

Mental Health & Herbs

by Sharlene Peterson, Genesis School of Natural Health, 2025

Mental illness and mental disorder are modern terms used to describe clinically significant disturbances in a person's cognition, behavior, or emotional regulation. Mental disorders include the many levels of depression, anxiety, bipolar, obsessive-compulsive, post-traumatic stress, attention-deficit hyperactivity, phobias, schizophrenia, disruptive, neurodevelopment (behavioral and cognitive), and eating disorders.

In 2023, about 58.7 million U.S. adults, or 22.8% of the adult population, experienced a mental illness, according to USAFacts. This translates to roughly 1 in 4 adults experiencing a diagnosable mental health disorder in a given year, according to John Hopkins Medicine. While the number of individuals experiencing mental disorders has significantly risen in recent years, we have a long history of mental struggles. Older terms to describe mental conditions included madness, hysteria, lunacy, the blues, and melancholy.

This manual is not a complete and comprehensive view of all mental disorders and possible causes. It will not prepare you to serve as a counselor or replace a client's medical doctor, psychologist or psychiatrist.



The purpose of this manual is to provide insight into the possible underlying health challenges and deficiencies that may be causing or contributing to a mental disorder. This manual will also describe many useful herbs, nutrients, and supplements that can help balance emotions, correct deficiencies, replenish the gut-brain axis, support HPA-axis, and minimize the internal and external toxins.

Mental Health & Herbs is divided into three sections.

1. The first section primarily describes the most common mental health disorders, symptoms, and drugs used by the medical community. Drug descriptions are not exciting and they can be long even with a few details. However, you will have clients that are taking prescriptions for depression and anxiety.
2. The second section dives into the viewing the mental disorders and solutions from a functional perspective - Gut-brain axis, HPA axis, Vagus nerve, etc. and some of the primary vitamins and minerals associated with function.
3. The third section includes herbal suggestions based on the symptoms presented by the individual struggling with mental health challenges.

Section One: Depression Disorders

Depressive episode is when a person experiences a persistent feeling of deep sadness, hopelessness, and loss of interest in activities that were once enjoyable and they have many of the common symptoms of depression for a period of at least two weeks.

Depressive disorder/Persistent depressive disorder is mild or moderate depression that lasts for at least two years. The symptoms are less severe than major depressive disorder and healthcare providers used to call it dysthymia.

Clinical Depression/Major Depressive Disorder is more than just feeling sad or going through a rough time. It is when a person changes how they function day-to-day for an extended time period because they are experiencing persistent feelings of deep sadness, unrelenting hopelessness, and loss of interest in activities that were once enjoyable. They also have many of common symptoms of depression.

Common symptoms of depression include:

- Changes in sleep / sleep disturbances
- Changes in appetite or weight
- Difficulty concentrating or making decisions
- Loss of energy / fatigue
- Loss of interest in all activities
- Hopelessness, feelings of low self-worth or guilt
- Changes in movement (less activity or heightened agitation)
- Physical aches and pains
- Suicidal thoughts or intentions

“People think depression is sadness. That it’s crying and dressing in black, but people are wrong. Depression is the constant feeling of being numb. It’s being numb to emotions, being numb to life. You wake up in the morning just to go back to bed again”. – Unknown.

Major Depressive Disorders recognized by The American Psychiatric Association:

- Seasonal affective disorder (seasonal depression): arises during the fall and winter and goes away during the spring and summer.
- Prenatal depression and postpartum depression: Prenatal depression is depression that happens during pregnancy. Postpartum depression is depression that develops within four weeks of delivering a baby.
- Atypical depression varies slightly from “typical” depression. The main difference is a temporary improvement when they were attending positive events. They also tend to be sensitive to feeling rejected and have an increased appetite.

Disruptive mood dysregulation disorder: is what psychiatrists call chronic, intense irritability and frequent anger outbursts in children.

Premenstrual dysphoric disorder is when you have premenstrual syndrome symptoms (PMS) along with mood symptoms, such as extreme irritability, anxiety or depression. The symptoms improve a few days after your period starts but they can be severe enough to interfere with your life.

Depression & Traumatic Brain Injury (TBI)

“Rates of depression from different studies vary widely, but on average, about 27% of people with a TBI meet the criteria for a diagnosis of major depression or persistent mild depression (dysthymia). Also, 38% have symptoms of depression that are severe enough to interfere with daily life. The average rate of major depression among people with mild TBI or concussion is 16%; the rate among those with severe TBI is 30%. People with a history of TBI are nearly eight times more likely to have major depression than the general population”. - <https://mskctc.org/tbi/factsheets/depression-after-traumatic-brain-injury>

Approximately 21 million U.S. adults, 8.4% of the population, had at least one major depressive episode in diagnosed in 2020.

Medical doctors have the following pharmaceutical toolbox: Selective serotonin reuptake inhibitors (SSRIs), tricyclic antidepressants (TCA), and monoamine oxidase inhibitors (MAOI).

Selective serotonin reuptake inhibitors (SSRIs) are said to work by blocking the serotonin transporter protein which prevents serotonin from being transported back into the nerve cell after it has been released. This increases the levels of serotonin available in the synaptic cleft, the space between nerve cells.

- **SSRIs are primarily used for:** Major depressive disorder; Anxiety disorders; Obsessive-compulsive disorder; and Bulimia nervosa.
- **SSRIs include:** Fluoxetine (Prozac), Sertraline (Zoloft), Citalopram (Celexa), Escitalopram (Lexapro), and Paroxetine (Paxil).
- **Common Side Effects:** nausea, diarrhea, insomnia, headache, anxiety, agitation, sweating, sexual dysfunction, and weight gain or loss.

Tricyclic antidepressants (TCAs) inhibit serotonin and norepinephrine reuptake but they also have “anticholinergic activity and lower threshold for overdose”.¹ Anticholinergic activity refers to blocking the action of the neurotransmitter acetylcholine which inhibits the parasympathetic nervous system and can lead to confusion and disorientation.

- **TCAs include:** amitriptyline (Elavil), clomipramine (Anafranil), desipramine (Norpramin), doxepin (Sinequan), imipramine (Tofranil), nortriptyline (Pamelor), and protriptyline (Vivactil), and amoxapine (Asendin).
- **“Clomipramine** holds FDA approval for treating obsessive-compulsive disorder (OCD) in individuals aged 10 and older”.¹

- **Amoxapine** (Asendin). “A small number of children, teenagers, and young adults (up to 24 years of age) who took antidepressants such as amoxapine during clinical studies became suicidal...However, experts are not sure about how great this risk is and how much it should be considered in deciding whether a child or teenager should take an antidepressant.”.² What is a small number?

Monoamine oxidase inhibitors (MAOI) work by inhibiting the enzyme monoamine oxidase from breaking down neurotransmitters such as serotonin, dopamine, and norepinephrine. This leaves higher levels of neurotransmitters in your brain.

- MAOIs are an **extremely strong** class of antidepressants that treat depression.³ They are not used often because **drug interactions** and safety concerns which include **food interactions** (certain cheeses, smoked, fermented, or pickled food, alcohol, and more).
- **MAOIs include:** Isocarboxazid (Marplan), Phenelzine (Nardil), and Tranylcypromine (Parnate). Selegiline (Emsam) is a newer MAOI that works by blocking the enzyme monoamine oxidase B (MAOI-B). The most concerning common side effects include dizziness/fainting, high or low blood pressure, and changes in heart rate and rhythm.



Serotonin Syndrome is having a dangerously high level of the neurotransmitter serotonin. It's rare, but it can be life-threatening. This can happen if a person takes two medications that raise serotonin levels at the same time (like other antidepressants, some pain medications, migraine treatments, or the herb St. John's wort).³

Antidepressants & Effectiveness

The use of drugs for depression is very common but the success rate is not impressive. Approximately 30% of people with depression have what has been termed “treatment-resistant depression” This means that several types of drugs, with or without therapy, have failed to improve their symptoms. In addition, treatment for around two-thirds of people with depression is only partially effective, some improvement with a few of the symptoms.

The Institute for Quality and Efficiency in Health Care in Germany found that studies involving adults with moderate or severe depression have shown the following:

- **Without antidepressants:** About 30 out of 100 people who took a placebo noticed an improvement in their symptoms within six to eight weeks.
- **With antidepressants:** About 50 out of 100 people who took an antidepressant noticed an improvement in their symptoms within six to eight weeks.

