



The Brain Fog Epidemic- Can We Blame Our Brain?

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Brain Fog Definition - According to the Dictionary

1. **brain fog**

NOUN

a usually temporary state of diminished mental capacity marked by inability to concentrate or to think or reason clearly

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[Brain Fog | Definition of Brain Fog by Merriam-Webster](#)

[https://www.merriam-webster.com/dictionary/brain fog](https://www.merriam-webster.com/dictionary/brain%20fog)

Brain Fog Definition - What it Means to Us

- Lowered cognitive speed and processing
- Lowered learning ability and information retention
- The check engine light of the brain is on, do we....
 - Unplug the fuse OR
 - Assess and address the issue
- What should we be asking the patient about if they say they have brain fog???

What your patients may say besides brain fog...

- I can't think straight
- I can't focus/ concentrate
- I can't remember what I read two seconds ago
- I can't remember items, lose things
- I can't remember things, events, appointments
- I make lists and forget the list...
- I forget words and names
- I say the wrong words for things, but catch myself
- I can't study, can't retain information
- I get mentally tired after math, long work day

Rule out Red Flags for Loss of Brain Function

- Recent head trauma, LOC
- Past concussions
- Stroke
- Tumors, brain lesions
- Neurological diseases and degeneration
- Sudden onset?
- Severe?
- Neurologist consult needed?

Severe Symptoms/ Brain Issues- Referral/ ER

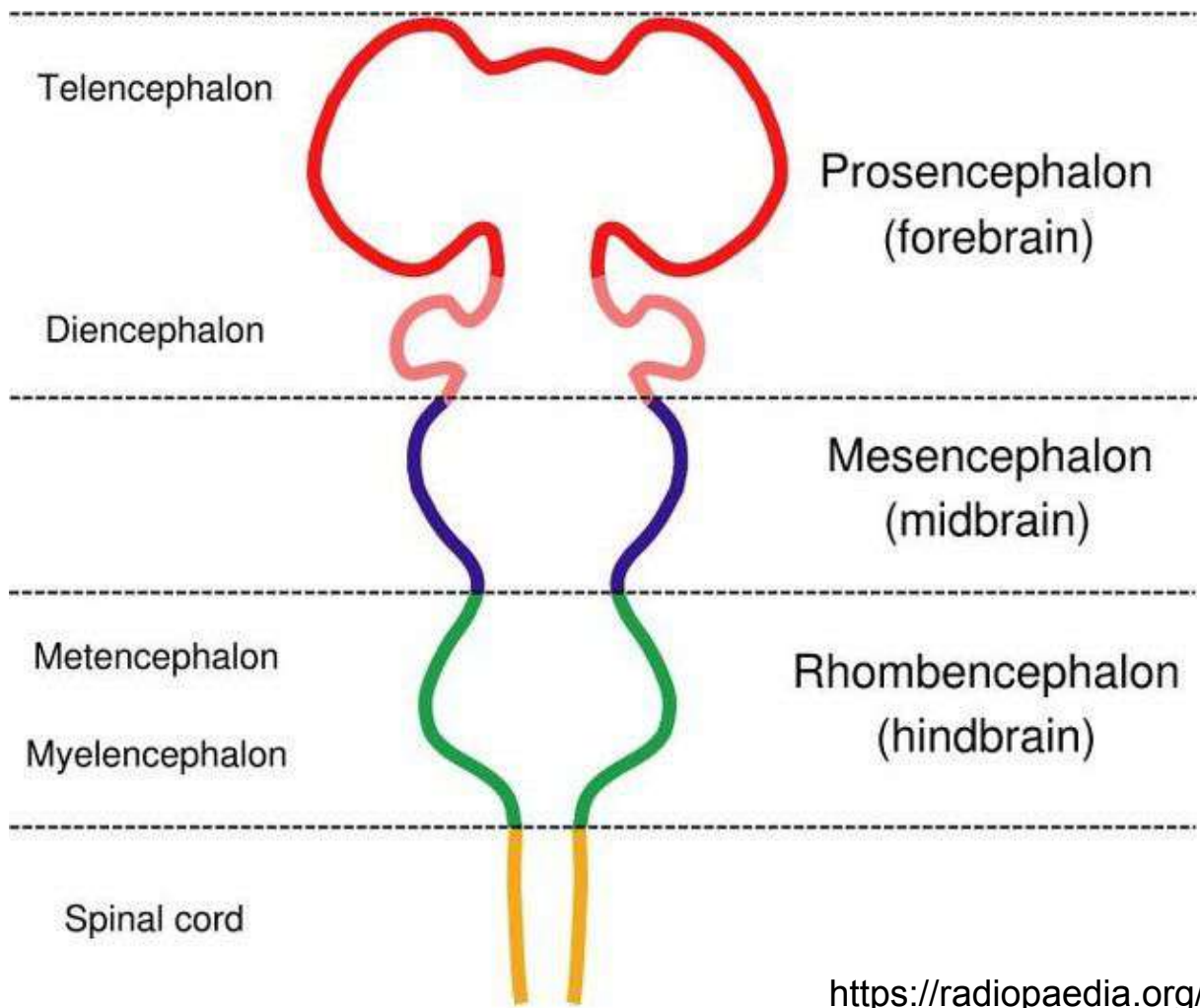
- Sudden/ severe loss of speech
- Sudden/ severe loss of memory
- Sudden/ severe loss of movement or coordination
- Sudden/ severe loss of reasoning
- Sudden/ severe loss of reading or math skills
- Sudden or progressing disorientation to time, place, identity, recent events
- Hallucinations
- Violent, inappropriate, and destructive behavior
- Severe depression and anxiety, suicidal ideation or attempts

