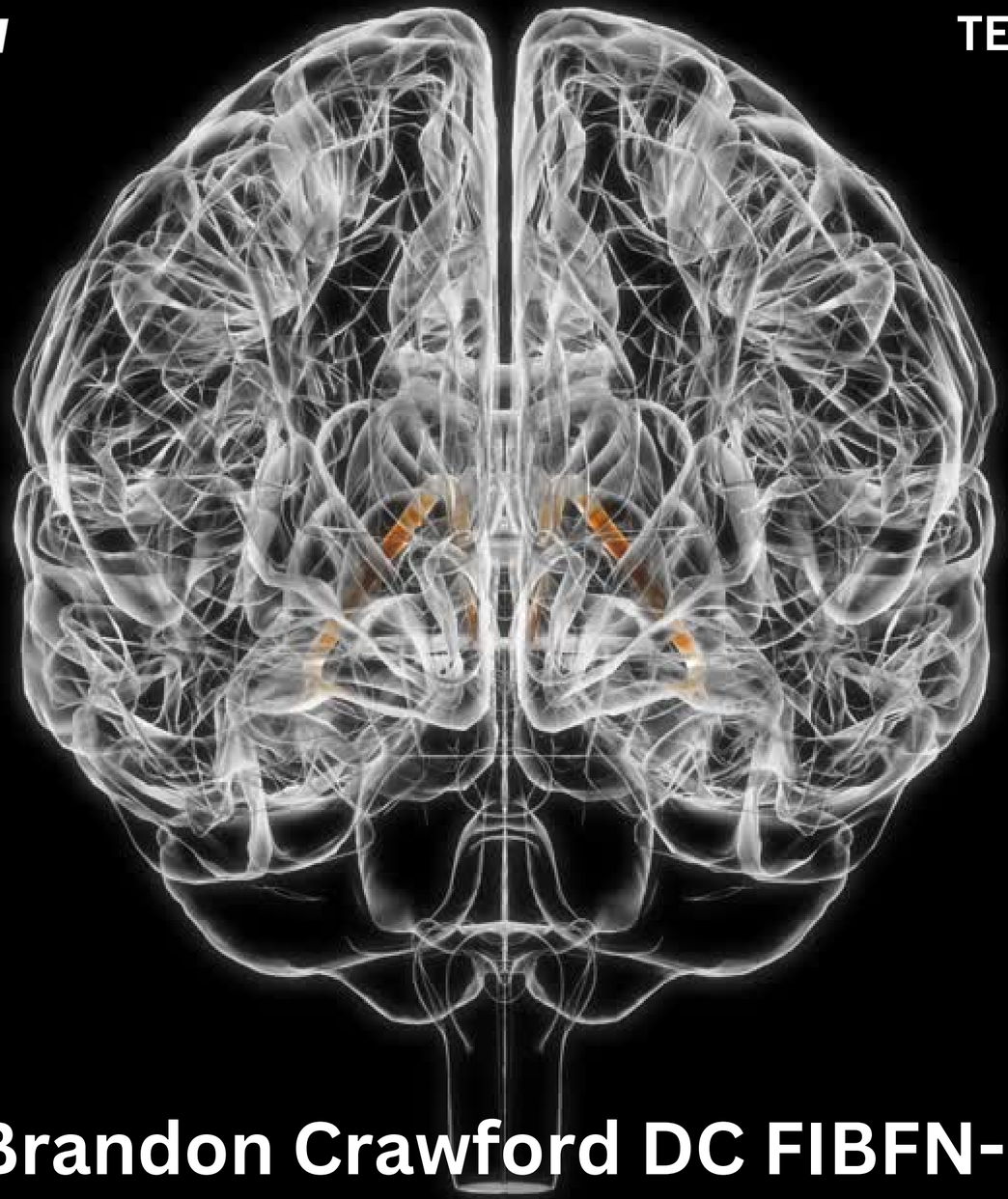
NEUROSOLUTION

TEAM LUKE CONFERENCE 2022



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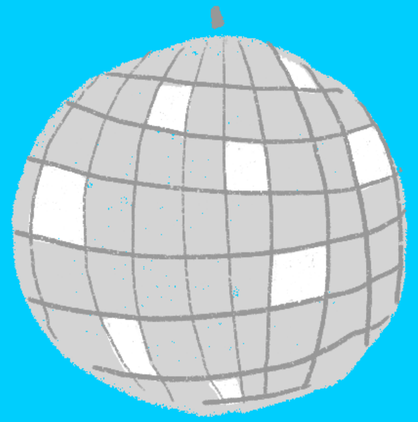
Dr. Brandon Crawford DC FIBFN-CND

EXCITING NEWS FROM NEUROSOLUTION!

- NeuroSolution Therasuite Intensives launching in January in the Austin location!
- New developments in Stem Cells + PBM coming soon! My personal experience.



LET'S GO TO VAGUS BABY!

I've organized this lecture to be like a mullet hair cut!

AUTONOMIC STATE

1. Social engagement – Ventral Vagal
2. Fight / Flight – Sympathetic
3. Play – Ventral Vagal + Sympathetic
4. Shutdown – Dorsal Vagal
5. Intimacy – Dorsal Vagal + Ventral Vagal

NEUROLOGICAL FALLOUT FROM LIFE THREAT

Chapter from my book!

What about life threat from past family members?

"Polyvagal Theory emphasizes that danger and life threat elicit different defensive response profiles. According to the theory, danger reactions are associated with the accepted notions of a stress response expressed in increases in autonomic activation through the sympathetic nervous system and the adrenals. However, Polyvagal Theory also identifies a second defense system related to life threat that is characterized by a massive down-regulation of autonomic function by an ancient pathway of the parasympathetic nervous system."

- *The Polyvagal Theory by Dr. Stephen Porges*

Safety is defined by feeling safe...not by the removal of threat.

...take a moment to think about this and let it soak in...

Discussion on Neuroception

DORSAL VAGAL COMPLEX

- Oldest, unmyelinated, develops in utero
- Projects to organs below the diaphragm
- Dorsal nucleus of the vagus & nucleus of the solitary tract
- Fear Paralysis -> Shutdown, fainting (vasovagal syncope), anxiety, chronic fatigue, bradycardia, multiple systems atrophy, organ dysfunction

SYMPATHETIC NERVE SYSTEM

- Antagonist to the Dorsal Vagal Complex
- HPA axis -> adrenaline -> whole body influence -> chronic stress implications
- Develops to move/fight/flight

VENTRAL VAGAL COMPLEX

- Newest, myelinated, uniquely mammalian
- Projects to organs above the diaphragm
- Nucleus Ambigus -> CN 5, 7, 9, 10 & 11
- Social Engagement -> facial tone, intonation/prosody of voice, acoustic perception.

"If we are protected with the newer vagal circuit, we do fine. However, if we lose the capacity of this newer vagal circuit to regulate physiological state, we become a defensive fight / flight machine. When functioning defensively as a fight / flight machine, humans and other mammals need to move. If we are confined, such as being placed in isolation or restrained, our nervous system reads cues and functionally wants to immobilize."