“Current practice for major depressive disorder treatment mainly relies on trial and error, with an estimated 42%–53% response rates for antidepressant use.”⁶

Specialists believe that some people, such as those with mild depression, are prescribed antidepressants unnecessarily. “Antidepressant prescriptions more than tripled between 1998 and 2018, from 377 items per 1000 population to 1266 per 1000”.⁷ An alarming trend is the use of antidepressants in children and teenagers.

A research report from The University of Michigan Health that revealed that monthly antidepressant prescriptions jumped more than 66 percent between January 2016 and December 2022. “Antidepressant dispensing to adolescents and young adults was already high and rising before March 2020. Our findings suggest these trends accelerated during the pandemic.” - Kao Ping Chua, M.D., Ph.D.⁸

Counseling / Psychotherapy

Research suggests that adding counseling (psychotherapy) to drug treatment was more helpful than medication alone in treating major depression. This combination therapy also helped decrease recurrences of depression. Therapy and drugs may complement each other because they have different effects on the brain. Changes in the brain can be observed through neuroimaging.

“Evidence of neurogenesis and neural plasticity has opened newer possibilities of interventions for increasing our ability to alter the brain. Psychotherapy that had long been dubbed as an unscientific and an invalidated dogma is beginning to find its neurobiological underpinnings and regaining its value as an immensely scientific method of intervention”.- Indian J Psychiatry. 2017 Oct-Dec;59(4):411–419. doi: 10.4103/0019-5545.217299

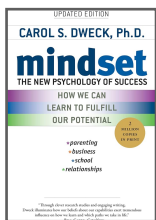
There are many types of counseling for depression but the most effective therapies focus on helping people get involved in activities that are enjoyable and serve a purpose. This helps change negative thought patterns or more fully accept past events or trauma.

- **Cognitive behavioral therapy** helps people learn how to change the way they act, think, and feel about things that happen to them. It also helps them to change the way they see themselves. It involves identifying and changing negative thought patterns and behaviors, focusing on the present, and developing practical coping skills to manage challenging situations. It can be an effective treatment for depression and for some people with PTSD, traumatic brain injury, or anxiety.
- **Behavioral activation therapy** is used to help people with depression by focusing on behaviors rather than thoughts and emotions/feelings. It involves identifying enjoyable activities, activities that are meaningful/serve a purpose, setting realistic goals, and gradually increasing activity levels to break the cycle of depression.

- **Acceptance and commitment therapy** uses mindfulness and other exercises to help people acknowledge and accept their thoughts and feelings. It involves “reframing” which challenges negative thoughts and beliefs. Reframing often involves focusing on more positive thoughts, but it can also be used to identify excessively high expectations that need to be more realistic. In cases where the individual experiences maladaptive or irrational thoughts, a therapist may choose a cognitive restructuring approach.⁹

It is important to understand that when people experience trauma, especially at an early age, it can cause long-term changes in how their brains respond to fear and stress. These changes may lead to depression or anxiety. In addition, individuals that have drug and/or alcohol addiction have a significantly higher risk for experiencing a major depressive episode or disorder. Specialized counseling for trauma and addictions should be considered.

Recommended Book:



Mindset: The New Psychology of Success by Carol Dweck

A mindset is a person’s self-perceptions or beliefs. They determine behavior, outlook, and mental attitude. Two mindsets have been identified by Carol Dweck, a fixed mindset and a growth mindset. People can have both types of mindsets, a growth mindset in some situations (for example, math) and a fixed mindset in others (for example, a sport).

Anxiety Disorders

Mild anxiety and fear, or a fight-or-flight reaction, is a normal reaction to stress or a sudden perceived danger (real or imagined). Anxiety disorders differ from normal feelings of worry, nervousness, or feeling anxious. They involve excessive fear that is out of proportion to the situation and uncontrollable worry. Muscle tension pain, indigestion, exhaustion, headaches, and an inability to fall asleep are common physical expressions of anxiety.

Anxiety disorder symptoms:

- Persistent, excessive fear or worry in non-threatening situations
- Feelings of dread, anticipating the worst, and looking for signs of danger
- Feeling tense, jumpy, restless, or irritable
- Pounding or racing heart, heart palpitations
- Shortness of breath or feeling like you can’t take a breathe
- Sweating, tremors and twitches
- Exhaustion and insomnia
- Upset stomach, headaches, frequent urination or diarrhea

Individuals with anxiety often excessively worry about a future situation which can lead to an avoidance response. The future situation does not need to be a big event, it can be something as normal as going to work, school, grocery shopping, or meeting a friend. Avoiding situations that may trigger or worsen their symptoms can affect their job, schoolwork, and relationships.

“It is very hard to explain to people who have never known severe depression or anxiety the sheer continuous intensity of it. There is no off switch”. – Matt Haig

Over 40 million adults (19%) have an anxiety disorder in the U.S. making it the most common mental health condition. Generalized anxiety disorder is the most common type of anxiety followed by panic disorder, social anxiety, phobias, and separation anxiety.

- **Generalized Anxiety Disorder (GAD)** is the persistent and excessive worry about everyday ordinary things or issues, for at least 6 months. This worrying can consume hours each day, making it hard to concentrate or finish tasks and it is exhausting.
- **Panic Disorder:** The core symptom of a panic disorder is recurring panic attacks which may be described as episodes of sudden, intense fear or terror. The physical symptoms during an attack may include a racing heart, heart palpitations, chest pain, shortness of breath or feeling like they can't breathe, trembling, feeling dizzy, or nauseous. Many will take desperate measures to avoid a panic attack, including social isolation.
- **Social Anxiety Disorder** (social phobia) is an intense fear of social situations leading to avoidance of social interactions. It is often driven by irrational worries (e.g. not knowing what to say or sounding stupid). Individuals with social anxiety may not take part in conversations or contribute to class discussions or offer their ideas. Panic attacks are a common reaction to anticipated or forced social interaction.

Post-traumatic Stress Disorder

Post-traumatic stress disorder (PTSD) is a mental health disorder that can occur when a person has experienced or witnessed a traumatic event. Most people will have a short-term response to a traumatic or a life-threatening event such as a serious accident, assault, military combat, or natural disaster. When an individual develops long-term symptoms it may lead to a diagnosis of PTSD.

Post-traumatic stress symptoms, in addition to changes in thoughts, feelings, and behaviors, may include acute or chronic physical reactions. Common physical symptoms include an increased heart rate, high blood pressure, sweating, trembling, muscle tension, nausea, back and joint pain, headaches, fatigue, trouble breathing, and dizziness. “For people with chronic pain, the pain may serve as a reminder of the trauma, which in turn may cause or worsen other PTSD symptoms, depression, or alcohol and prescription medication misuse”.⁴

Trauma in the form of emotional, physical, and sexual abuse may also lead to PTSD. A person's risk for developing PTSD increases when the event is violent or occurs repeatedly over a long period of time. A history of childhood trauma or adverse experiences also increases the risk for the development of PTSD after an event.

"Young children can also develop PTSD, and the symptoms are different from those of adults. Young children lack the ability to convey some aspects of their experience. Behavior (e.g. clinging to parents) is often a better clue than words, and developmental achievements in an impacted child might slip back (e.g. reversion to not being toilet trained in a 4-year-old)."5

Avoidance is another factor in developing PTSD - it is important to return to normal life activities like work, school, and driving. Numbing feelings with drugs, alcohol, and prescription sedatives is a form of avoidance.



PTSD symptoms often co-exist with other conditions such as substance use disorders, depression and anxiety. "The prevalence of PTSD in the U.S. is estimated to be approximately 4% of U.S. adults and 8% of U.S. adolescents aged 13-18. The lifetime prevalence in the U.S. is estimated to be 6%".4

"Trauma-focused psychotherapies are the gold standard of treatment, with most people no longer meeting criteria for PTSD after 10-12 weeks of therapy."4

Obsessive-Compulsive Disorder

Many are unaware that OCD involves two separate processes: thought and behavior. The "obsessive" component is the unwanted thought and fear. The thoughts and fears lead to deep feelings of stress that are temporarily relieved when the person is able to complete a specific act. The act is the repetitive behavior we call a compulsion.