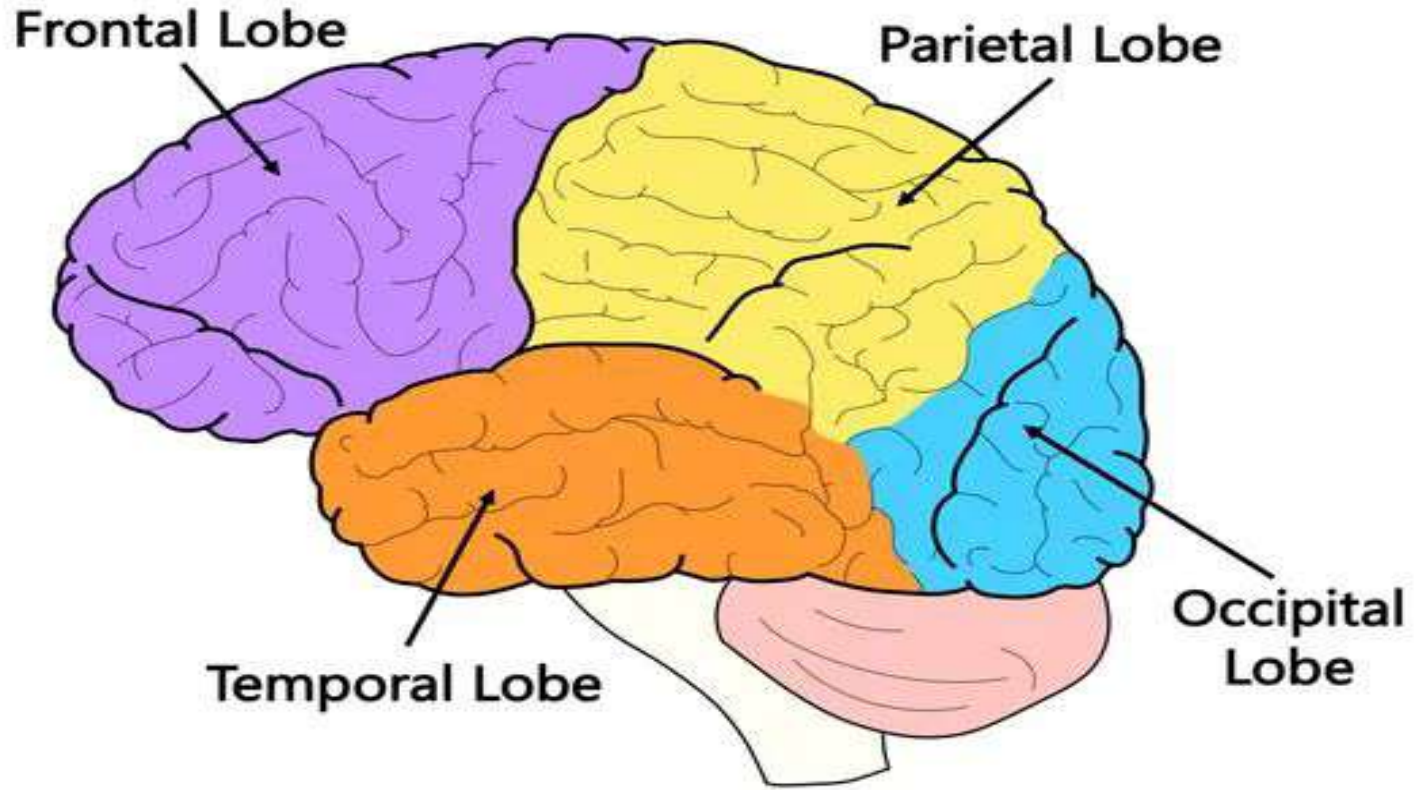
Ask About Determinants of Health

- Air quality- pollution, metals, mycotoxins, histamine overload...
- Water- hydration
- Blood sugar regulation
- Calories, protein, fats
- Inflammatory foods
- Stress
- Trauma - emotional, physical, etc
- Life changes- relationship, job, move, etc
- Medication or supplement side effects or overload
- Alcohol and drugs
- Stimulant use
- Sleep

What other symptoms or disorders are present?

- IBS, constipation, diarrhea, bloating, reflux
- Depression, anxiety, irritability
- Fatigue, hair loss, tremors, goiter
- Weight gain
- Insomnia
- Irregular or abnormal periods
- Low libido
- Autoimmune disease
- Menopause, andropause
- Thyroid disease
- Adrenal issues





Basic Brain Structures and Function Review

- Forebrain from Prosencephalon
 - Cerebrum
 - Frontal lobe function
 - Personality, consciousness, appropriate behavior and emotions, motivation, organization, planning, attention, voluntary muscle movement, fine motor skills, long term memory
 - Frontal lobe inflammation and issues- what patients present with
 - Slower voluntary muscle movement
 - Depression
 - Mental fatigue
 - Apathy
 - Poor impulse control
 - Handwriting worsens
 - Poor social behavior
 - Decreased learning ability- cognitive and muscle coordinated

Basic Brain Structures and Function Review

- Forebrain from Prosencephalon
 - Cerebrum
 - Parietal lobe function- perceive and interpret touch and pressure, awareness of body position, balance, taste, smell, hearing, sight
 - Parietal lobe inflammation and issues- what patients present with
 - Difficulty remembering words
 - Handwriting becomes sloppy
 - Basic math skills decline
 - Spatial awareness declines
 - Unstable in darkness
 - Unstable in high heels, able to wear before
 - Accident prone, sprains and injuries more common
 - Hypersensitive to pain or touch