– *The Polyvagal Theory by Dr. Stephen Porges*

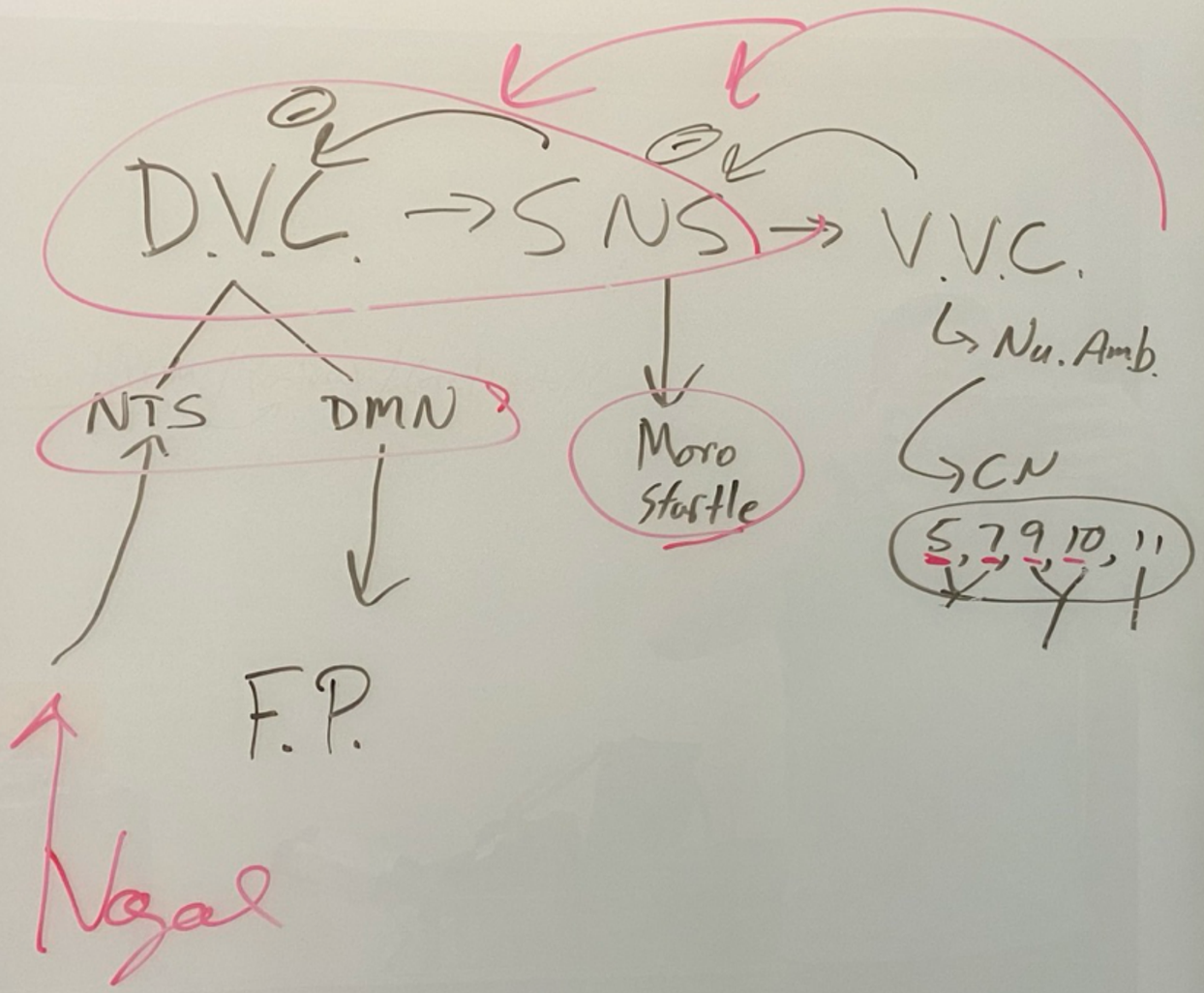
"When challenged, the regulation of the autonomic nervous system sequentially degrades to the older circuits as an adaptive attempt to survive."

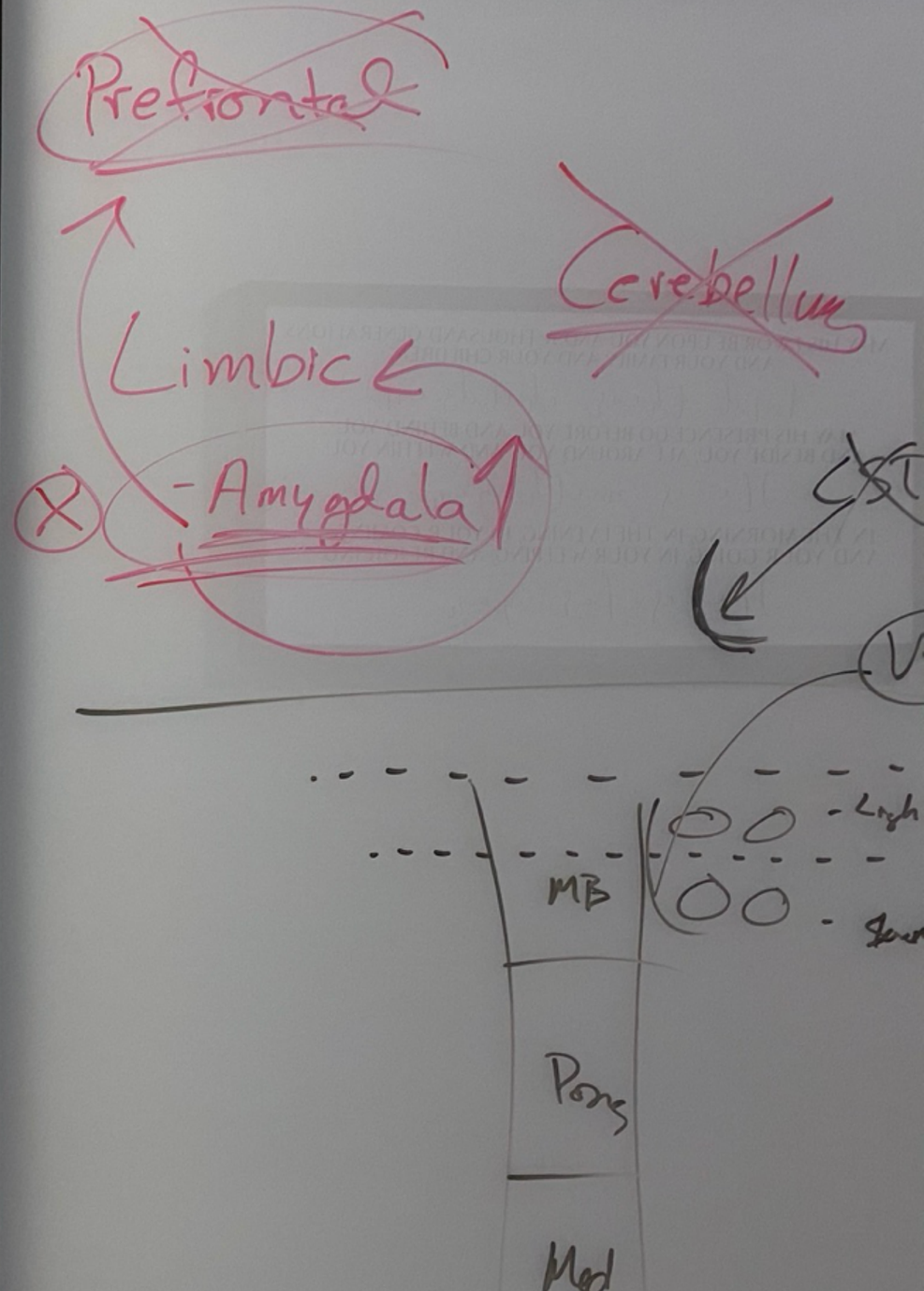
- The Polyvagal Theory by Dr. Stephen Porges