OCD obsessions are defined as long-lasting, intrusive, unwanted thoughts or urges that keep coming back and they cause significant distress or anxiety. Obsessions usually have themes, such as: fear of contamination/germ or dirt, doubting and having a hard time dealing with uncertainty, requiring things to be orderly and balanced, aggressive or horrific thoughts about losing control and harming yourself or others.

Compulsions are the repetitive actions (physical or mental) that are used by the person with OCD to alleviate the distress caused by the obsessions or to prevent a feared consequence from occurring. With OCD, compulsions do not result in feelings of pleasure and they only provide limited relief from anxiety.

Compulsion examples include: hand-washing until your skin becomes raw, checking doors over and over again to make sure they're locked, checking the stove over and over again to make sure it's off, counting in certain patterns, arranging your canned goods to face the same way and needing to “fix” if someone moves it a bit. Body-focused repetitive behaviors (BFRBs) such as trichotillomania (hair pulling) and excoriation (skin picking) are considered OCD-related disorders.

To complicate the diagnosis, it is possible to have only the obsession or only the compulsions and OCD frequently coexists with other psychiatric disorders. When a person has more than one disease or disorder it is called comorbidity. The most common comorbidity with OCD is anxiety. It is so common that OCD used to be categorized as an anxiety disorder. When OCD leads to the inability to function socially or at work, or become isolated they may develop depression.

Drugs Used For Anxiety Disorders, PTDS, and OCD

Medications for anxiety disorders generally include antidepressants, antianxiety medications, and beta-blockers. The most common drugs are selective serotonin reuptake inhibitors (SSRIs), serotonin-norepinephrine reuptake inhibitors (SNRIs), benzodiazepines, and buspirone. If these drugs are ineffective a doctor may recommend the antipsychotic medication Trifluoperazine - it is the only FDA approved antipsychotic to treat anxiety.

The antidepressants most commonly prescribed for anxiety are the SSRIs Prozac, Zoloft, Paxil, Lexapro, and Celexa. SSRIs are also used for obsessive-compulsive disorder (OCD), panic disorder, social anxiety disorder, and post-traumatic stress disorder.¹⁰ Tertiary tricyclic antidepressant agents (TCAs) are also used.

Benzodiazepines, also known as tranquilizers, are commonly prescribed for anxiety. They slow down the nervous system and brain activity by “telling” your brain to release the neurotransmitter gamma-aminobutyric acid (GABA). Benzodiazepines are classified as a controlled substance because they can have dangerous effects and can be habit forming.

Not all benzodiazepine medications are the same! Some are stronger and short-acting (last several hours) for short-term conditions. The long-acting (lasts for several days) benzodiazepines are not as strong and are used for chronic conditions. In addition, drugs in this class have varying effects so some are used for anxiety, insomnia, and seizures. Benzodiazepines for anxiety include alprazolam (Xanax), clonazepam (Klonopin), diazepam (Valium), and lorazepam (Ativan). Long-term use is not recommended because they are physically addictive.

Buspirone is used primarily for generalized anxiety disorder. Off-labeled buspirone is used as a “second-line agent behind selective serotonin reuptake inhibitors (SSRIs) when a patient does not respond to or cannot tolerate the side effects of SSRIs. Buspirone has also been used as an augmentation agent to reduce SSRI's sexual side effects”.¹¹

Bipolar Disorder

Bipolar disorders cause dramatic changes in a person's mood, energy, and ability to think clearly. The shifts from high and low moods are known as mania and depression. About 3% of the U.S. population has been diagnosed with a bipolar disorder and the average age-of-onset is 25. A bipolar diagnosis is mainly dependent on the mania episodes.

The following paragraphs are from the National Alliance on Mental Illness.

- **There are four types of bipolar disorder:** Bipolar I, Bipolar II, Cyclothymic, and Unspecified. An unspecified diagnosis means that the symptoms do not meet the criteria for Bipolar I, II or Cyclothymia but the person experiences periods of clinically significant abnormal mood elevation/mania.
- **Bipolar I Disorder** describes those who have experienced one or more episodes of mania. Most people diagnosed will have episodes of both mania and depression, but an episode of depression is not necessary for a diagnosis. To be diagnosed, manic episodes must last at least 7 days or be so severe that hospitalization is required.
- **Bipolar II Disorder** is a subset of bipolar disorder in which people experience depressive episodes shifting back and forth with hypomanic episodes, but never a “full” manic episode.
- **Cyclothymic Disorder** is a chronically unstable mood state in which people experience cycles of hypomania and mild depression for at least two years. Individuals can typically function in daily life, though it may be difficult. Treatment usually involves counseling and therapy.
- **Bipolar Depressions** are often so devitalizing that the person may be unable to get out of bed. When a person is in a bipolar depression episode even minor decisions, such as what to eat, can be overwhelming. They may become obsessed with feelings of loss, personal failure, guilt or helplessness which can lead to thoughts of suicide.
- **Bipolar Mania.** To be diagnosed with bipolar disorder, a person must have experienced at least one episode of mania or hypomania. The “high” at the start of a mania episode, especially when it occurs after depression, often feels like relief. This relief can quickly turn into a high level of uncontrollable irritability. A mania episode impairs judgement and often leads to impulsive, reckless, and unpredictable behaviors. Hypomania is a milder form of mania that doesn't include psychotic episodes (delusions and/or hallucinations) and people can often function well in social situations or at work.
- Severe bipolar episodes of mania or depression may include psychotic symptoms such as hallucinations or delusions. People with bipolar disorder who have psychotic symptoms can be wrongly diagnosed as having **schizophrenia**.

“Mania starts off fun-not sleeping for days, keeping company with your brain, which has become a wonderful computer, showing 24 TV channels all about you. That goes horribly wrong after a while”. - Carrie Fisher.

Medications for bipolar disorder often include mood stabilizers like lithium, anticonvulsants such as valproate (Depakote) and carbamazepine (Tegretol, Curatil), and antipsychotics like olanzapine (Zyprexa) or quetiapine (Seroquel), sometimes in combination.

Zyprexa and Seroquel are atypical antipsychotic medications. Zyprexa has a strong sedative effect and is said to balance the levels of dopamine and serotonin in the brain. It is approved for bipolar disorders and schizophrenia if the patient is over the age of 13.

Seroquel is used to treat bipolar disorder and schizophrenia in children and teenagers. It can cause high blood sugar, diabetes, high cholesterol, weight gain, sleepiness, and headaches. Serious side effects include suicidal thoughts and a **movement disorder**.

Both Zyprexa and Seroquel may increase the risk of death in older adults with psychosis (loss of touch with reality) related to dementia.

Tardive Dyskinesia (TD) is a movement disorder that can occur with long-term use of medications that block the activity of the neurotransmitter dopamine in the brain- **it is a drug-induced disorder!**¹³ There are many drugs that can cause TD and they are used for mental disorders, nausea, seizures, Parkinson’s disease, and more.

Tardive dyskinesia symptoms usually develop after taking the drug for months to years but they can develop in as little as six weeks. TD affects over 500,000 people in the U.S. Females, especially post-menopausal women, and those with diabetes have a higher risk of developing TD.



Abilify (aripiprazole) is a powerful antipsychotic medication first approved for the treatment of schizophrenia. Since then, it has been approved to treat bipolar disorder, major depression (combined with antidepressants) **and irritability associated with autism**. Abilify is one of the drugs associated with the development of tardive dyskinesia.

Common drugs associated with TD: Older antipsychotics, also known as neuroleptics, are the most common cause (chlorpromazine, fluphenazine, haloperidol, and prochlorperazine). Antidepressants like amitriptyline, fluoxetine (Prozac), and sertraline. The anti-nausea medication Metoclopramide. Levodopa used for Parkinson's disease. Anti-seizure medications like phenobarbital and the mood stabilizer lithium.