Basic Brain Structures and Function Review

- Forebrain from Prosencephalon
 - Cerebrum
 - Temporal lobe function- formation of long-term memories, processing speech and speaking, anger, fear, sexual behavior, food and water intake
 - Temporal lobe inflammation and issues- what patients present with
 - Difficulty recalling recently learned facts or names
 - Difficulty with long-term memory
 - Reduced understanding of language with distractors like noise, accents
 - Difficulty with direction, visual memory
 - Fluctuating energy levels
 - Aphasia

Basic Brain Structures and Function Review

- Forebrain from Prosencephalon
 - Cerebrum
 - Occipital lobe function - vision- mapping, colors, distance, size, depth, visual stimuli and recognition
 - Occipital lobe inflammation and issues -
 - Floaters, halos
 - Difficulty distinguishing between two shades of color
 - Hand- eye coordination diminished
 - Dullness of colors at different times of day

Basic Brain Structures and Function Review

- Forebrain from Prosencephalon
 - Cerebrum
 - Thalamus function - sensory system relay hub (except olfaction), circadian rhythm balance, motor function, sensory info, taste, memory, emotions
 - Hypothalamus function - works with pituitary gland- regulates hormones, hunger, thirst, weight control, body temperature, electrolyte balance, circadian rhythm, reproductive function

Brain Structures and Function Review

- Midbrain from Mesencephalon
 - Connects hindbrain and forebrain
 - Visual and auditory sensory information
 - Pupil constriction
 - Eye movement
 - Circadian rhythm
 - Dopamine production

Brain Structures and Function Review

- Hindbrain from Rhombencephalon
 - Pons- breathing regulation and rhythm, sleep and wakefulness, facial sensation and movement, eating, hearing
 - Connection between cerebrum and cerebellum, connection between right and left hemispheres
 - Medulla - breathing, swallowing, digestion, heart and blood vessel function
 - Cerebellum - balance, coordination, eye movement, vision, muscle tone, motor learning

Serotonin

- Found in brain and gut, central nervous system
- Frontal lobe is saturated with serotonin receptor sites
- Inhibitory neurotransmitter
- Mood, sleep, appetite, pain, GI motility
- High levels: intestinal complaints, low libido, serotonin syndrome....
- Low levels: anxiousness, low mood, intestinal complaints, low libido, pain, sleep issues, weight issues, menopause symptoms, vasomotor reactions
 - Lack of interest in eating or cravings for sweets and carbs
- Must be in balance with dopamine
 - 5-HTP and L-dopa both require L-amino acid decarboxylase to be converted into serotonin and dopamine respectively

Fix, James D. (2009). High-Yield Neuroanatomy (4th ed.). Baltimore, MD, USA & Philadelphia, PA, USA: Lippincott Williams & Wilkins

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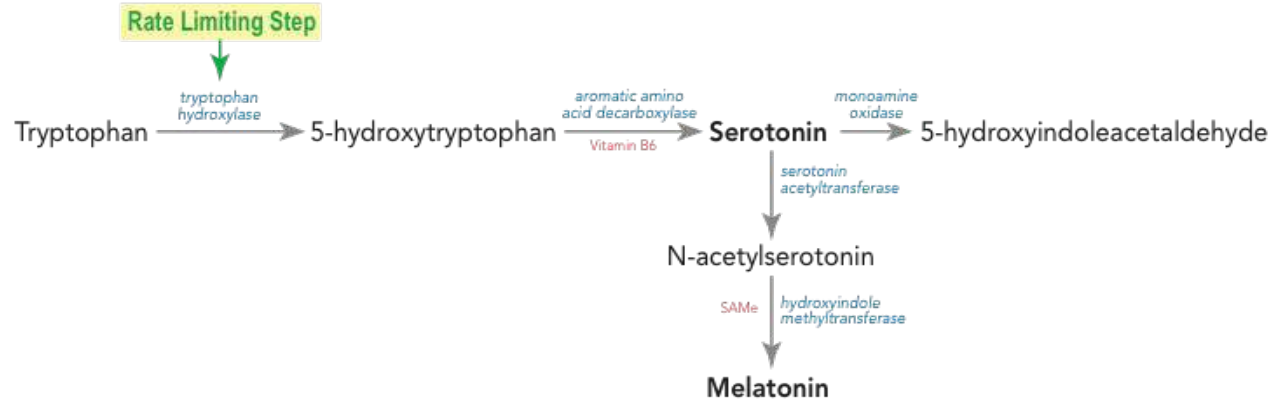
Serotonin Imbalances

- Fluctuating body temperatures
- Aches and pains
- Cramps
- Bladder issues
- Suicidal thoughts
- Racing thoughts
- Emotionally numb
- Crying or angry outbursts
- Escaping thoughts
- OCD
- Insomnia- low serotonin = low melatonin

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Serotonin Pathway



Blue = Enzyme

Red = Cofactor

Natural serotonin support

- Address leaky gut, leaky blood-brain barrier
 - Stool testing vs blood tests
- 5-HTP, B3, B6, Vitamin C to increase levels
- Cofactors- iron, methyl B12, folic acid, magnesium
- L-dopa can lower levels
- Regular exercise
- Consuming eggs, cheese, nuts, salmon, turkey... beware food sensitivities
- Asian ginseng, Hypericum perforatum, Rhodiola rosea, Cannabis, CBD oil
- Massage- urinary serotonin increased by 28%