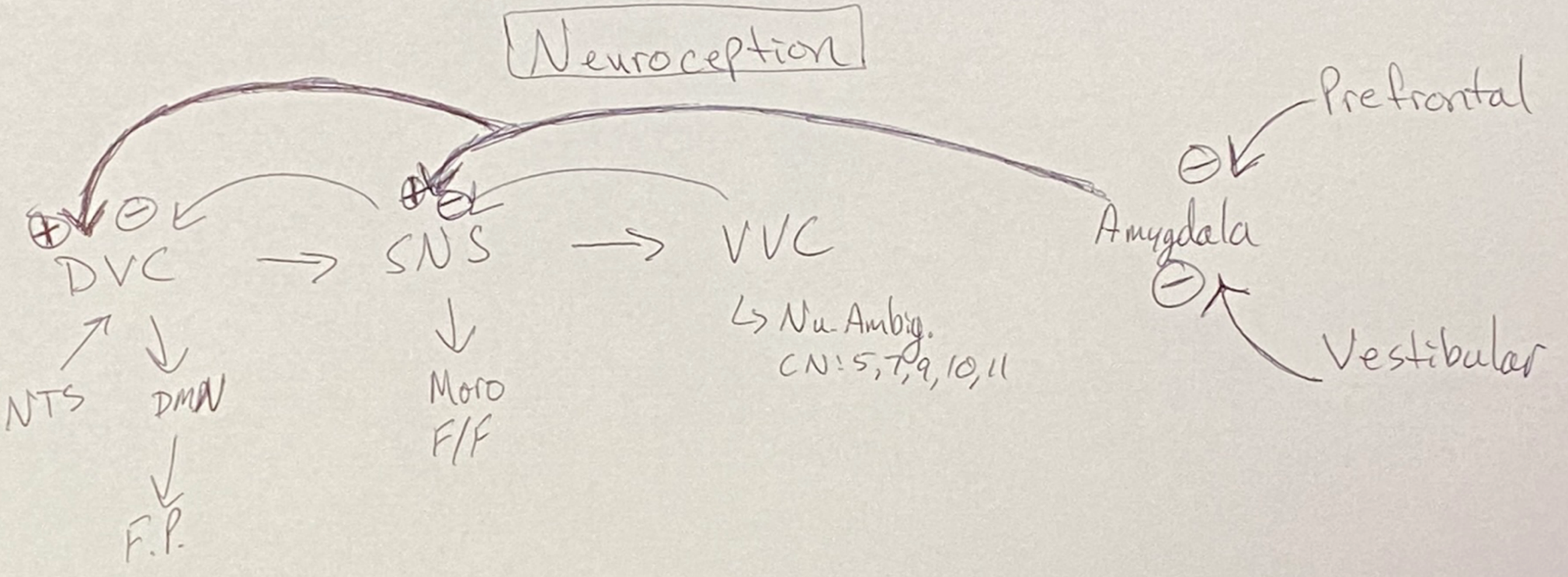
Let's put this all together!