Attention Deficit Hyperactivity Disorder (ADHD)

The term attention deficit disorder (ADD) was discontinued in 1987 by the American Psychological Association and replaced with attention deficit hyperactivity disorder ADHD. While many continue to use the term ADD, it is no longer recognized as a distinct diagnosis in the Diagnostic and Statistical Manual of Mental Disorders. It is now referred to as a predominantly inattentive presentation of ADHD - ADD is a specific type of ADHD where individuals struggle with inattention and distractibility without hyperactivity.¹²

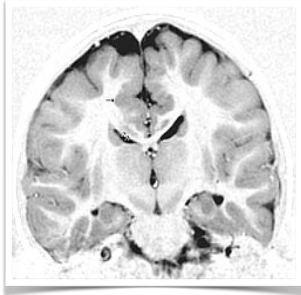
ADHD is commonly identified by hyperactivity, impulsivity and an inability to concentrate. There are three medically recognized types of ADHD:

1. **Predominantly Inattentive Presentation:** Individuals struggle with inattention, forgetfulness, and poor organizational skills. They often makes careless mistakes, do not pay close attention to details, have difficulty with continued attention/difficulty focusing attention or completing a task or activity, become bored easily, do not seem to listen when spoken to directly, do not follow instructions or finish tasks/trouble completing or turning in homework assignments, have trouble organizing tasks and activities, avoid or dislike tasks that require continued mental effort, frequently lose items, are often forgetful and easily distracted/jump from one activity to another.
2. **Predominantly Hyperactive/Impulsive Presentation:** Individuals display excessive energy, impulsivity, difficulty staying still, are often impatient and find quiet activities challenging. They fidget with or tap hands or feet, squirm when seated or leave their seat, run or climb in inappropriate situations (adults usually limit themselves to feelings of restlessness), touch or play with everything, are unable to play or participate in activities quietly, are often “on the go”, talk excessively, interrupt or intrude on others, and have difficulty waiting for their turn or sharing.
3. **Combined Presentation:** Individuals exhibit significant symptoms of both inattention and hyperactivity/impulsivity - six or more symptoms of inattention and six or more symptoms of hyperactivity/impulsivity.

Dr. Daniel G. Amen, a psychiatrist and nuclear brain imaging specialist, uses a functional neuroimaging technique called SPECT (Single Photon Emission Computed Tomography). It shows cerebral blood flow (brain activity) and is used to determine the areas in the brain that are working well, too hard, or too little. He also uses the term ADD instead of ADHD because he believes ADD is a more appropriate term for the condition.

Dr. Amen, through SPECT imaging, believes there are seven types of ADD/ADHD.

- | | |
|----------------------|--------------------------------|
| 1. Classic ADD | 5. Limbic ADD |
| 2. Inattentive ADD | 6. Ring of Fire ADD (ADD Plus) |
| 3. Over-focused ADD | 7. Anxious ADD |
| 4. Temporal Lobe ADD | |



“There is evidence of anatomical differences in the brains of children with ADHD in comparison to other children without the condition. For instance, children with ADHD have reduced grey and white brain matter volume and demonstrate different brain region activation during certain tasks. Further studies have indicated that the frontal lobes, caudate nucleus, and cerebellar vermis of the brain are affected in ADHD”¹⁴ .

According to the Centers for Disease Control and Prevention, it is estimated that 6.4 million American children are diagnosed EVERY YEAR.

ADHD is the most common neurodevelopmental disorder and is most often diagnosed in childhood. About 1 in 9 children in the U.S., between the ages of 3 and 17, have been diagnosed with ADHD and it is diagnosed more in boys. There are several conditions can mimic ADHD such as learning disorders, mood disorders, anxiety, head injuries, thyroid conditions, and use of some medications such as steroids. In 2021 a systematic review of studies found that ADHD is overdiagnosed in children and adolescents.²⁰

Symptoms of ADHD are similar to typical childhood behaviors. Many children have difficulties sitting still, waiting their turn, paying attention, being fidgety, and acting impulsively. Teachers (a learning environment) are often the first to notice symptoms that may indicate ADHD but it is important that we do not jump to conclusions. Sadly, many doctors are quick to give medications without a proper diagnosis.

Scientists have not identified the specific causes of ADHD but many believe that there is a primary genetic component because dozens of genes have been associated with ADHD. However, a specific gene or gene combination has not been identified as the cause or the risk factor for developing ADHD. Genes are likely involved in the development of ADHD but that does not mean a child was “born that way”.

“Many of the gene variations have only a small effect, and most people with ADHD are thought to have numerous associated gene variations. These variations also combine with environmental risk factors to determine an individual's risk of developing this complex condition.”²¹ Environmental risks include diet, nutrient deficiencies, exposure to metals and toxins, and stress. These factors can alter DNA methylation and affect gene expression - epigenetics.

DNA methylation is an epigenetic process where methyl groups are added to specific parts of DNA to influence whether that gene is turned "on" or "off". It plays a vital role in cellular development, cell differentiation, and maintaining genome stability (prevention of mutations). Some studies have shown that abnormal DNA methylation can lead to ADHD symptoms.

Vitamins B6, B12, and folate (B9) are required for the production of methyl groups that will be used for DNA methylation. In addition DNA methylation, adequate folate is required during pregnancy for proper brain development and it influences neurodevelopment. Folate deficiency at any stage of life can impair cognitive function (memory, concentration, and overall performance). Folate deficiency is also associated with neuropsychiatric disorders such as depression, psychosis, and seizures.

Folate, before it can be used, is converted into its active form L-methylfolate. L-methylfolate is a cofactor in the production of serotonin, dopamine, norepinephrine, and is the only form of folate that can cross the blood-brain barrier.

Both norepinephrine and dopamine are implicated in ADHD. Dopamine is a precursor to norepinephrine so issues with dopamine levels can affect norepinephrine levels. Dopamine plays a prominent role in motivation, focus, attention, and the brain's reward system. Imbalances in dopamine levels or its function are believed to contribute to ADHD symptoms like difficulty with attention, impulsivity, and hyperactivity. Norepinephrine, also called noradrenaline, is involved in alertness, arousal, and focus. Stimulant-based ADHD medications increase dopamine and norepinephrine levels in the brain. Gut microbiota may also affect cognition and emotions by influencing the production of dopamine and peripheral serotonin in the intestinal tract.

Folate deficiency can also occur if a person has a mutated methylene-tetrahydrofolate reductase (MTHFR) gene. MTHFR is the name of both a gene and an enzyme. The gene tells the body how to make the enzyme. This enzyme is needed to process folate or folic acid properly - turn folate into its bioavailable form, L-methylfolate via methylation. When there is a MTHFR mutation, the body does not convert enough folate or folic acid into methylfolate which results in a deficiency. At the same time a person will have an excess of unmetabolized folate or folic acid in the blood which may cause a wide range of health challenges.

To complicate matters, insufficient folate metabolism, folate deficiency, or vitamin B12 deficiency can lead to elevated homocysteine levels. Elevated homocysteine levels hinder methylation and are linked to cognitive decline and an increased risk for blood clots, heart disease and stroke. In addition, methylation turns homocysteine into methionine. Methionine builds proteins, repairs cells, and supports detoxification.

Improper detoxification (metals and other toxins) is an additional environmental factor that can lead to ADHD symptoms. Research suggests a link between heavy metal exposure (lead, mercury, arsenic, manganese, and cadmium), and an increased risk of ADHD. Studies on aluminum are less conclusive but research is ongoing. Other factors, such as low birth weight, premature birth, exposure to toxins (alcohol, smoking, lead, etc.) during pregnancy, and extreme stress during pregnancy have also been linked to the disorder.

Using hair analysis, researchers found a statistically significant difference between the ADHD and the control groups. **Manganese** levels were higher, especially among those with the **hyperactive presentation** of ADHD. For those with the **inattentive presentation** of ADHD there was higher levels of **aluminum**. This research paper also stated that it is possible that those with ADHD may accumulate more toxins. They “may have problems with the chemical pathway that **detoxify these metals**”. (Mansoura J. Forens. Med. Clin. Toxicol., Vol. 28 , No. 1 , Jan. 2020)

Gut-brain axis: Inflammation and gut problems (dyspepsia, chronic constipation, and irritable bowel syndrome) are common in children with ADHD. The gut microbiome may play a role in these symptoms with some studies suggesting an association between altered gut flora and ADHD. “Plasma short-chain fatty acid (SCFA) levels were also found as deficient in ADHD patients (both children and adults). This is particularly interesting because SCFAs are produced during bacterial fermentation and have been hypothesized to improve neuro-immunoendocrine functionality, and speculated to have a mediational role in microbiota-gut-brain crosstalk”.¹⁶

HPA axis: It has been hypothesized that disturbances in the endocrine and immune systems influence the development of ADHD (and in some psychiatric disorders). Most of the data are related to “disturbances in the activity of the hypothalamus-pituitary-adrenal (HPA) axis activity”.¹⁹ Children with ADHD, especially in the hyperactive-impulsive type, have lower levels of cortisol. Many clinical data indicate that in children with ADHD, the psychological stress evokes a weaker activation of the HPA axis than in the control group.