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GABA

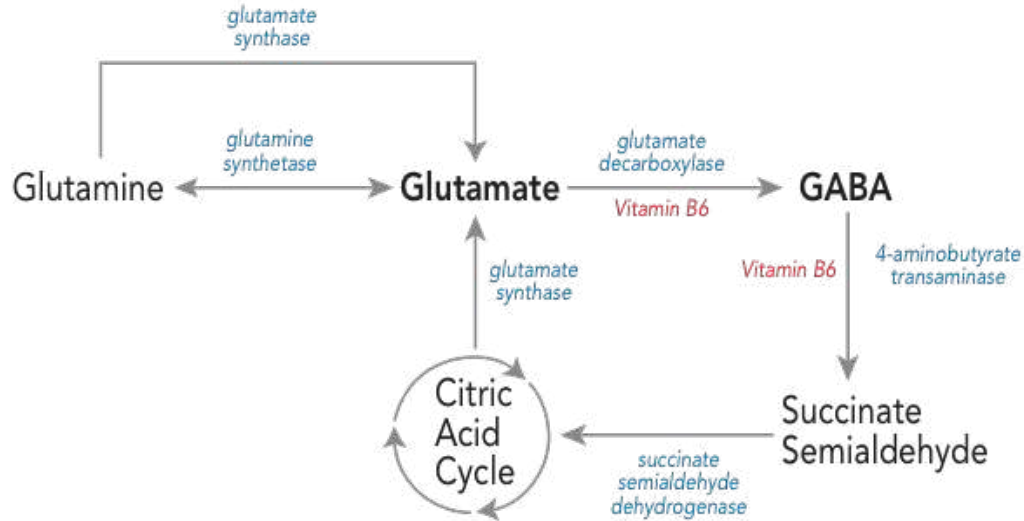
- Made in different areas of brain
- Primary inhibitory neurotransmitter in the brain
- High levels: excessive energy, anxiety, sleep difficulties, panic, depression, alcoholism
- Low levels: anxiety, sleep difficulties, menopause symptoms, vasomotor reactions, drowsiness, concentration issues, decreased memory, low mood, decreased cognition
- Must be in balance with stimulating neurotransmitters ie glutamate, PEA, norepinephrine
 - Stress, immune factors can disrupt balance
 - Often increases when excitatory neurotransmitters are high

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GABA and Glutamate Pathway



Blue = Enzyme

Red = Cofactor

Natural GABA support

- 4-amino-3-phenylbutyric acid: GABA receptor agonist
- GABA and leaky blood-brain barrier...
- Glutamic acid decarboxylase (GAD) antibodies- avoid artificial glutamates
- Magnesium citrate: GABA receptor agonist
- B6, glutamine
- Valerian root, Passionflower, Piper methysticum, green/ black/ oolong tea
- Lithium orotate, L-theanine, P5P, zinc, manganese
- Yoga

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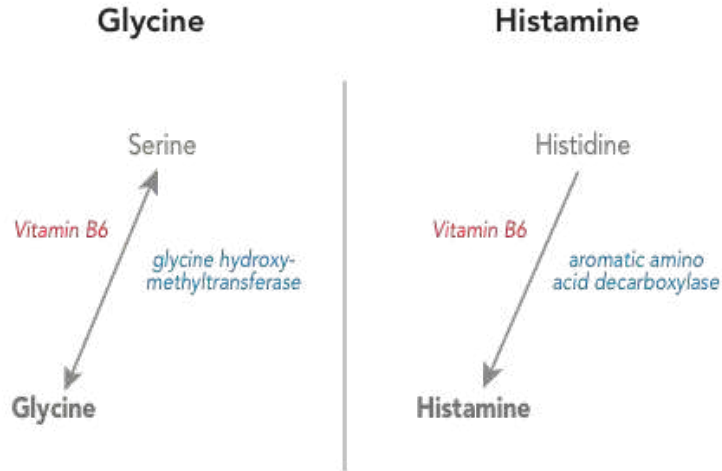
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Glycine

- Made by body and found in food
- Calms and relaxes the body
- Inhibitory
- Acts as neurotransmitter and amino acid
- Building block of proteins
- Anti-inflammatory
- High levels: excess energy, anxiety, sleep difficulties, diminished cognitive processing
- Low levels: anxiety, poor sleep, low cognitive function, memory issues

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Glycine and Histamine Synthesis



Blue = Enzyme Red = Cofactor

Natural glycine support

- B6, serine
- Animal products ie meat, fish, dairy
- Improve cell sensitivity to glycine

