

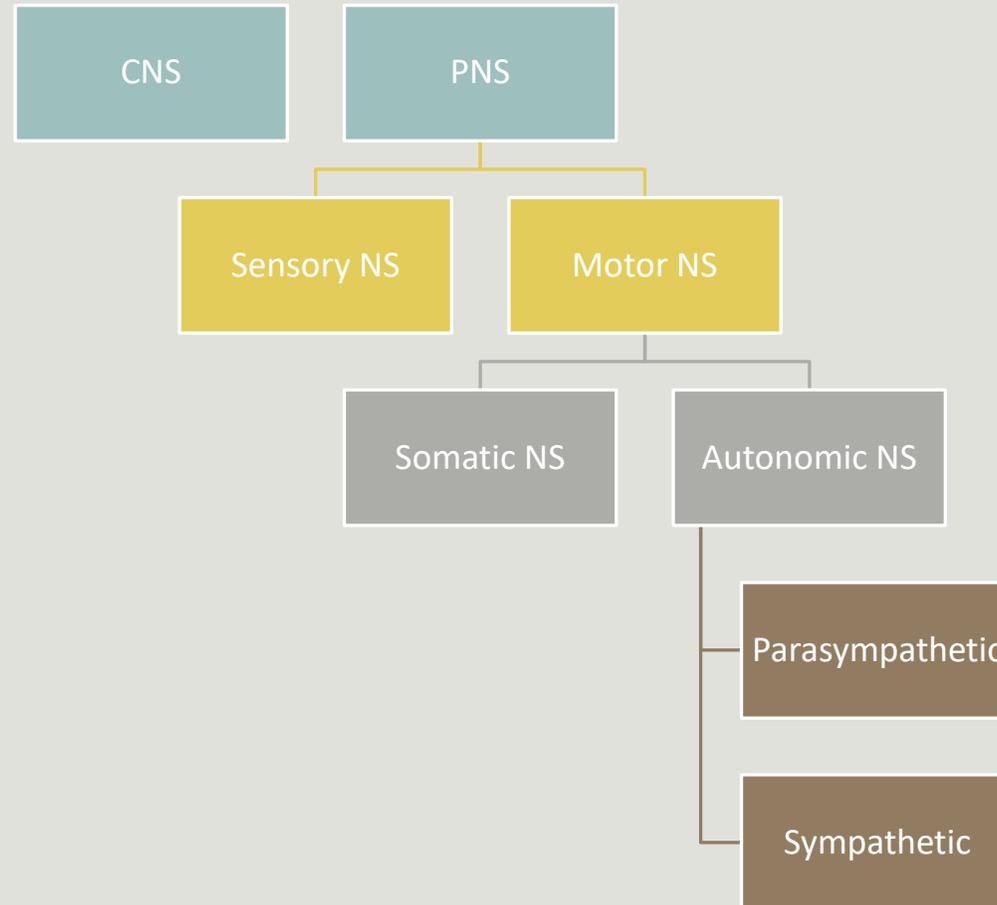
An Introduction to Complementary and Alternative Lifestyle Therapies that Encourage Stress Reduction.

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Objectives:

- Review physiological stress response, including endocrine and sympathetic nervous systems
- Overview of research-supported lifestyle interventions to reduce stress
- Overview of select research-supported botanicals (teas and essential oils) to complement lifestyle interventions

Physiological Stress Response- Nervous Sys



Parasympathetic- “Rest and Digest”

constricted pupils, low HR, increased salivary enzymes and HCl acid production, bowel movements, urination



Sympathetic- “Fight, Flight, Fright”

dilated pupils, increased HR, increased respirations, vasodilation to skeletal m., reduced digestion



Physiological Stress Response- Endocrine Sys

Adrenal Medulla

- Effects of the adrenal medulla are longer lasting than neurotransmitters
- Secretes catecholamines: epinephrine, norepinephrine

Causes increased alertness and prepares body for physical activity (sympathetic drive= fight, flight, fright response)