Learning Environment & Movement

According to the research article *Hyperactivity in ADHD: Friend or Foe* **hyperactivity plays a functional role**, it upregulates prefrontal cortical hypoarousal and executive functioning in ADHD¹⁵. Simply put, the act of fidgeting or being able to move while completing a task improves performance and cognitive functions. This finding counters the assumption that “hyperactivity” interferes with the ability to learn.

Extensive research shows that ADHD hypofrontality can be improved through physical activity. Physical activity can increase blood flow to the brain, brain activity, and improve connectivity in the prefrontal cortex. The prefrontal cortex is crucial for executive functions like attention, focus, working memory, decision making, and impulse control. This is true in children **with or without** ADHD.

- **Hypofrontality** means that there is reduced activity or function in the prefrontal cortex, the brain region responsible for higher-level cognitive functions.
- **Executive function** refers to three main processes: the ability to control attention and suppress responses, being able to shift attention from one task to another, and retaining and processing information. Children with ADHD often struggle with executive functioning.



ALL children need more physical activity, especially in their learning environment!

Children who are “acting up” should not be confined to a chair and told to sit still - they should be told to do jumping jacks, hop on one foot... anything physical. Taking a minute after completing a lesson and having all the children do some marching in place or jumping in place by their desk would have great benefits.

ADHD Treatment

Physicians and psychiatrists recommended that ADHD is treated with a combination of drugs and behavioral therapy. Stimulants like methylphenidate and amphetamine are often the first line of treatment to help improve focus and reduce impulsivity. Amphetamines are the only FDA-approved medication for preschool-aged children however, guidelines suggest that methylphenidate rather than amphetamines may be helpful if behavioral interventions are not sufficient. - <https://www.psychiatry.org>.

“In preschool-age and younger children, the recommended first-line approach includes behavioral strategies in the form of parent management training and school intervention. Parent-Child Interaction Therapy (PCIT) is an evidence-based therapy modality to help young children with ADHD and oppositional defiant disorder.” - <https://www.pcit.org/>

While behavioral therapies such as cognitive behavioral therapy can help individuals manage symptoms and improve skills, it is not known how many children receive this help. Studies show that a considerable number of children with ADHD are not currently receiving mental health care or medication. For example, one study found that only 26.2% of children diagnosed with ADHD had ever received outpatient mental health care, and only 12.9% were currently taking medication.¹⁸

Stimulant drugs include methylphenidate (Ritalin, Concerta, Jornay etc.) and amphetamine (Adderall, Vyvanse, etc.). If stimulants are not suitable or effective, non-stimulant medications like atomoxetine (Strattera) or Qelbree (viloxazine) may be prescribed.

Common Drug Side-Effects (parent version): Methylphenidate can cause headaches, insomnia, loss of appetite, stomach ache, dry mouth, and feeling or being sick.

The Other Version: “In therapeutic doses, methylphenidate can cause anorexia, insomnia, headache, abdominal pain, nausea and irritability. Insomnia and loss of appetite are dose-related, but its other adverse effects appear not to be dose-dependent. Weight loss and developmental delay are adverse effects, which may occur in long-term methylphenidate consumption. Data also exist about cardiovascular adverse effects of methylphenidate such as tachycardia and hypertension especially in chronic users. Methylphenidate, even in therapeutic dose range, may also lower seizure threshold.” - <https://pmc.ncbi.nlm.nih.gov/articles/PMC4262859>

The positive side of treating ADHD with drugs is that “ADHD medication has been shown to reduce impulsivity and, by extension, the risks of car accidents, substance abuse, unplanned pregnancy, comorbid depression and anxiety, incarceration, self-harm, and suicide. In fact, research has found that stimulant medication use among individuals with ADHD reduces the risk of premature death by a staggering 19%”. -<https://www.additudemag.com>

Approximately two-thirds of children with ADHD have a co-condition. Common conditions associated with ADHD include:

- Learning disabilities
- Oppositional defiant disorder
- Conduct disorder (persistent destructive or violent behaviors)
- Anxiety and depression
- Obsessive-compulsive disorder
- Bipolar disorder
- Tourette's syndrome
- Sleep disorders and Bed-wetting

Adults/ADHD

Some recent studies suggest that ADHD can appear for the first time in adults however, there is no clear evidence. It is more likely that the diagnosis was not made when they were a child. Some children have a milder form of ADHD. As an adult, the additional stresses in life such as work, finances, and family, can enhance the symptoms. In addition, the structured environment of school and home may not be present in adulthood, making it harder for individuals with ADHD to manage their time and tasks.

Common symptoms in adults include:

- Disorganized and/or Easily Distracted
- Trouble with time management and/or establishing priorities
- Chronic lateness - never on time
- Inability to focus on things they find boring
- Trouble with personal relationships
- Trouble in the workplace
- Emotional outbursts and/or Low tolerance to stress
- Have a hard time starting challenging tasks
- Appearing “scatterbrained” or forgetful
- Work hard to gain approval
- Overcommitting
- Hypersensitive to stimuli

ADHD can affect women differently than men. Studies have shown that men tend to externalize their symptoms (easier to recognize and diagnose) and women tend to internalize many of their symptoms. ADHD often co-occurs with anxiety and depression which can add to inattention and difficulty concentrating. Individuals with ADHD are also at a higher risk for substance abuse which can negatively impact mental health.

We also need to be aware of health challenges that adults with ADHD may encounter. According to a large register-based study in Sweden, adults with ADHD have an increased risk of nervous system, respiratory, musculoskeletal, and metabolic diseases, especially fatty liver disease, sleep disorders, COPD, epilepsy, and obesity. ¹⁷

Section Two: Functional View

Natural Health Professionals Have a Huge Toolbox!



- Functional Nutrition
- Supplement Knowledge
- Functional Anatomy Knowledge
- Herbs / Herbal Formulas
- Homeopathic Remedies
- Elimination Diets
- Toxicity Protocols
- Lifestyle Recommendations, and more!

Natural health professionals also have a different view of mental disorders and often use different terminology to describe them. David Winston, RH (AHG)²² lists many of the depressive and anxiety disorders according to the root causes :

- | | |
|--|----------------------------------|
| • Blood sugar dysregulation-induced depression | • Post-traumatic stress disorder |
| • Cardiovascular-based depression | • Stagnant depression |
| • GI-based depression | • Thyroid-induced depression |
| • Hormonal depression | • Hormone-induced anxiety |
| • HPA axis dysfunction-induced depression | • Old-age anxiety |
| • Liver-based depression | • Stress-induced anxiety |
| • Nutrient deficiency-induced depression | • Thyroid-induced anxiety |
| • Old-Age depression | • Asthma-induced anxiety |
| • Stress-induced depression | • Cardiac-induced anxiety |
| | • Drug-induced anxiety |
| | • GI-based anxiety |

Defining Mental Health Disorders Is Easy!

Finding what will help resolve the health challenge is bit more complicated.

Through observation and research we can conclude that our mental outlook affects our physical health and our physical health affects our mental status. We can call this our mind-body interaction. Did you know that a positive outlook can reduce the intensity and duration of an illnesses and a negative or pessimistic outlook can result in longer and more intense symptoms during an illness? As natural health professionals it is important to be aware of the interactions between the mind and body and the first connection we should consider is the gut-brain axis.

Gut-Brain Axis

The gut-brain axis is a bidirectional and complex communication network linking your gastrointestinal system to your brain and it influences both physical and mental health. Simplified we could say that the gut influences the brain and the brain influences the gut because they “talk” to each other.

It is well known in the realm of natural health that the guts should be addressed when there is any dysfunction, disorder, or disease in the body and that includes our brain. Addressing the guts means determining if digestion, assimilation, and elimination are functioning properly, if there is a likely imbalance in the intestinal microbiome (the good and the bad), if there is likely increased intestinal permeability (leaky gut), if there are food sensitivities or nutrient deficiencies, and then finding solutions.