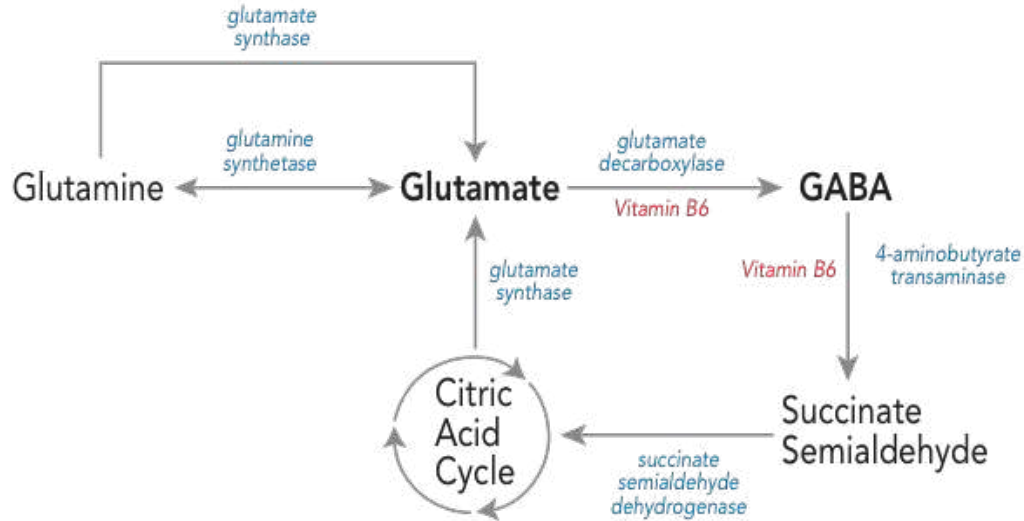
Glutamate

- Produced in brain
- Primary excitatory neurotransmitter
- High levels: urges, cravings, focus and concentration issues, low mood, intestinal complaints, pains, sleep difficulties, weight issues, anxiety, seizures
 - Diseases with high glutamate- ALS, MS, autism, Alzheimer's
- Low levels: fatigue, focus and concentration issues, depression, brain fog, addiction, slow learning

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GABA and Glutamate Pathway



Blue = Enzyme

Red = Cofactor

Natural glutamate support

- Magnesium: GABA receptor agonist
- Glutamine
- Assess citric acid cycle
- Turkey, soybeans, spirulina

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Food sources of glutamatic acid

- Always contain:
- MSG
- Yeast extract
- Hydrolyzed foods
- Textured protein
- Soy or whey protein
- Gelatin
- Often contain or produce:
- Boullion or broth
- Flavors and flavoring
- Barley malt or malt extract
- Soy sauce
- Seasonings
- Carageenan

Dopamine

- Produced in midbrain
- Feelings of pleasure and satisfaction, muscle control, muscle function, gastrointestinal matters
- High levels: focus/ concentration issues, sleep difficulties, paranoia, nervousness, irritability, hypersexuality
- Low levels: urges, impulses, cravings, anxiety, focus and concentration issues, low mood, fatigue, low libido, memory issues, weight issues, mood swings, apathy, forgetfulness, addiction
- Again, must be in balance with serotonin

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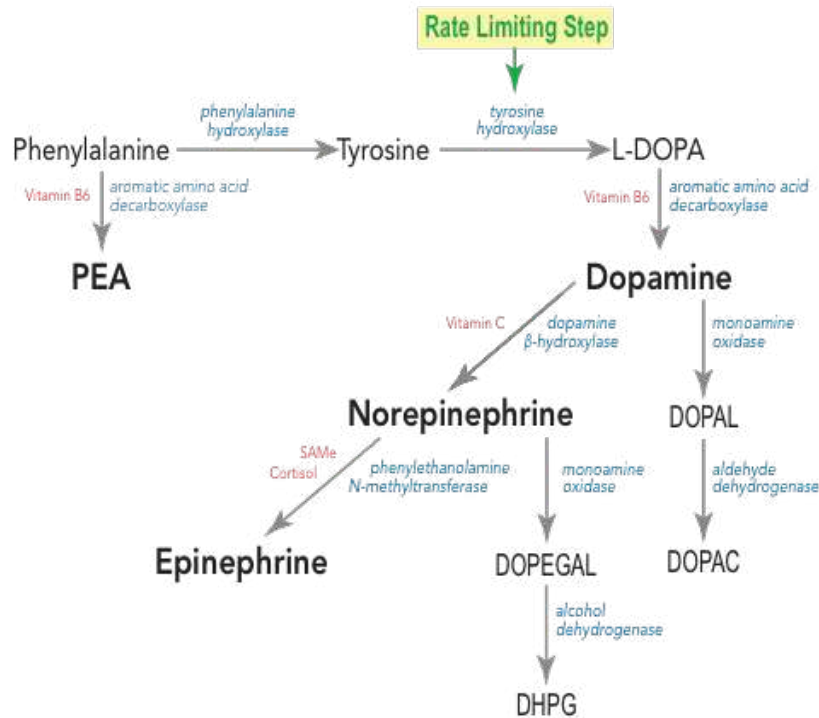
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Dopamine Imbalances

- Reward response especially when reward greater than expected
 - Gumball machine analogy
- Stimulates pleasure centers
- Coordination of movement
- Behavior
- Cognition
- Sleep
- Mood
- Attention
- Learning
- “Motivation molecule”
 - Severe apathy- lab mice study- starvation

Catecholamine and PEA Synthesis



Blue = Enzyme Red = Cofactor

Natural dopamine support

- L-dopa, B6, selenium, blueberry extract, alpha lipoic acid
- Amino acids D, L-phenylalanine, beta-phenylethylamine, N-acetyl L- tyrosine,
- 5-HTP can cause levels to fall
- Diosmin: flavonoid that reduces breakdown
- EGCG (epigallocatechin galate): inhibits breakdown
- Ashwagandha
- Hypericum perforatum: blocks enzymes that break down dopamine
- Massage- urinary dopamine increase by 31%

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Norepinephrine aka noradrenaline