- Mobilizes high-energy fuels: amino acids, fatty acids, and glucose

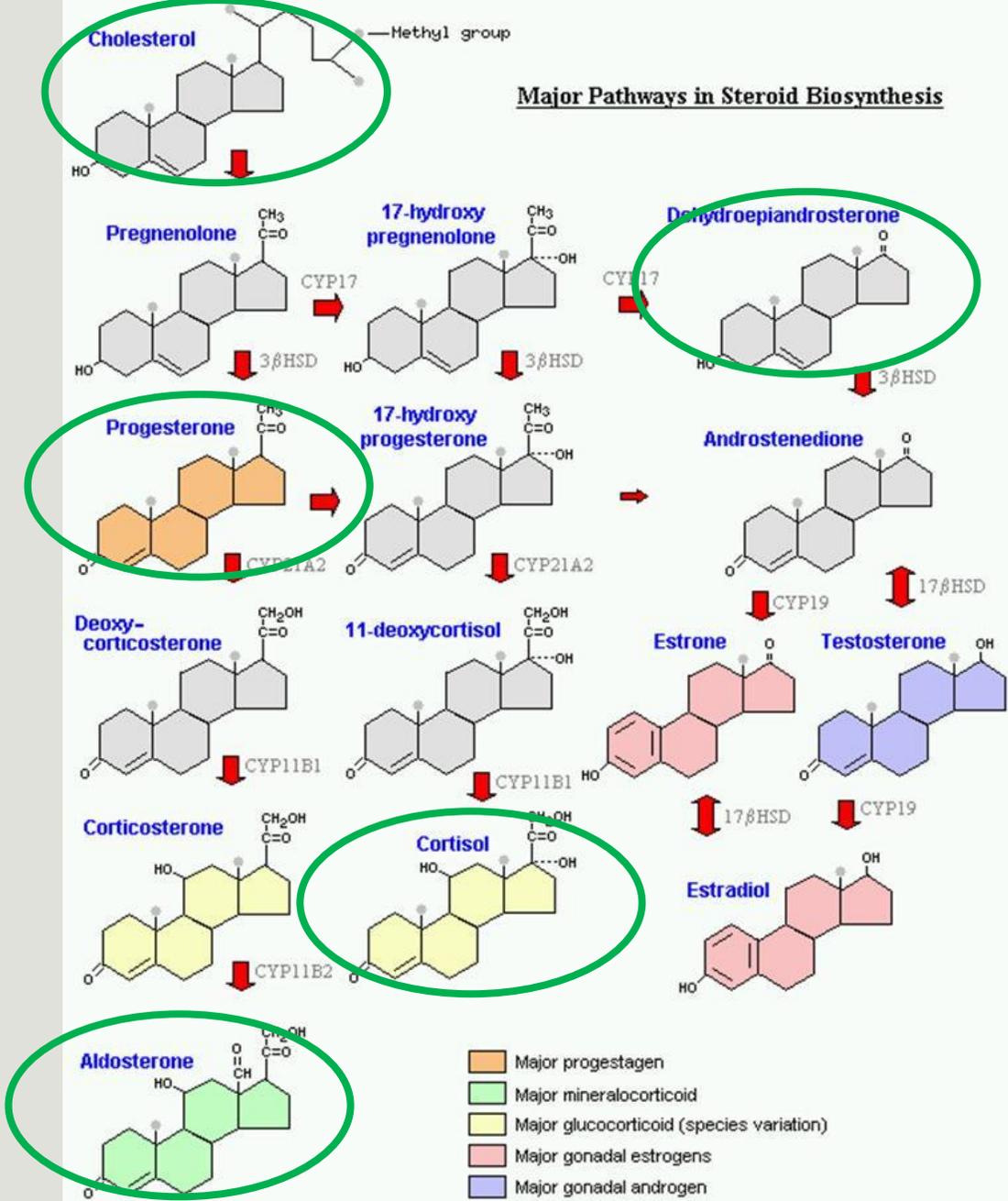
-Increases blood pressure, heart rate, blood flow to muscles, pulmonary airflow, and metabolic rate

Physiological Stress Response- Endocrine Sys

Adrenal Cortex

- Surrounds adrenal medulla
- The predominant hormones from the cortex are all cholesterol based:
 - ❑ Aldosterone - stimulates Na⁺ retention by the kidneys; sodium retains water ➡ Increases BP
 - ❑ Cortisol - regulates metabolism of glucose so the body can adapt to stress, repair tissues, and immune suppression ➡ Increases blood sugar
 - ❑ DHEA and progesterone = sex steroids; the precursors to Testosterone and Estrogens; sets libido throughout life; large role in prenatal development





Adrenal Hormone Production

Physiological Stress Response- Muscular

“Muscle tension is almost a reflex reaction to stress—the body’s way of guarding against injury and pain.