We also know that our physical, mental, and spiritual health are connected to each other and refer to considering all aspects as holistic health. Mental health is a term that encompasses a very large category of various emotions, reactions, and feelings with many possible causes. In addition, mental health issues may be acute and situational or chronic.

Acute stress or anxiety is usually situational and highlights the connection of the brain to gut. An example would be the child who has frequent stomach aches in the morning, especially on school days, but they feel fine after they get to school. The child is experiencing anxiety created by their thoughts (brain) and the result is a feeling in their guts that they call a stomach ache. The child may be worried about a test, the bus ride, getting assignments done correctly, social situations, wearing the right clothes, or a host of other interactions.

Adults may describe their feeling as “gut-wrenching”, “butterflies in the stomach”, or feeling “nauseous” when they are uncomfortable or worried about attending an appointment or event, hear bad news, have to speak in public, or imaging the worst-case scenario. Even our intuition is described as having a “gut feeling,”

How does a thought in the brain cause a feeling in the guts?

Why would our guts have an impact on our mental health?

Let’s take a look at the following networks involved in the gut-brain axis:

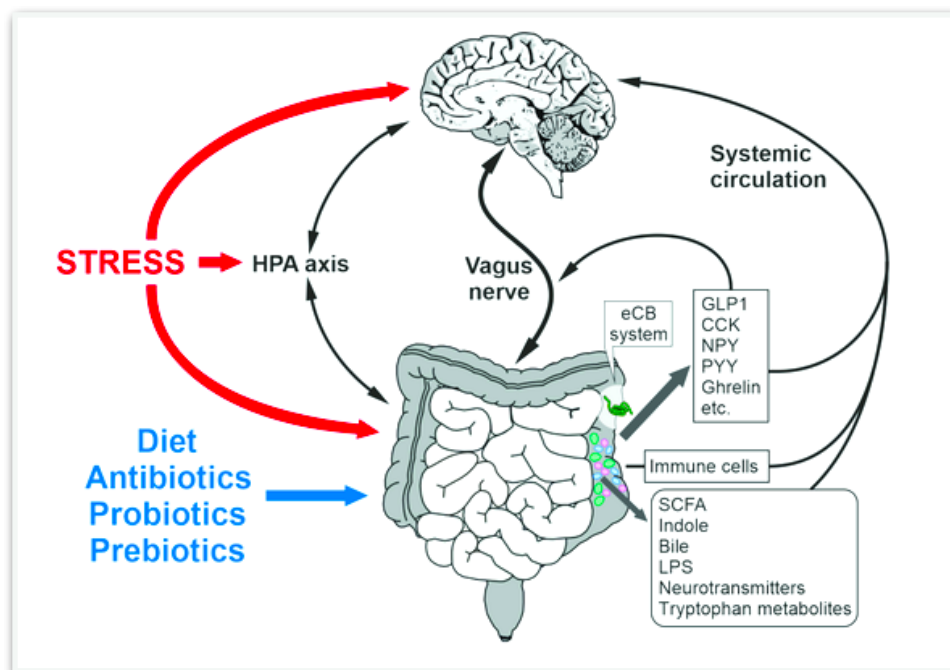
1. Gut microbiota / microbiome
2. Enteric nervous system
3. Vagus nerve
4. Hypothalamic-pituitary-adrenal axis

Microbiome/ Gut Microbiota

Gut microbiota refers to the community of microorganisms that live in our digestive tract, primarily the large intestine. This community includes beneficial and harmful bacteria, various parasites, fungi, and viruses. Dysbiosis refers to a deranged state, broken homeostasis, an imbalance in the composition or function of the gut microbiome - a disruption of the balance between beneficial and harmful organisms within the microbiota.

Research into the gut-brain axis and how it relates to mental health disorders has uncovered several mechanisms and pathways involved in the crosstalk between the microbiome and brain. They have revealed that the microbiota can influence the central nervous system (brain) via the hypothalamic-pituitary-adrenal (HPA) axis, the vagus nerve, through modulation of the immune system, by producing metabolites such as short-chain fatty acids, and through the metabolism of tryptophan. The metabolism of tryptophan results in metabolites that are used in the body to create serotonin and melatonin.²⁴

Several factors can deplete tryptophan in the body, including dietary deficiencies, high sugar intake, alcohol consumption, and stress. Additionally, the kynurenine pathway, a tryptophan degradation pathway, can be overactive in times of illness or stress, diverting tryptophan away from serotonin and melatonin synthesis.



Gut-Brain Axis Image: <https://creativecommons.org/licenses/by/4.0/>

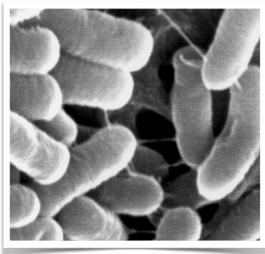
Several studies have shown that dysbiosis is, at minimum, a contributing factor to the development of neurological and psychiatric diseases. Dysbiosis disrupts tryptophan catabolism and the production of short-chain fatty acids such as acetate, lactate, butyrate, and propionate. “These disruptions affect immune homeostasis, neuro-transmission, and gut-brain communication”.²³

Enterochromaffin cells are located in the mucosal layer of the gastrointestinal tract, primarily in the small intestine (especially the jejunum and ileum) and large intestine. They produce almost 95% of the serotonin used by the body. Only 5% of serotonin is created in the brain. Serotonin produced outside the brain is called peripheral serotonin. Peripheral serotonin is mainly stored in the platelets but it is also found in the hematopoietic stem cells and enteric nerves (enteric nervous system is in the gut).

Peripheral serotonin acts as a hormone and neurotransmitter and has many roles:

- It influences glucose and lipid homeostasis and promotes insulin secretion.
- It is involved in gut motility, digestion, and nutrient absorption.
- It modulates the activity of various immune cells, including monocytes/macrophages, dendritic cells, neutrophils, mast cells, T cells, and B cells.
- It is released by platelets which play a crucial role in blood clotting and tissue repair.
- It can stimulate the vagus nerve which relays signals to the brain and affects areas involved in mood, emotions, and behavior.

With our gut producing 95% of the serotonin, it is often wrongly assumed that the gut provides the serotonin needed in the brain. **Peripheral serotonin does not penetrate the blood-brain barrier.** Serotonin must be synthesized in the brain from neurotransmitter precursors via specialized enzymes. Most of these precursors are amino acids such as tyrosine and tryptophan provided through the diet. The microbiota do play a role in regulating the metabolism of precursors that affect the brain.



The production of serotonin in both the gut and brain requires the amino acid tryptophan as a precursor. In addition, vitamin B6 is required for tryptophan metabolism. Some probiotic strains, like *Lactobacillus plantarum*, increase the uptake of tryptophan in the gut. In addition, the gut microbiota can alter the expression of genes involved in serotonin synthesis, metabolism, and transport.

“...there is accumulating evidence that the metabolites (e.g., short-chain fatty acids, neurotransmitters, and their precursors) produced by bacteria affect the levels of related metabolites in the brain via the blood circulation, thus regulating brain functions and cognition. In addition, the gut microbiota can act on the local nervous system (e.g., enteric nerves, vagus nerve) to quickly transmit signals to the brain”. - <https://pmc.ncbi.nlm.nih.gov/articles/PMC8234057>

Short-chain fatty acids (SCFAs) produced by gut bacteria can cross the blood-brain barrier. SCFAs influence brain function and they have the potential to alleviate symptoms of depression and anxiety by inducing the expression of the enzymes tryptophan 5-hydroxylase 1 and tyrosine hydroxylase. These enzymes are required for the synthesis of neurotransmitters like serotonin and dopamine in the brain.



What do gut bacteria need to produce short-chain fatty acids? Dietary fiber, the non-digestible complex carbohydrates found in whole foods. Most types of dietary fiber are fermented by gut bacteria and any fiber that can be fermented by gut bacteria is a prebiotic.

Soluble fibers, except psyllium, are fermented faster by the microbiota than insoluble fibers.

Insoluble fibers, in addition to undergoing fermentation, have the ability to bind with toxic chemicals and eliminate them through the feces. Toxins can be formed during digestion, ingested, or by the microbiota as metabolic waste.