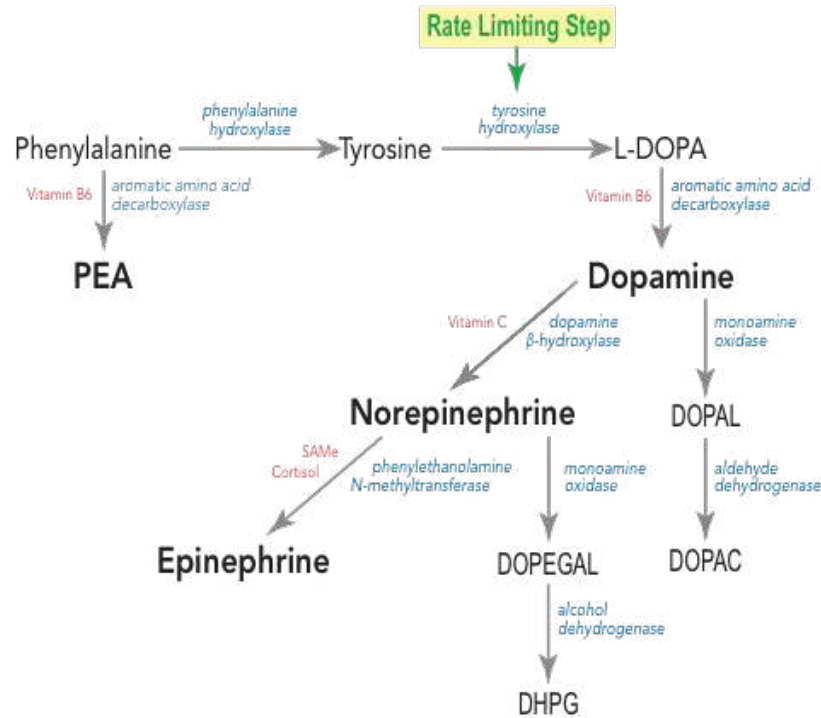
- Role in mental focus, emotional stability, endocrine function, regulates flight or fright response, regulates heart rate/ blood pressure, release glucose
- Released during stressful events
- High levels: anxiety, focus/ concentration issues, low mood, pain, sleep difficulties, weight issues
- Low levels: Focus/ concentration issues, low mood, fatigue, low libido, memory issues, weight issues, menopause symptoms

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Catecholamine and PEA Synthesis



Blue = Enzyme Red = Cofactor

Natural norepinephrine support

- Diosmin: reduces breakdown
- EGCG inhibits breakdown
- Dopamine, vitamin C
- Control cortisol, adrenal health

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Epinephrine aka adrenaline

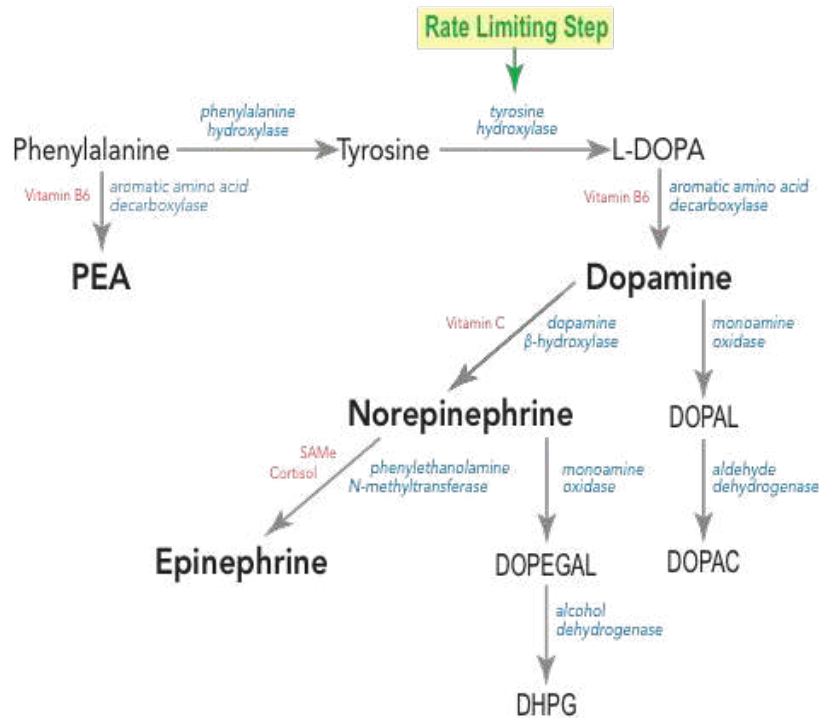
- Role in motivation, energy, mental focus, regulates fright or flight response , heart rate/ blood pressure , releases glucose from energy stores
- High levels: anxiety, focus/ concentration issues, sleep difficulties
- Low levels: focus/ concentration issues, fatigue, low libido, weight issues
- Increases with increased cortisol

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Catecholamine and PEA Synthesis



Blue = Enzyme Red = Cofactor

Natural epinephrine support

- Diosmin: reduces breakdown
- EGCG inhibits breakdown
- Norepinephrine, SAMe, cortisol
- Adrenal health

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PEA (phenethylamine)

- Important for energy, elevating mood, attention, lowering aggression
- High levels- anxiety, can be associated with high cortisol, paranoia, aggression, increased alertness, decreased appetite
- Low level association- depression, ADHD (biomarker), Parkinson's, bipolar, autism
- D-amphetamine, methylphenidate lower PEA

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Acetylcholine

- Role in visual and photographic memory, verbal memory, comprehension, mathematical calculation, spatial orientation and direction, mental speed, short to long-term memory
- Hippocampus involvement
- Deficiency mimics dementia and Alzheimer's symptoms
- Foods rich in choline (precursor): beef, cream, egg yolk, fatty cheese, liver and organ meats, nuts, tofu, whole milk
- Pantothenic acid, L-acetyl carnitine, L-Huperzine A, Alpha GPC
- Watch for MSK cramping, digestive issues, fatigue from supplementation
- Rule out genetic predisposition and/or development of dementia and Alzheimer's

Fright or flight response

- Norepinephrine and epinephrine
 - Released from adrenal medulla in response to fright, exercise, cold, low blood sugar.
 - Breakdown of glycogen and triacylglycerol – regulates carbohydrate and lipid metabolism
 - Increase blood pressure and cardiac output
- Where is the lion?