Neuroception

↳ Risk



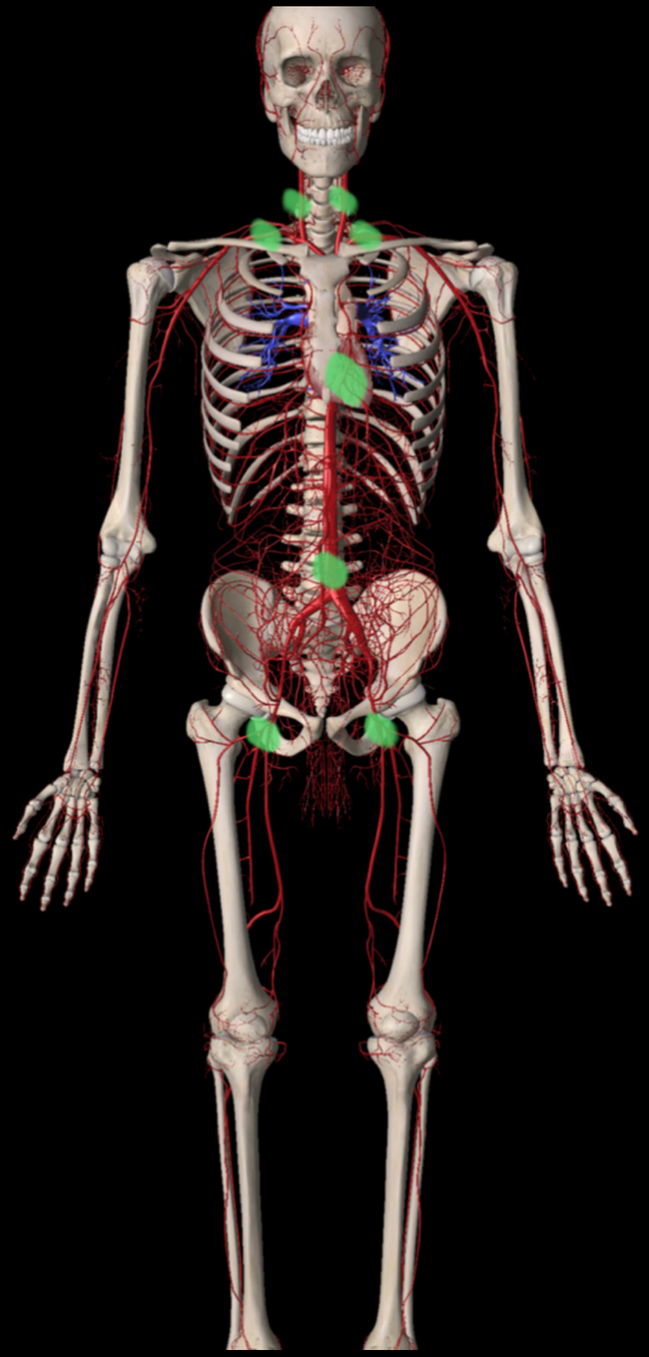


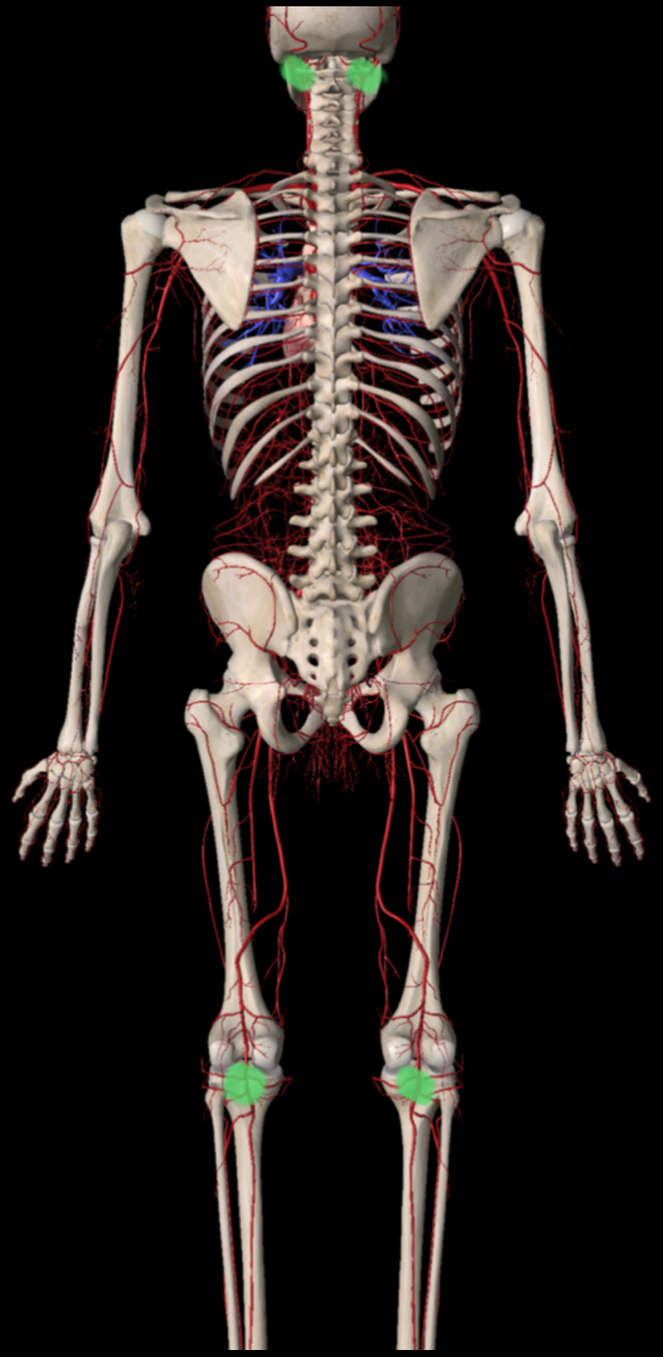

Neuroception
Prefrontal
Amygdala
Vestibular
DVC
SNS
VVC
Nu. Ambig.
CN: 5, 7, 9, 10, 11
NTS
DMN
F.P.
Moro
F/F

Now that we can draw and describe the entire system with understanding about each circuit, our exam will define and determine our therapeutic considerations.

THE IMPORTANCE OF SIMPLE STRATEGIES AT HOME

- Blood Flow
- Blood Illumination if you have PBM at home, if not use the SUN!
- Supplementation / Nutrition
- Primitive Reflexes / Movement
- Ventral Vagal Stimulus
- Vestibular Stimulus - properly done with the correct timing, frequency, duration, intensity, and direction
- Frontal / Prefrontal Stimulus





TO SUSTAIN LIFE AND THRIVE YOU NEED:

- Blood Flow -> oxygen & nutrients
  - Need to actually have nutrients in your system to deliver
  - Need to reduce triggers/roadblocks working against you
- Movement -> targeted and specific, not random

If you don't have these you will decline much more rapidly - PERIOD

CURRENT PILOT STUDY

Methods:

- Control group
- Laser therapy-only group
  - NeuroSolution Cerebellum Setting / 637 nm / over both Rhombencephalon spots for 5 minutes per side
  - 528 hz / 808 nm / over both prefrontal cortices 5 minutes per side
  - Energy Intensity for Red 637nm -> 150 J/cm2 per location
  - Energy Intensity for IR 808 nm -> 210 J/cm2 per location
- Vagal stimulation only group
  - Pulsed Radiofrequency via Stimpod / 2 mA @ 2 Hz / both cymba conchas 10 minutes per side and behind both ears off the TVP of the atlas 10 minutes per side
- Vagal stimulation + laser therapy group
  - Combined above methods for co-activation effects

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CURRENT PILOT STUDY

Outcome/goals of the study is to test my Crawford Theories of Co-Activation in PBM.

To assess if the bi phasic dose-response curve is altered in living systems, especially in the brain, and especially when we activate the specific networks we are targeting (co-activation). We see clinically that doses that exceed what is quoted in the literature correlate with positive clinical outcomes; we see this consistently and can reproduce the outcomes clinically.

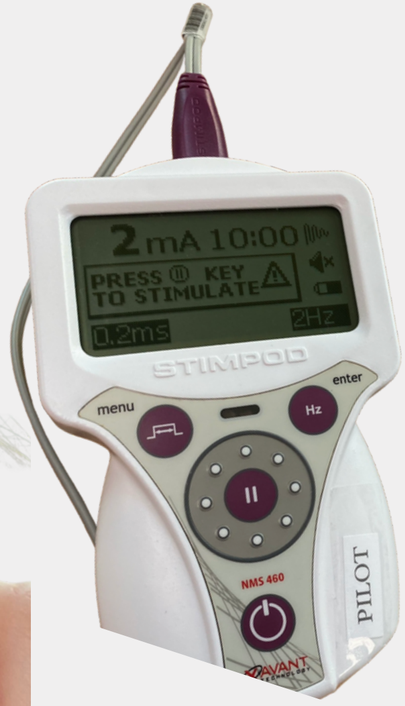
My reasoning for this is that as networks and neurons fire they utilize more nutrients and oxygen and thus require more energy to sustain themselves and/or heal. We also know that systems that are stressed or injured require more energy and nutrients to heal; thus it would make sense that the optimal dose for injured tissue may in fact be higher than that of non-injured tissue.