SCFA-producing bacteria include (a short list!):

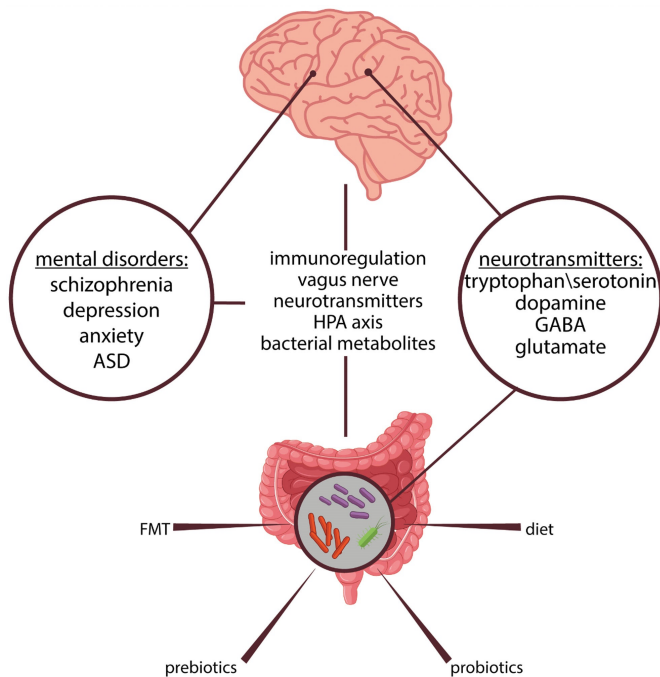
- *Bifidobacterium* species with *B. adolescentis* being a primary producer of acetate
- *Lactobacillus gasseri*, *L. reuteri*, *L. rhamnosus*, *L. lactis*, and more
- *Bacteroides fragilis* is a primary producer of propionate
- *Akkermansia muciniphila* produces propionate, acetate, and butyrate.
- The Lachnospiraceae family, *Faecalibacterium prausnitzii*, *Clostridium leptum*, *Eubacterium rectale*, and *Roseburia* species are part of the Ruminococcaceae family that produce butyrate, propionate, and acetate.

Short-chain fatty acids, in addition to working directly in the brain, influence blood-brain barrier permeability and integrity. Some research suggest that butyrate can help repair a "leaky" blood-brain barrier by restoring tight junctions. Studies also suggest that vitamins B1, B12, B6, and folate may help restore blood-brain barrier integrity.

A compromised blood-brain barrier has been implicated in the development of several neurological and psychiatric disorders, including anxiety, depression, memory dysfunction, Alzheimer's disease, epilepsy, long COVID-related brain fog, and multiple sclerosis. Chronic or acute inflammation, high stress, some infections, lack of sleep or exercise, poor diet, and traumatic brain injury can cause or contribute to a leaky blood-brain barrier.

Review:

- Peripheral serotonin (5-HT) is a key signaling molecule throughout the body and is produced in gastrointestinal tract by the enterochromaffin cells. Enterochromaffin cells need tryptophan to synthesize the peripheral serotonin.
- Gut microbes directly metabolize tryptophan in the colon where it used by the enterochromaffin cells to make the serotonin.
- Indirectly, through microbial metabolites such as short chain fatty acids, tryptophan, tryptamine, and secondary bile acids, the microbiota provides the substances needed for the production of serotonin in the central nervous system (brain).



Gut microbiota play a role in “both neurotransmitters (including serotonin, dopamine, GABA, and glutamate), and psychiatric illnesses (including depression, anxiety, schizophrenia, and autism spectrum disorder) through the gut-brain axis, which comprises several pathways and mediators such as immunoregulation, the vagus nerve, the hypothalamic-pituitary-adrenal axis (HPA), bacterial metabolites. Hence, therapeutic applications targeting the gut microbiota (such as fecal microbiota transplantation, diet, probiotics, and prebiotics) may give rise to more promising and efficient treatments for these disorders in the future”.²⁵

Enteric Nervous System

The enteric nervous system is one of the three divisions of the autonomic nervous system, the others being the sympathetic nervous system and parasympathetic nervous system. Your autonomic nervous system controls the automatic functions of your body.

- **Sympathetic** nervous system - activates body processes that help you in times of need, stress, or danger (“fight-or-flight” response)(gas peddle).
- **Parasympathetic** nervous system - is responsible for the “rest-and-digest” body processes (brake peddle).
- **Enteric** nervous system (ENS), also known as the intrinsic nervous system, is a network of neurons and specialized cells that are embedded in the wall of the gastrointestinal tract with nerve fibers extending to the pancreas and gallbladder. The ENS regulates a wide range of functions in the gastrointestinal tract.

There are approximately 100 million neurons in the enteric nervous system which is similar to the number in the spinal cord. ENS neurons include sensory neurons, motor neurons, secretomotor neurons, vasodilator neurons and interneurons.²⁶ This nerve network plays a crucial role in digestion, absorption of nutrients across the intestinal wall, blood flow to the intestines, motility, sphincter tone and activity, immune and inflammatory responses, and other functions of the gastrointestinal tract.

As part of the brain-gut axis, the enteric nervous system communicates with the central nervous system/brain through the vagus nerve. However, unlike the sympathetic and parasympathetic divisions, the enteric nervous system can regulate many its functions independently, without communication with the brain. This is why it is often called the **"second brain"**. While the enteric nervous system can function independently from the brain central nervous system, it normally interacts with the brain to coordinate digestive functions. The brain sends regulatory signals to the ENS through vagal and spinal nerves and the ENS sends information back to the brain via the vagus nerve.

Remember the enterochromaffin cells (EC) of the gastrointestinal tract that produce the peripheral serotonin? The enteric nervous system uses this serotonin to regulate gut motility, secretion, and blood flow. Other neurotransmitters that are found in the enteric nervous system and used to regulated digestive functions include acetylcholine, dopamine, and various neuropeptides (amino acids linked by peptide bonds).

Amino acids like L-cysteine and L-arginine influence enteric nervous system function by serving as precursors. L-arginine is a precursor for nitric oxide, a signaling molecule that acts as a vasodilator to relax blood vessels and improve blood flow. Low or decreased production of nitric oxide reduces blood flow to the brain and increases inflammation and oxidative stress which contributes to depression, anxiety, and cognitive decline such as vascular dementia. Nitric oxide also modulates the release of various neurotransmitters.



L-cysteine, a sulfur-containing amino acid, is involved in the production of the major antioxidant glutathione. Research suggests a connection between oxidative stress and the exacerbation of anxiety symptoms via impaired mitochondrial function, inflammatory responses, and disrupted neuro-transmitter systems. NAC (N-acetyl cysteine) is a precursor to L-cysteine that can be used as a supplement to increase cellular glutathione - glutathione levels in mitochondria.

Breast milk contains neurotrophic factors, cytokines, and oligosaccharides that are involved in the development and protection of the enteric nervous system. Breast milk also plays a role in the development of the ENS by providing bioactive peptides such as tryptic β -casein hydrolysate.