With sudden onset stress, the muscles tense up all at once, and then release their tension when the stress passes. Chronic stress causes the muscles in the body to be in a more or less constant state of guardedness. When muscles are taut and tense for long periods of time, this may trigger other reactions of the body and even promote stress-related disorders.”

American Psychological Association. (2018, November 1). *Stress effects on the body*. <https://www.apa.org/topics/stress/body>

Physiological Stress Response- Muscular

Stress increases tension, tension increases pain

This study looks specifically at TMJD, stress as an inducer, and muscle tension as a cause of pain.

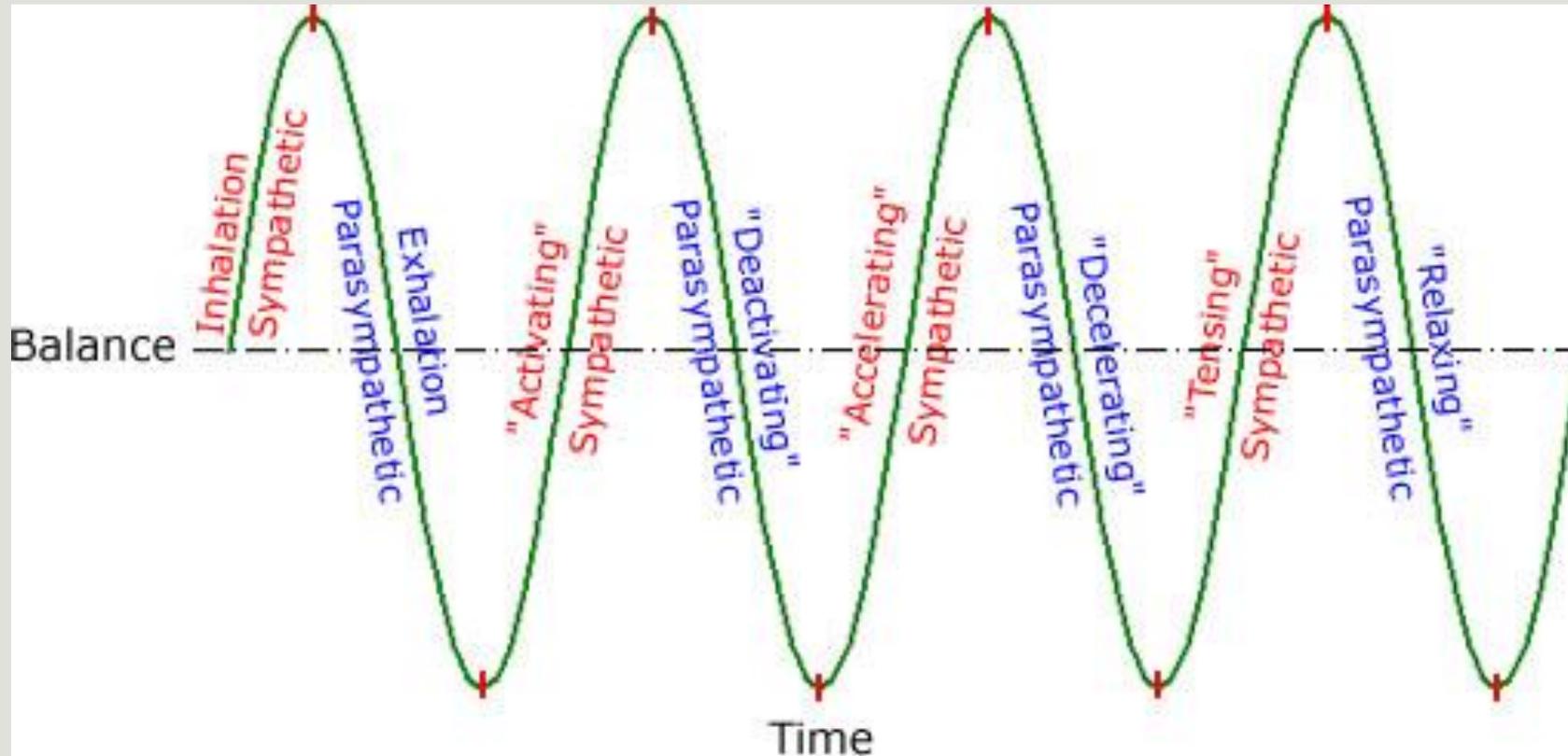
“Clinically, the results suggest that addressing tension and other oral parafunctions in those diagnosed with TMJDs should be an important part of the conservative, noninvasive care of individuals diagnosed with the myofascial pain or arthralgia of TMJD.”