CURRENT PILOT STUDY

2 weeks / 10 treatments

Testing Measurements:

- Balance Tracker
- QEEG
- Cognitive Testing
- Heart Rate Variability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PRESS ⏸ KEY
TO STIMULATE
0.2ms
2Hz
STIMPOD
menu
enter
Hz
NMS 460
PILOT


2 mA 10:00
PRESS ⏸ KEY
TO STIMULATE
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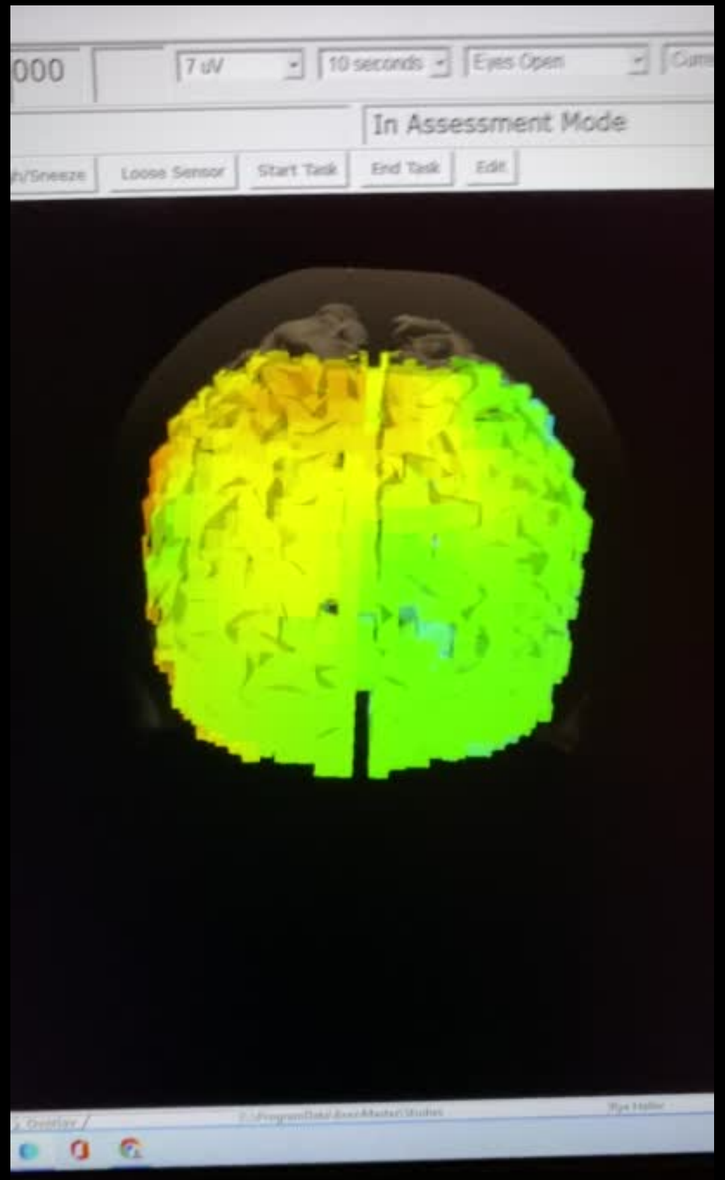
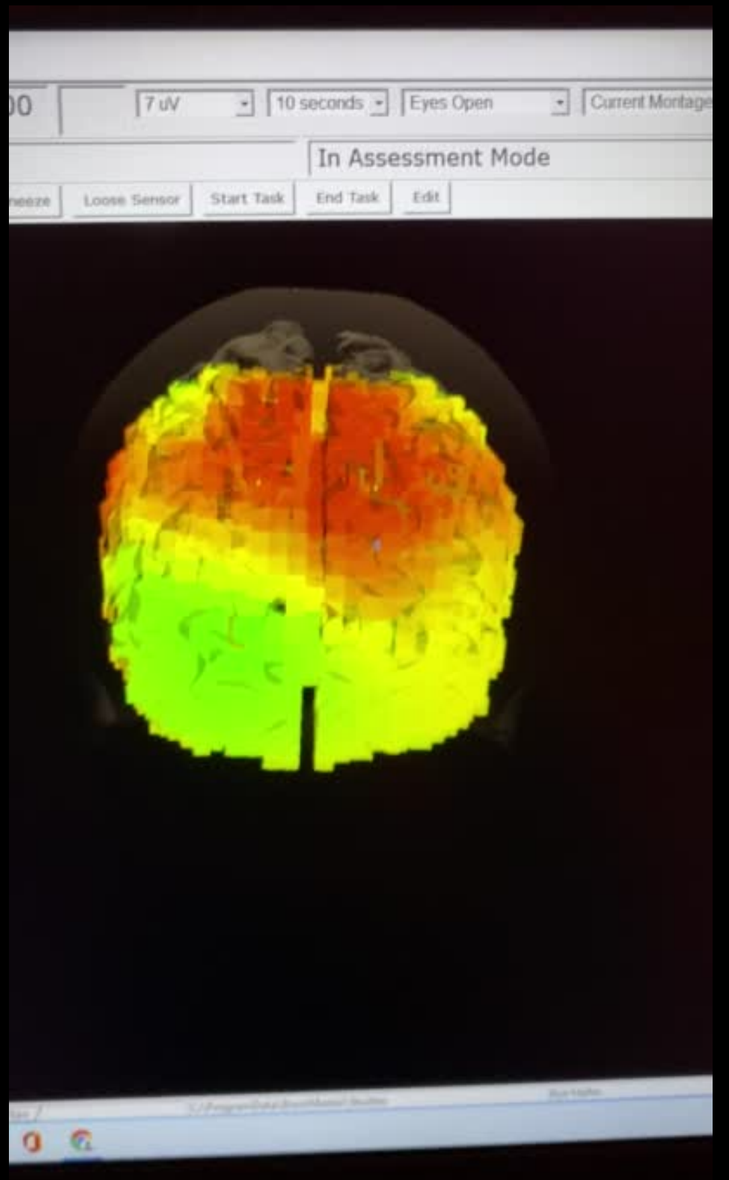
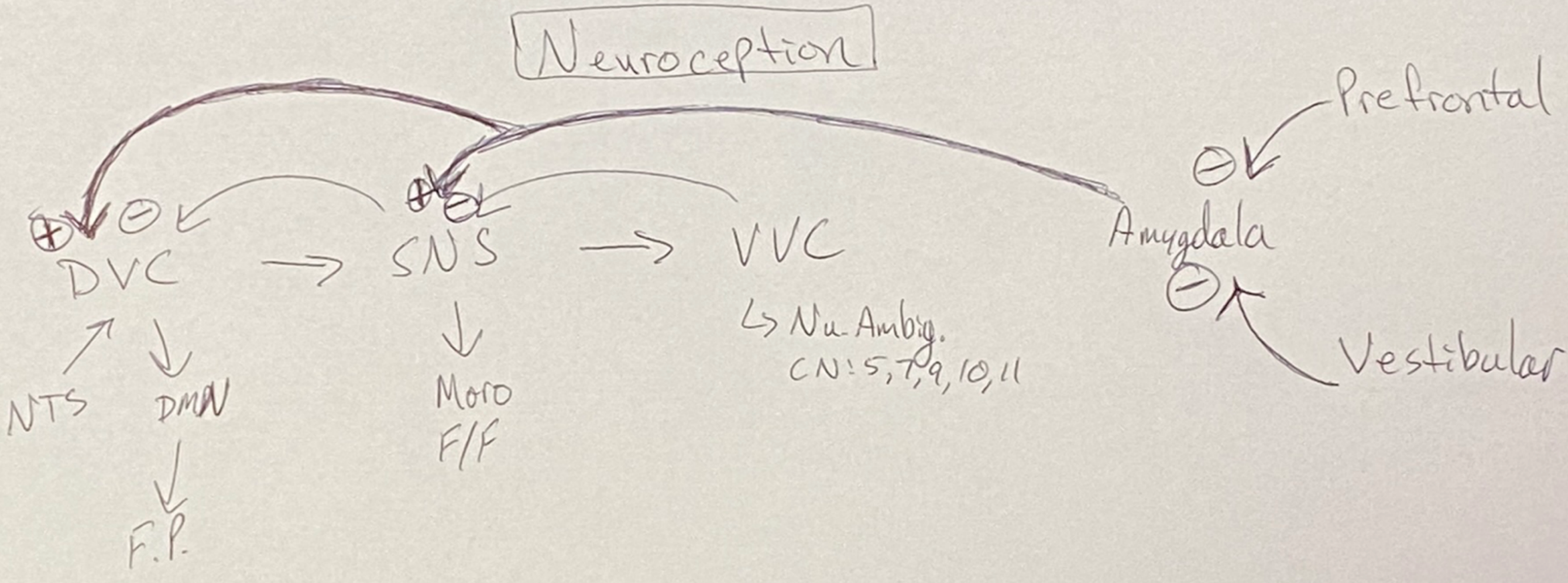
LZ30