Signs and Symptoms Associated with Neurotransmitter Imbalances

- Fatigue
- Low motivation
- Sleep issues
- Stress
- Irritability
- Anxiety
- Mood swings
- Decreased mental acuity
- Decreased Stamina
- Dizziness/ lightheadedness
- Sugar and salt cravings
- Weight gain
- Headaches/ migraines
- Low libido
- Lack of focus
- BRAINFOG
- Increased pain sensitivity

Signs and Symptoms Associated with HPA Axis Dysfunction

- Fatigue
- Low motivation
- Sleep issues
- Stress
- Irritability
- Anxiety
- Mood swings
- Decreased mental acuity
- Decreased Stamina
- Dizziness/ lightheadedness
- Sugar and salt cravings
- Weight gain
- Headaches/ migraines
- Low libido
- Lack of focus
- BRAINFOG
- Increased pain sensitivity

What We Know About the HPA Axis

- Bridge between mind and body
- Regulates
 - Endocrine system
 - Nervous system
- Modulates immune system
- Initiates and coordinates response to fear, infection, dehydration, thermal exposure, hemorrhage, anticipation, inflammation, STRESS...

Sex Hormones and Neurotransmitters

- Estrogen levels effect serotonin receptors
- Progesterone levels effect GABA receptors
- Estrogen levels effect dopamine receptors in women
- Testosterone levels effect dopamine receptors in men
- Thyroid hormones effect all neurotransmitter receptors
- Endocrine triad- thyroid, adrenal, sex hormones
 - Neurotransmitters as chemical signalers

HPA Axis and Stress

- Stress shrinks the brain and degrades the blood-brain barrier
- Exogenous chemicals can reach the brain
- Stress leads to high cortisol which damages hippocampus
 - Disrupts circadian rhythm
- Stress = increase in IL-6 = increased sympathetic response
 - Elevation lasts for days and floods midbrain, midbrain response can be disproportionate to stressor
- Eventually cortisol lowers and leads to fatigue

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Stressors

- Psychosocial
- Physical
- Inflammation
 - Cytokines can influence the synthesis, release, and reuptake, of serotonin, dopamine, and norepinephrine.
- PERCEPTION

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Sleep and neurotransmitters

- To improve sleep
 - Support neurotransmitter levels
 - Circadian rhythm
 - Melatonin
 - Sleep hygiene
 - Fatigue- from sleep or HPA or neurotransmitters?

Genetic polymorphisms and effects on neurotransmitters

- MTHFR- Methylene tetrahydrofolate reductase- chromosome 1
- Gene vs. enzyme
- Heterozygous vs homozygous
- B vitamin status, stress
- Neurotransmitter production