Glaros, A. G., Marszalek, J. M., & Williams, K. B. (2016). Longitudinal Multilevel Modeling of Facial Pain, Muscle Tension, and Stress. *Journal of dental research*, 95(4), 416–422. <https://doi.org/10.1177/0022034515625216>

Lifestyle Interventions

- Square breathing
- Extended exhalation
- Epsom soaks
- Adequate sleep
- Gardening
- Meditation
- Massage

Square Breathing



It's all about balance!

Square Breathing (aka Slow Deep Breathing)

“Slow deep breathing is known to modulate cardiovascular control and is used in many ancient breath control practices...

Parasympathetic activity is represented by LF [low frequency] **when respiration rate is lower than 7 breaths per minute** or during taking a deep breath. Thus, when the subject is in the state of relaxation with a slow and even breathing, the LF values can be very high **indicating an increase in parasympathetic activity** rather than an increase in sympathetic regulation.”

- Malhotra, V., Bharshankar, R., Ravi, N., & Bhagat, O. L. (2021). Acute Effects on Heart Rate Variability during Slow Deep Breathing. *Mymensingh medical journal : MMJ*, 30(1), 208–213. PMID: 33397876

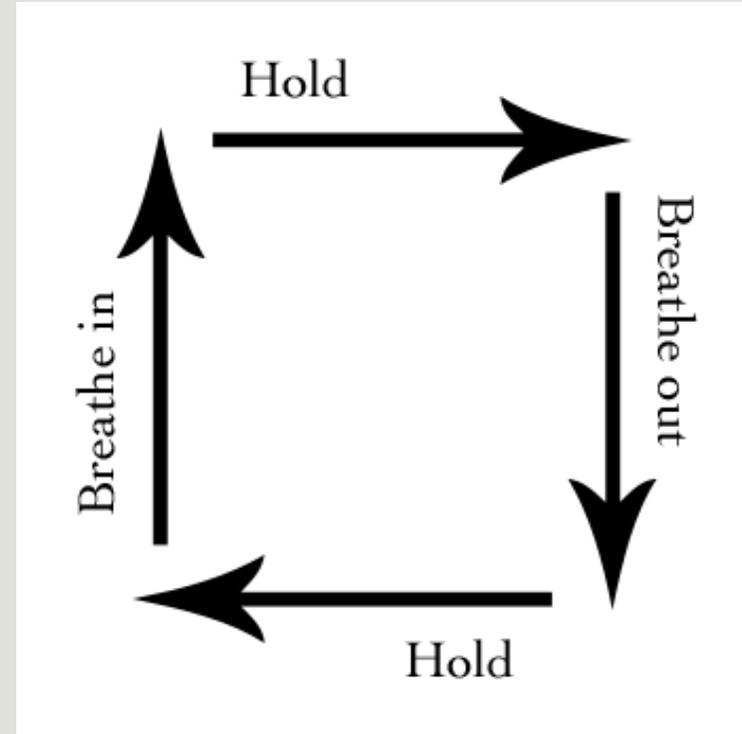
Square Breathing

- To the count of 3-5
- Repeat 5-10 times
- Stop if you get lightheaded

Do:

- When stressed
- If can't go to sleep
- When anxious
- Preventatively

Find a time that works best for you!