REAL TIME QEEG RESULTS WITH CYMBA CONCHA ACTIVATION VIA STIMPOD!







Let's review this again!

AREAS OF THE BRAIN THAT WILL GATE THE AMYGDALA:

1. Vestibular System
2. Prefrontal Cortex

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Research report

Fos induction in the amygdala by vestibular information during hypergravity stimulation

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Abstract

Altered gravity environments including both hypo- and hypergravity can elicit motion sickness. Vestibular information is known to be essential for motion sickness, but its other neural substrates are poorly understood. We previously showed that bilateral lesions of the amygdala suppressed hypergravity-induced motion sickness in rats, using pica behavior as an emetic index. We show in the present study that during hypergravity stimulation, vestibular information activated the central nucleus of the amygdala (CeA), as determined by the induction of Fos expression, in comparison between normal and bilaterally labyrinthectomized rats. The finding that Fos expression was confined to the CeA and almost completely absent in other subnuclei of the amygdala contrasted with many previous studies that used other stressful stimuli such as foot shock, restraint and forced swimming, suggesting a specific vestibular effects on the amygdala. Prolongation of hypergravity resulted in reduction of Fos expression in the CeA, suggesting a process of habituation. Such decreases appeared earlier than in the vestibular nucleus, suggesting that adaptive changes in the CeA to hypergravity were independent of changes in the vestibular input. Our results suggest the amygdala is a neural substrate involved in the development of and habituation to motion sickness.

Theme: Motor systems and sensorimotor integration

Topic: Vestibular system

Keywords: Amygdala; Fos; Hypergravity; Rat; Motion sickness

Review Article

Understanding the links between vestibular and limbic systems regulating emotions

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The vestibular system, which consists of structures in the inner ear and brainstem, plays a vital role in body balance and patient well-being. In recent years, modulating this system by vestibular stimulation techniques are reported to be effective in stress relief and possibly a patient's emotional well-being. Emotions refer to an aroused state involving intense feeling, autonomic activation, and related change in behavior, which accompany many of our conscious experiences. The limbic system is primarily involved in the regulation of emotions. Considering the extensive networks between the vestibular and limbic system, it is likely that vestibular stimulation techniques may be useful in influencing emotions. Hence, we review here, the possible mechanisms through which the vestibular system can influence emotions and highlight the necessary knowledge gaps, which warrants further research to develop vestibular stimulation techniques as a means to treat health conditions associated with emotional disturbances.

The vestibular apparatus located in the inner ear coordinates the body's balance and movement, which requires extensive neuronal networking. The vestibular system via the vestibular nuclei has a widespread of network within the higher centers of the brain, which is evident from the observations of diverse activation patterns following vestibular stimulation.[1] Emotions are aroused state of mind involving intense feeling, autonomic activation, and related change in behavior, which often accompany many of our conscious experiences, including mental and physical components.[2] Vestibular stimulation can modulate mood and hence influence emotions depending on the region of vestibular stimulation.[3] Indeed the concepts of vestibular system influencing emotions has been used therapeutically. For instance, the spinning chair was used to treat mania or elevated arousal in the nineteenth century.[4] While vestibular dysfunction is well known to affect mood and is associated with anxiety disorders and depression.[5,6] Conversely, changes in mood/emotions can also influence body balance, which may probably be mediated through vestibulo-ocular reflex pathways.[7]

Like hypothalamus, amygdala, and hippocampus are also part of the limbic system and hence are involved in the regulation of emotions and probably memory. Specifically, amygdala and prefrontal activity integration are reported to play a key role in the regulation of emotions.[29] Retrograde viral transneuronal tracing has strongly supported the existence of vestibular projections to central amygdala cells,[13] which indicates the possible utility of vestibular stimulation in influencing the physiology of the amygdala. Amygdala is also a neural substrate that is involved in

Dorsal raphe nucleus (DRN) is a major source of serotonin and modulation of serotonin levels, and has a major role in value-based decision-making process.[60] Interestingly, serotonin is also a major player in diffuse modulatory systems, which help vestibular nuclei connect with the limbic system and hence regulate emotions. The malfunction of serotonin or its receptors (5-HT system) is associated with several emotional/neuronal disorders such as depression, schizophrenia, drug abuse, autism, and Parkinson's disease.[60] Indeed several direct and indirect connections exist between vestibular nucleus and DRN,[61-65] further supporting the role for vestibular stimulation in activating DRN[65] and regulation of emotions.

****Think about receptor-based autoimmunity implications****

Prefrontal-amygdala fear networks come into focus

Maithe Arruda-Carvalho and Roger L. Clem*

Fishberg Department of Neuroscience and The Friedman Brain Institute, Icahn School of Medicine at Mount Sinai, New York, NY, USA

The ability to form associations between aversive threats and their predictors is fundamental to survival. However, fear and anxiety in excess are detrimental and are a hallmark of psychiatric diseases such as post-traumatic stress disorder (PTSD). PTSD symptomatology includes persistent and intrusive thoughts of an experienced trauma, suggesting an inability to downregulate fear when a corresponding threat has subsided. Convergent evidence from human and rodent studies supports a role for the medial prefrontal cortex (mPFC)-amygdala network in both PTSD and the regulation of fear memory expression. In particular, current models stipulate that the prelimbic (PL) and infralimbic (IL) subdivisions of the rodent mPFC bidirectionally regulate fear expression via differential recruitment of amygdala neuronal subpopulations. However, an array of recent studies that employ new technical approaches has fundamentally challenged this interpretation. Here we explore how a new emphasis on the contribution of inhibitory neuronal populations, subcortical structures, and the passage of time is reshaping our understanding of mPFC-amygdala circuits and their control over fear.