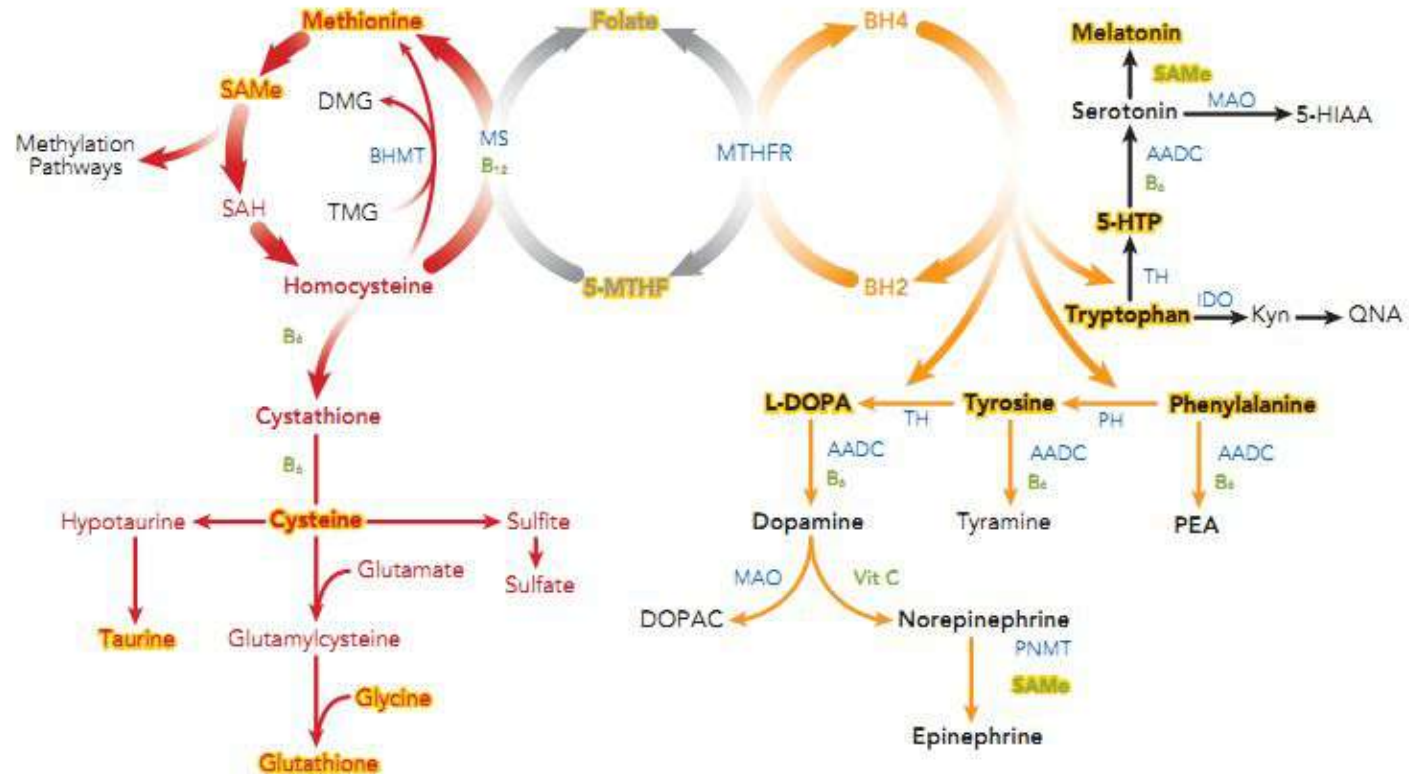
Methylation Biochemistry

Methionine Cycle

Folate Cycle

Biopterin Cycle

NT Metabolism



COMT

- Catechol-O-methyltransferase
- Prefrontal cortex regulation of catecholamines: dopamine, norepinephrine, epinephrine
- Personality, planning, behavior, emotions, short-term memory, etc

Genetic Testing

- MTHFR, COMT, serotonin gene polymorphisms, dopamine gene polymorphisms, etc
- Genetic translating software
 - Drugs and supplements
 - Chances for diseases
- Does testing change your treatment?
- Will testing make you give up treatment?

Gut and Brain

- Leaky gut= leaky blood-brain barrier and visa versa
 - Concussions
- What is causing leaky gut?
- What will heal their leaky gut?
- What happens when you heal the gut?
- How do you test for leaky gut?
- Is there dysbiosis? What is it affecting?

Therapeutic Order Step 1

- Re-establish the Basis for Health- Address Determinants of Health
 - Ensure they have access to clean air - purifiers, clean vents and ducts, essential oils, forest bathing, avoid pollution
 - Water- are they drinking enough? Drinking any?
 - Consistent meals and meal times
 - Do macronutrients meet metabolic needs? Healthy fats, protein, etc
 - Address food sensitivities and SAD
 - Find and address stressors, find stress-reducing activities
 - Address trauma, PTSD, anxiety, triggers for stress
 - Look for possible side effects of medications, supplements
 - Address addictions, overconsumption of alcohol
 - Reduce stimulant use, sugar intake
 - Sleep hygiene- restorative sleep? Quality sleep?

Therapeutic Order Step 2

- Stimulate the Vis Medicatrix Naturae

- Homeopathy for brain fog, mental focus issues

- Anacardium orientale- sudden loss of memory, especially under stress. Hit a wall studying.
- Argentum nitricum- poor focus and concentration, difficulty with conversation, anxiety, hurried
- Calcarea carbonica- headaches, forgetfulness, focus issues, wrong words, anxiety
- Gelsemium- can't think clearly or concentrate, mental fatigue, irritable
- Helleborus niger- apathy, dullness, blank mind, difficulty concentrating
- Kali phos- mental fatigue, low energy, forgetfulness, overexertion, worried mind
- Lycopodium clavatum- gradual memory loss and confusion, wrong words used, spelling mistakes
- Natrum muriaticum - sleeplessness, exhaustion, dull mind, depression
- Phosphoricum acidum- forgetfulness and apathy from grief, can't find the right word, can't focus on reading, can't collect thoughts
- Sulphur- absent-minded, forgets words, handwriting errors, speech difficulties

- Cell salts - Kali Phos

- Hydrotherapy

- Acupuncture

Therapeutic Order Step 3

- Tonify Weakened Systems
 - Vitamins, minerals, amino acids
 - Omega 3
 - Balance sex hormones
 - Support thyroid
 - Support adrenals
 - Psychotherapy/ counseling
 - Essential oils
 - Decrease brain inflammation

Therapeutic Order - Step 4

- Restore structural integrity
 - Osseous manipulation
 - Massage therapy
 - Craniosacral therapy
 - Prescribe exercise

Therapeutic Order - Step 5

- Natural substances for symptomatic relief
 - Botanical medicine
 - Adrenal formulas
 - Thyroid formulas
 - Sex hormone formulas
 - Anxiolytics
 - Cognitive formulas
 - Pharmaceutical-grade supplements
 - High dose anti-inflammatories, neurotransmitter support, nootropics

Therapeutic Order- Step 6

- Synthetic substances for symptomatic relief
 - First line therapy- short-acting or long-acting stimulants
 - Dextroamphetamine
 - Methylphenidate
 - Vyvanse
 - Second line therapy- non-stimulants
 - Atomoxetine (Strattera)
 - Quelpree- expensive
 - Third line therapy- antidepressants
 - Serotonin Norepinephrine Reuptake Inhibitors (SNRI)- Venlafaxine
 - Norepinephrine Dopamine Reuptake Inhibitors (NDRI)- Bupropion
 - Selective serotonin reuptake inhibitors (SSRI)- Citalopram, Fluoxetine, Sertraline....
 - Tricyclic antidepressants- Imipramine, Desipramine...

Moses, Scott. (Revised 2021). ADHD Medication.

<https://fpnotebook.com/peds/neuro/atntndfctdsrdinadlts.com>

Therapeutic Order- Step 7

- Higher Force Intervention
 - Referral
 - Address brain lesions, bleeds
 - Neurosurgery

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