Extended Exhalation

2:1 Exhalation (exhalation twice as long as inspiration) reduces HR significantly more than 1:1 (square breathing)

- Great for pts with normal blood pressure but elevated HR
- And overly anxious pts
- Not for pts with nl HR or only slightly elevated HR



Bae, D., Matthews, J., Chen, J. J., & Mah, L. (2021). Increased exhalation to inhalation ratio during breathing enhances high-frequency heart rate variability in healthy adults. *Psychophysiology*, 58(11), e13905. <https://doi.org/10.1111/psyp.13905>

Breathing interventions reduce muscle tension!

- Abdominal breathing reduced CO2 load in trapezius muscles of manufacturing operators, a job which requires sustained attention and is associated with high stress.

Wixted, F., O'Riordan, C., & O'Sullivan, L. (2018). Inhibiting the Physiological Stress Effects of a Sustained Attention Task on Shoulder Muscle Activity. *International journal of environmental research and public health*, 15(1), 115. <https://doi.org/10.3390/ijerph15010115>

- Breath training reduces job-related, stress-induced hyperventilation and associated upper extremity musculoskeletal disorders.

Schleifer, L. M., Ley, R., & Spalding, T. W. (2002). A hyperventilation theory of job stress and musculoskeletal disorders. *American journal of industrial medicine*, 41(5), 420–432. <https://doi.org/10.1002/ajim.10061>

Epsom Salts

“...we found that magnesium penetrates through human stratum corneum and it depends on concentration and time of exposure. We also found that hair follicles make a significant contribution to magnesium penetration.”

Chandrasekaran, N. C., Sanchez, W. Y., Mohammed, Y. H., Grice, J. E., Roberts, M. S., & Barnard, R. T. (2016). Permeation of topically applied Magnesium ions through human skin is facilitated by hair follicles. *Magnesium research*, 29(2), 35–42. <https://doi.org/10.1684/mrh.2016.0402>

And another study showing that Magnesium Sulfate penetrates the dermis:

Ghimirey, K. B., & Ita, K. (2020). Microneedle-Assisted Percutaneous Transport of Magnesium Sulfate. *Current drug delivery*, 17(2), 140–147. <https://doi.org/10.2174/1567201817666191217093936>



Epsom Salts

“Based on the knowledge that ACh and KCl cause Ca²⁺ influx into the cells and subsequent contraction by acting on different Ca²⁺ channels, we concluded that magnesium inhibits Ca²⁺ influx by blocking the voltage-dependent calcium channels.”

Gourgoulianis, K. I., Chatziparasidis, G., Chatziefthimiou, A., & Molyvdas, P. A. (2001). Magnesium as a relaxing factor of airway smooth muscles. *Journal of aerosol medicine : the official journal of the International Society for Aerosols in Medicine*, 14(3), 301–307. <https://doi.org/10.1089/089426801316970259>



Epsom Salt Bath

- 3-5 cups in bathtub
- Soak 20-40 minutes
- 3-5x/wk
- Consider adding 2-3 drops of essential oils:
 - Lavender
 - Citrus

For:

- Mental and Physical relaxation
- Decompress nerves



Sleep

Bedtime routine:

20-40 min

Epsom bath/ square breathing/ light, gentle stretching

Journal/Make a list- to get thoughts out of the head prior to bed. You can always come back to the thoughts another time; when you wake at night, also journal anything that comes to mind.

Avoid television 30min before bed- the bright lights stimulate you to be awake. Enjoy the darkness during this time

Dark bedroom- Pull curtains or hang dark curtains to keep light out, cover alarm clocks with a cloth or turn them around so the light doesn't shine at you

Close your eyes

Botanical Interventions

- Lavender
- Chamomile
- Citruses: Sweet Orange, Bitter Orange, Bergamot, Lemon (Not Grapefruit)

Do Essential Oils Really Work for Stress?

Yes!