AT THE END OF THE DAY WE NEED TO BE TARGETING:

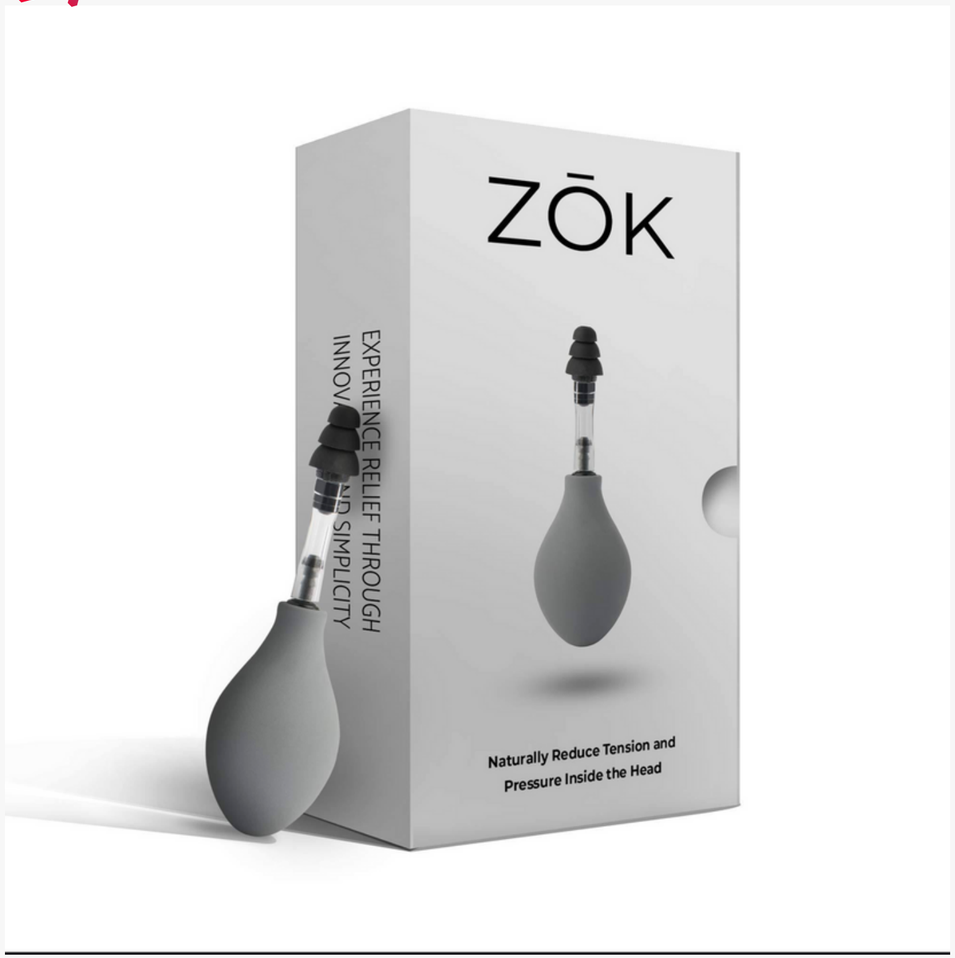
1. Ventral Vagal System
    a. CN 5, 7, 9, 10 &11
2. Vestibular System
3. Prefrontal Cortex
    a. mPFC

VENTRAL VAGAL ACTIVATION

Caregivers, do this for yourself too!!!

1. Acoustics / Neurosage / Brainwaves app
    - Cymba Concha
2. Tympanic Membrane Stimulus via Zok Device (CN 5, 9 & 10)
3. Cold Stimulus
    - Face (CN 5 sensory / 7 motor)
    - Carotid arteries (CN 9 & 10)
    - Cold Plunge / Shower!
4. Gargling, Loud & Proud! (CN 9 & 10)
5. Gagging (CN 9 & 10)
6. Vibration (Rezzimax or similar)
    - SCM / Traps (CN 11)
    - Abdomen (CN 10)
    - Vocal Cords (CN 10)
    - Cymba Concha, the lowest setting on Rezzimax

Discuss trauma's while performing Ventral Vagal Stimulus


ZŌK
EXPERIENCE RELIEF THROUGH
Naturally Reduce Tension and
Pressure Inside the Head

VENTRAL VAGAL ACTIVATION

Caregivers, do this for yourself too!!!

4. E Stim
   - Face (CN 5 & 7)
   - Traps / SCM (CN 11)
5. Peripheral Nerve Stimulator
   - Traps / SCM (CN 11)
6. Stimpod
   - Traps / SCM (CN 11)
   - Cymba Concha
   - TVP of Atlas

How long? Monitor for stress response: O2 levels drop 5%, HR increases 10 bpm, color changes in face/hands/feet, dramatic change in personality or energy, postural changes...

Discuss trauma's while performing Ventral Vagal Stimulus

VESTIBULAR ACTIVATION

Caregivers, do this for yourself too!!!

Scan for more info

1. Post Rotatory Nystagmus Test
2. Head Thrusts with gaze stability / VOR
    a. Add in a warm caloric stimulus
3. Couple vestibular therapy with acoustics
4. Calorics
    a. Cold stimulates vagal response and is more intense, use in-ear of overactive vestibular side
    b. Warm, use in-ear of under active vestibular side

How long? Monitor for stress response: O2 levels drop 5%, HR increases 10 bpm, color changes in face/hands/feet, dramatic change in personality or energy, postural changes...

