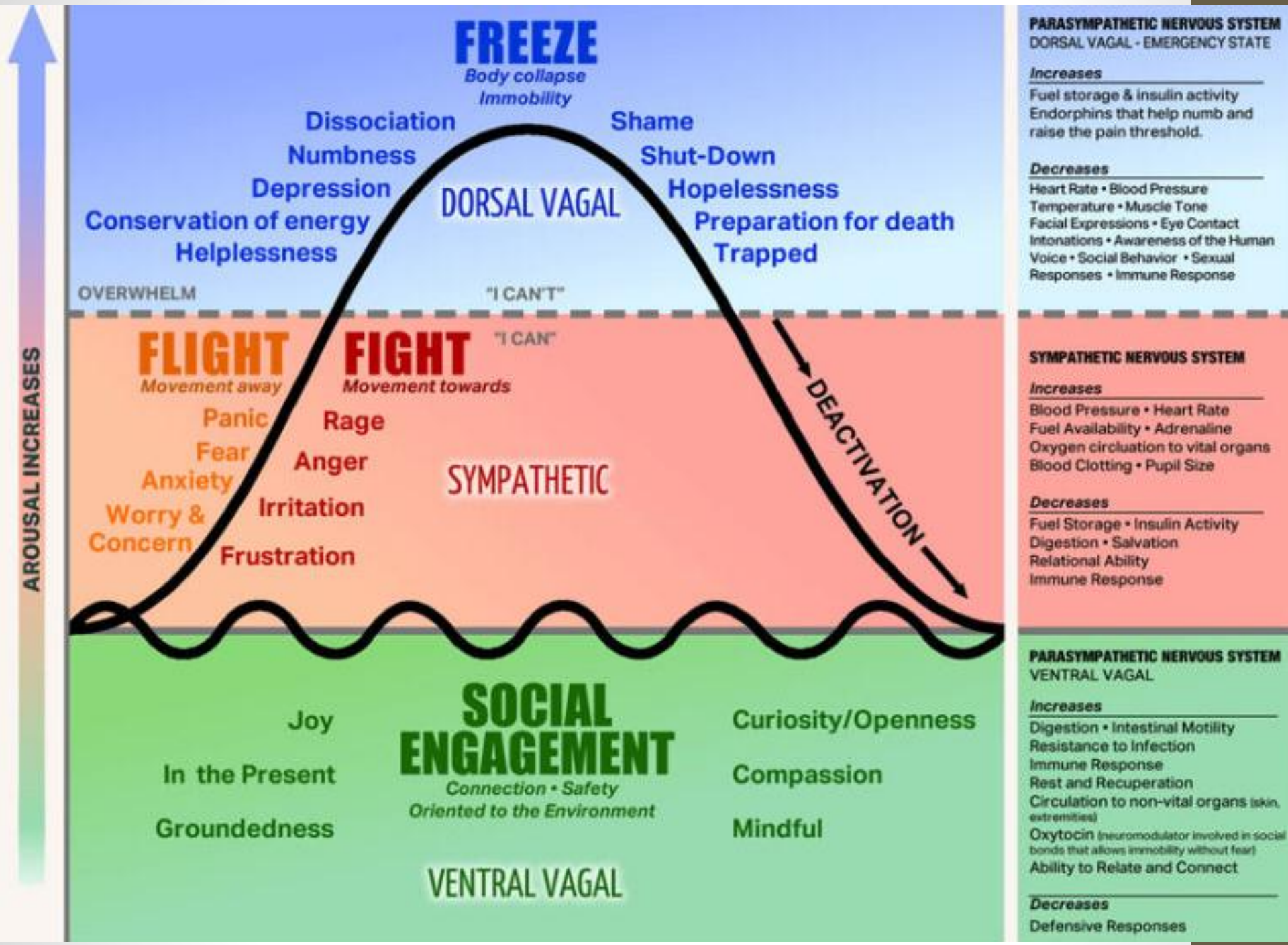


Parasympathetic nervous system

- The PSNS has all opposite actions from the SNS but with some key differences (e.g. slower response, less exocrine actions)
- Works on salivation, lacrimation (making tears), urination, digestion and defecation
- How do you feel after a moment of panic?

Polyvagal theory

- Dr. Stephen Porges
- Knowing what your tendencies are helps recognize the state you're in and self-regulate, rest and digest is optimal but can be challenging and not always the best state at that moment
- Sympathetic nervous system: **Fight or flight** (Mobalization was our pathway into evolutionary hierarchy)
- Parasympathetic nervous system:
  - **Ventral vagal: Rest and digest** (Safety and homeostasis, we are grounded, mindful, joyful and compassionate)
  - **Dorsal vagal: Shut down** (depression, we feel hopeless and like there's no way out. Overwhelmed and numb)


AROUSAL INCREASES
FREEZE
Body collapse
Immobility
Dissociation
Numbness
Depression
Conservation of energy
Helplessness
DORSAL VAGAL
Shame
Shut-Down
Hopelessness
Preparation for death
Trapped
OVERWHELM
"I CAN'T"
FLIGHT
Movement away
Panic
Fear
Anxiety
Worry & Concern
FIGHT
Movement towards
Rage
Anger
Irritation
Frustration
"I CAN"
SYMPATHETIC
DEACTIVATION
Joy
In the Present
Groundedness
SOCIAL ENGAGEMENT
Connection • Safety
Oriented to the Environment
Curiosity/Openness
Compassion
Mindful
VENTRAL VAGAL
PARASYMPATHETIC NERVOUS SYSTEM
DORSAL VAGAL - EMERGENCY STATE
Increases
Fuel storage & insulin activity
Endorphins that help numb and raise the pain threshold.
Decreases
Heart Rate • Blood Pressure
Temperature • Muscle Tone
Facial Expressions • Eye Contact
Intonations • Awareness of the Human Voice • Social Behavior • Sexual Responses • Immune Response
SYMPATHETIC NERVOUS SYSTEM
Increases
Blood Pressure • Heart Rate
Fuel Availability • Adrenaline
Oxygen circluation to vital organs
Blood Clotting • Pupil Size
Decreases
Fuel Storage • Insulin Activity
Digestion • Salvation
Relational Ability
Immune Response
PARASYMPATHETIC NERVOUS SYSTEM
VENTRAL VAGAL
Increases
Digestion • Intestinal Motility
Resistance to Infection
Immune Response
Rest and Recuperation
Circulation to non-vital organs (skin, extremities)
Oxytocin (neuromodulator involved in social bonds that allows immobility without fear)
Ability to Relate and Connect
Decreases
Defensive Responses

Stress, anxiety, PTSD & trauma

- Physiological responses to stress are very sticky, we end up staying longer than we need to
- Softening and relaxing through yoga can help with this
- We come more accustomed to the parasympathetic nervous system but it takes time

- Sensory awareness
- Stay with your student
- No adjustments or ask permission
- AB choices in yoga
- Use inviting language

Autonomic nervous system in yoga

- In yoga we attempt to stimulate the relaxation response through self- and co-regulation
  - Soften and relax muscles
  - Breath awareness to stimulate the nerve response
  - Relax brain activity through pratyahara
  - Turn inward and get silent

We can't control the autonomous nervous system but we can set up favorable conditions

Think of the gunas, which guna is associated with which part of the ANS?

Relaxing

- Abdominal breathing gently stimulates the vagus nerve
- Meditation, awareness and acceptance
- Active relaxation through hatha yoga or walking
- Touch is very important for relaxation of the nervous system
- Chanting, pranayama and soothing sounds and vibrations

Thank you!