“Fragrance inhalation of essential oils, such as pepper oil, estragon oil, fennel oil or grapefruit oil, resulted in 1.5- to 2.5-fold increase in relative sympathetic activity...In contrast, fragrance inhalation of rose oil or patchouli oil caused a 40% decrease in relative sympathetic activity”

Study measured sympathetic response via HR, BP, and plasma catecholamine levels before and after oil inhalations

Haze, S., Sakai, K., & Gozu, Y. (2002). Effects of fragrance inhalation on sympathetic activity in normal adults. *Japanese journal of pharmacology*, 90(3), 247–253. <https://doi.org/10.1254/jjp.90.247>



Essential Oils

aka Volatile Oils

- Not carrier oils (ie olive oil, grapeseed oil, avocado oil, vegetable oils, etc) aka pressed oils

Essential oils are steam distilled

- They evaporate and do not stain

“Lavender” = Lavendula spp.

- Tea
- ❖ Essential oil

”Lavender oil, for instance, has also been studied for the ability to reduce stress,² anxiety, aggression,³ and cortisol levels⁴... Aromatherapy works primarily through the nose, but can also act through the lung and the skin. When inhaled, volatile aroma compounds from plants are capable of exerting direct-to-brain actions”

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- Sayer Ji, Evidence-Based Aromatherapy: Stress Relief and Much More <http://www.greenmedinfo.com/blog/evidence-based-aromatherapy-stress-relief-and-much-more>





Lavender

-Lavender E. oil reduces catecholamine and cortisol levels

Toda, M., & Morimoto, K. (2008). Effect of lavender aroma on salivary endocrinological stress markers. *Archives of oral biology*, 53(10), 964–968.
<https://doi.org/10.1016/j.archoralbio.2008.04.002>

“Chamomile” = *Matricaria* spp.

- Essential oils \$\$\$

❖ Tea

“the first controlled clinical trial of chamomile extract for GAD (Generalized Anxiety Disorder). The results suggest that chamomile may have modest anxiolytic activity in patients with mild to moderate GAD.”

Amsterdam, J. D., Li, Y., Soeller, I., Rockwell, K., Mao, J. J., & Shults, J. (2009). A randomized, double-blind, placebo-controlled trial of oral *Matricaria recutita* (chamomile) extract therapy for generalized anxiety disorder. *Journal of clinical psychopharmacology*, 29(4), 378–382.
<https://doi.org/10.1097/JCP.0b013e3181ac935c>



Citrus: Orange, Bergamot, Lemon

“...Citrus sinensis [Sweet Orange] and bergamot oil, which showed certain clinical anxiolytic actions...

Citrus aurantium [Bitter Orange]...which, like Lavendula angustifolia, appear to exert anxiolytic-like effects without GABA/benzodiazepine activity, thus differing in their mechanisms of action from the benzodiazepines. The anxiolytic activity of 25 compounds commonly found in essential oils is also discussed.”

de Sousa, D. P., de Almeida Soares Hocayen, P., Andrade, L. N., & Andreatini, R. (2015). A Systematic Review of the Anxiolytic-Like Effects of Essential Oils in Animal Models. *Molecules (Basel, Switzerland)*, 20(10), 18620–18660.
<https://doi.org/10.3390/molecules201018620>



Citrus: Orange, Bergamot, Lemon

“Our results suggest that limonene inhibits anxiety-related behavior through A2A receptor-mediated regulation of DAergic and GABAergic neuronal activity.”

Song, Y., Seo, S., Lamichhane, S., Seo, J., Hong, J. T., Cha, H. J., & Yun, J. (2021). Limonene has anti-anxiety activity via adenosine A2A receptor-mediated regulation of dopaminergic and GABAergic neuronal function in the striatum. *Phytomedicine : international journal of phytotherapy and phytopharmacology*, 83, 153474. <https://doi.org/10.1016/j.phymed.2021.153474>



Summary

Lifestyle interventions to improve neuronal, endocrine, and muscular stress responses:

- ❖ Square breathing
- ❖ Extended Exhalation
- ❖ Epsom salt soaks
- ❖ Proper sleep training

Botanical interventions that support lifestyle interventions:

- ❖ Lavender E. oil
- ❖ Chamomile tea
- ❖ Citrus E. oils