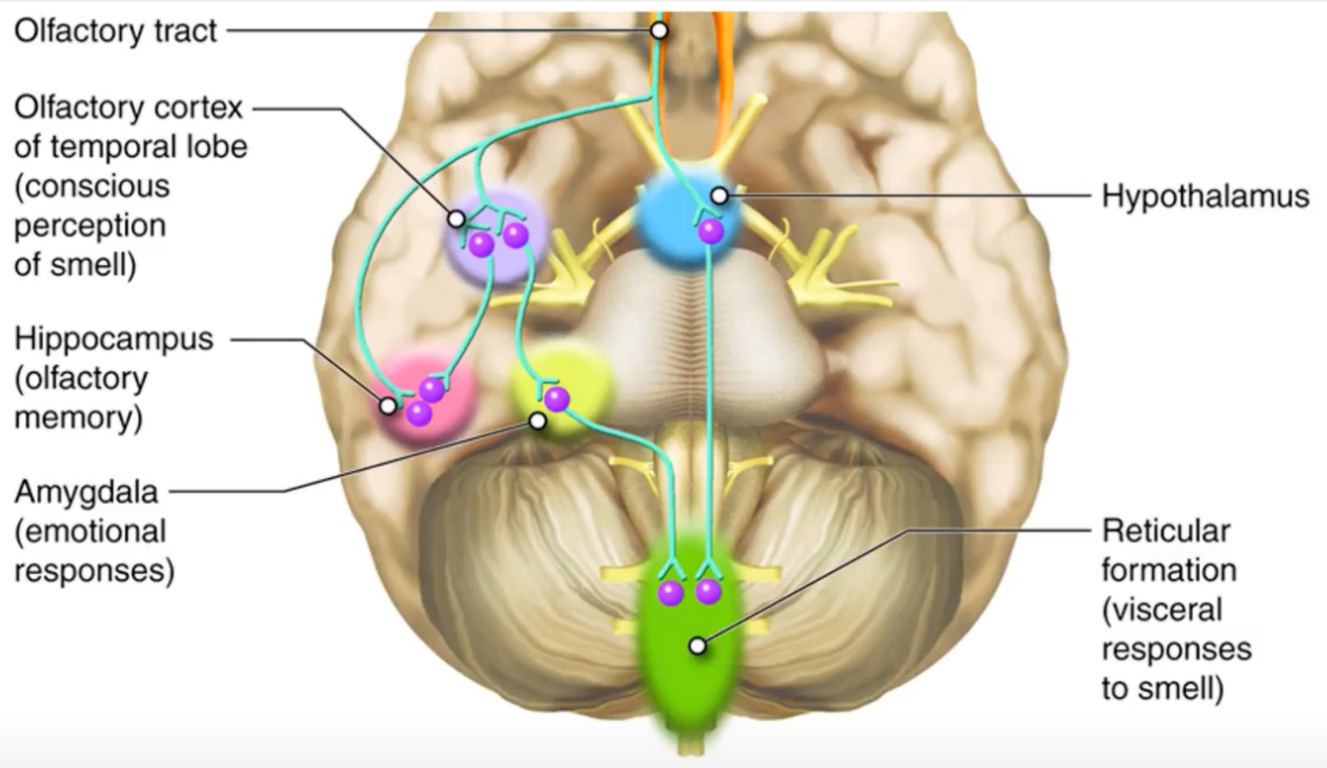
PREFRONTAL ACTIVATION

Caregivers, do this for yourself too!!!

1. Exercise!
2. Meditation
3. Purposefully restraining from wants / needs
    a. Wait to go to the bathroom longer...etc
4. Transcranial Direct Current Stimulus – Fisher Wallace
5. Go no Go activities
6. Smell (OFC – see next slide)
7. Neurofeedback – Theta, Alpha, or Gamma Up entrainment while using the corresponding brainwave in laser (IR) over prefrontal cortex
8. NeuroSolution Laser Therapy!

How long? Monitor for stress response: O2 levels drop 5%, HR increases 10 bpm, color changes in face/hands/feet, dramatic change in personality or energy, postural changes...

OLFACTION



Smelling in the Brain:

- Amygdala
- Hippocampus
- Hypothalamus
- Orbitofrontal Cortex of the PFC
- Olfactory Cortex of the Temporal Lobe

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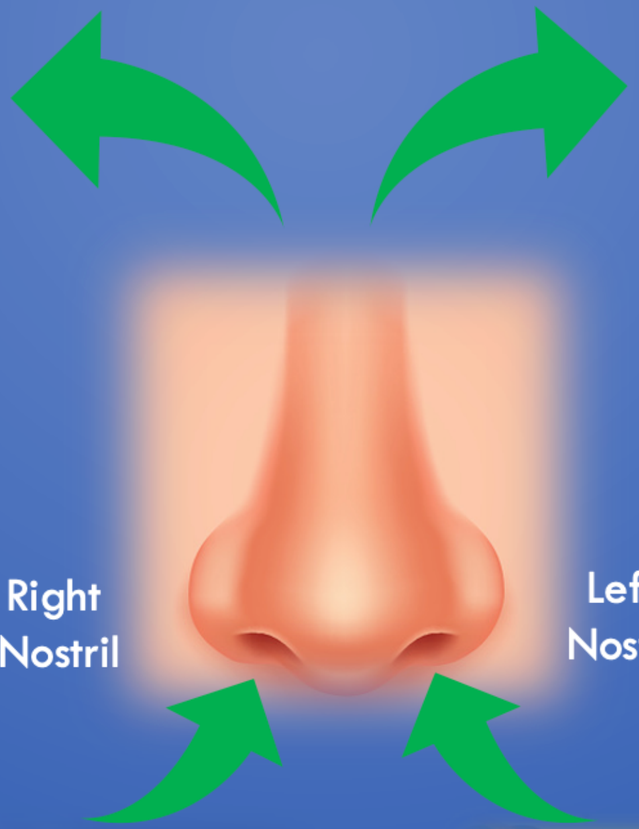
SMELLY RECEPTORS - OLFACTION

- Lots of areas receive input from olfaction!
  - Amygdala
  - Hippocampus
  - Insula
  - Orbitofrontal Cortex

♦→Amygdala	♦→Intensity of scent
	♦→Olfactory memory and emotional value
♦→Hippocampus	♦→Olfactory memory
♦→Insula	♦→Hedonicity of olfactory stimulus
	♦→Smell-to-taste integration
♦→Orbitofrontal cortex (OFC)	♦→Odour identification
	♦→Hedonicity of olfactory stimulus
	♦→Medial portion: pleasant scents
	♦→Lateral portion: unpleasant scents
	♦→Emotional role assignment
	♦→Olfactory memory
	♦→Left OFC: unpleasant odours
	♦→Right OFC: pleasant odours
	♦→Multisensory integration of olfactory information; semantic association

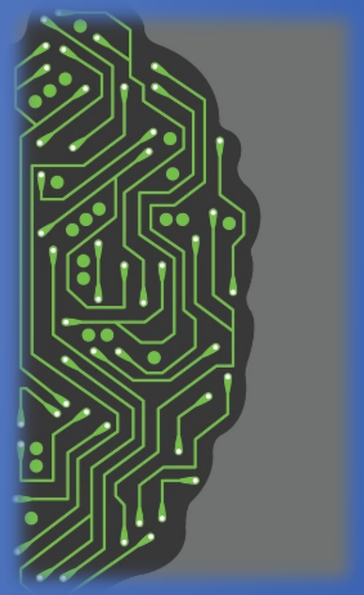
https://www.sciencedirect.com/science/article/pii/S0185106317300501

Right Hemisphere



Right Nostril

Left Nostril



Left Hemisphere

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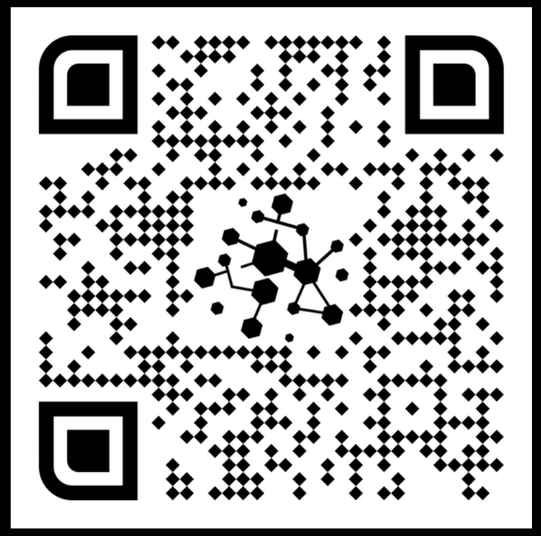
OLFACTION

Tools Needed:

- Essential Oils:
  - Frankincense
  - Peppermint
  - Coffee
- How far away can they smell right vs left?
- Can they ID correctly?



Scan to watch Casyn's Story

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