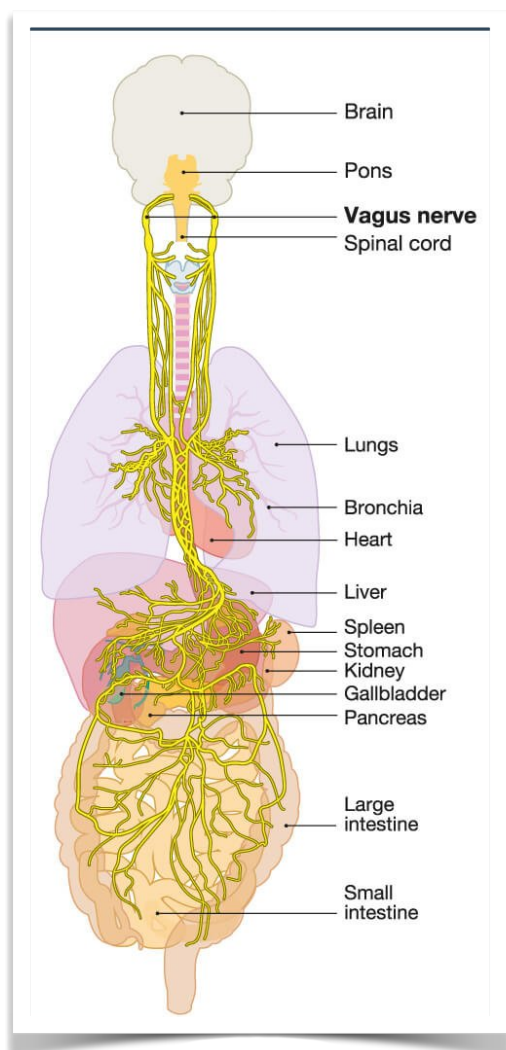
"It is well recognised that GI infections in children predispose them to develop functional abdominal pain disorders. A number of studies show the likely contribution of inflammatory damage to neuronal hyper-excitability, possibly related to aberrant ENS regeneration. Similar pathophysiology with cow's milk protein allergy may also lead to disorders of gut-brain interaction in later life...The GI tract presents one of the largest immune organs in the body. There is recent and accumulating evidence to suggest that the ENS and immune systems are inexorably linked from development through to the neuromodulation of intestinal immunity by the ENS".²⁹

B vitamins, especially B1 (thiamine), B6, and B12, are crucial for nerve health and function. They play essential roles in the synthesis of neurotransmitters, nerve regeneration, and protecting nerves from damage. Sufficient choline, omega-3 fatty acids, magnesium, sodium, calcium, zinc, selenium, and potassium are also required for nervous system protection and function.

Omega-3 fatty acids, especially EPA and DHA, play a role in the function of the enteric nervous system by impacting inflammation, membrane fluidity, and neurotransmitter function. Omega-3s also help preserve the integrity of the blood-brain barrier.

Low thiamine can result in depression, anxiety, and cognitive memory loss via several mechanisms, including the gut-brain axis. Thiamine deficiency can reduce pancreas function, gastric acidity, and intestinal motility, while increasing gut permeability and inflammation.²⁷ Insufficient thiamine also leads to abnormal vagus nerve function.

Vagal Nervous System



Vagal nervous system or vagus nerve? The vagal nervous system and the vagus nerve are closely related, but not exactly the same. The vagus nerve is the main component of the vagal nervous system. The vagus nerve, also known as the tenth cranial nerve, is a major nerve that connects the brain to various organs in the body, including the heart, lungs, stomach, and intestines. The vagal nervous system is the system that encompasses the vagus nerve and its functions, particularly within the parasympathetic nervous system.

The vagus nerve is the longest nerve in the body and a critical link between the gut and brain. It originates in the brainstem and extends down into the intestinal tract. It does not take a simple path to the guts! It splits just after the medulla oblongata at the base of the brain to form the right and left vagal nerves that run down the sides of your neck, through your chest, and around your heart and lungs before coming together below the esophagus to form the “vagal trunk”. The vagal trunk extends into the abdomen before branching off once again.

Vagal nerves make up a large part of your parasympathetic (“rest and digest”) nervous system. As a key component of the para-sympathetic nervous system, the vagus nerve sends signals from the **brain to the gut** to influence gut motility, immune responses, and digestion (the brain sends signals to the gut to prepare for digestion before food is ingested).

The vagus nerve also sends signals from the **gut to the brain**. Signals include information about nutrient levels, microbiota metabolites, and immune activity. This information can impact everything from stress and emotions to appetite (sends satiety signals to the hypothalamus to regulate meal size). Image: <https://www.highpointaz.com/christinas-blog/the-power-of-the-vagus-nerve>

Signals from the vagus nerve are the result of peripheral serotonin binding to receptors on the vagus nerve fibers. This stimulates the nerves to send signals to the brain, heart, lungs, digestive system, and other organs. Because the vagus nerve helps with many functions of the body, its dysfunction can cause a wide range of symptoms including changes in heart rate and blood pressure, fainting or dizziness, difficulty swallowing, and digestive issues like bloating, acid reflux, and constipation.

It is well known among researchers that the vagus nerve plays a significant role in depression, anxiety, and post-traumatic stress disorder. Vagus nerve stimulation (VNS), via a surgically implanted device to deliver electrical impulses, has been used in individuals with treatment-resistant depression and it has also shown promise in alleviating symptoms of anxiety and PTSD.

“Originally developed for neurological conditions such as epilepsy and depression, vagus nerve stimulation, has been repurposed to harness its anti-inflammatory potential. By engaging multiple mechanisms - including the cholinergic anti-inflammatory pathway, the vagus-adrenal axis, and the vagus-gut axis - vagus nerve stimulation offers a level of precision in modulating systemic inflammation that traditional therapies cannot achieve.”³⁰



Low vagal tone, a measure of vagus nerve activity, has been linked to an increased risk of depression and anxiety. Strengthening the vagus nerve through techniques like deep breathing and meditation can help improve vagal tone and reduce symptoms of anxiety, depression, and PTSD. Singing and/or gargling may also stimulate your vagus nerve. The vibrations stimulate the parts of the vagus nerve in the back of your throat. Massage, cold exposure, and physical activity are also helpful.

“Healthy vagal tone can be thought of as an optimal balance of parasympathetic and sympathetic nervous system actions that allows you to respond with resilience to the ups and downs of life.” — Dr. Arielle Schwartz.

Chronic stress, nutrient deficiencies, diabetes, viruses and bacteria that have an affinity for nerve tissue (human herpesvirus 6, Epstein-Barr virus, varicella zoster virus, chickenpox, some enteroviruses and the bacterium borrelia), abdominal surgery, inflammation, head or neck injuries, and some pharmaceuticals, negatively impact the vagus nerve. Magnesium, calcium, zinc, choline, B1 (thiamine), B6, and vitamin B12 are particularly important for vagus nerve health and function.

As a reminder, the brain-gut axis includes the central nervous system (brain and spinal cord), the autonomic nervous system (enteric, sympathetic, and parasympathetic nervous systems), the vagal nervous system, and the hypothalamic–pituitary–adrenal (HPA) axis.

“Both neural (vagus) and hormonal (HPA axis) lines of communication combine to allow brain to influence the activities of intestinal functional effector cells, such as immune cells, epithelial cells, enteric neurons, smooth muscle cells, interstitial cells of Cajal [specialized cells in the GI tract], and enterochromaffin cells [makes serotonin in the guts]. These cells, on the other hand, are under the influence of the gut microbiota. The gut microbiota has an important impact on the brain–gut axis interacting not only locally with intestinal cells and ENS, but also by directly influencing neuroendocrine and metabolic systems”.²⁸

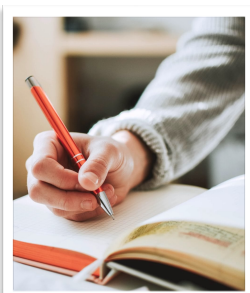
HPA Axis

The HPA axis, the interactions between the hypothalamus, pituitary gland, and adrenal glands, is a neuroendocrine system that plays a central role in coordinating the adaptive responses of the organism to stressors of any kind. Neuroendocrine cells respond to nerve signals by releasing hormones and signaling molecules. When the nervous system detects stress, it signals neuroendocrine cells to release hormones like cortisol and epinephrine, which help the body cope with the stress. Neuroendocrine cells in the digestive tract release hormones like gastrin and serotonin, which regulate stomach acid production and intestinal movement. The endocrine system is a network of glands and organs that produce the hormones that regulate various bodily functions.

Endocrine system glands and organs include:

- **Hypothalamus** - a small region in the center of the brain that functions as both an organ and a gland. It is a control point for many bodily functions, including regulating the release (start or stop) of hormones from the pituitary gland.
- **Pituitary gland** - also known as the master gland, uses information it gets from your brain to tell other glands in your body what to do by producing hormones such as growth hormone, prolactin and oxytocin (breastmilk production and release), antidiuretic hormone which controls blood pressure and water balance, adrenocorticotrophic hormone (ACTH) which stimulates the adrenal gland to make hormones, thyroid-stimulating hormone (TSH), and luteinizing hormone which manages estrogen and testosterone.

- **Pineal gland** - makes melatonin that helps your body get ready to go to sleep.
- **Adrenal glands** - are well known for making the "fight or flight" hormone adrenaline (also called epinephrine) and cortisol. These two glands also make hormones that affect your metabolism, heart rate, oxygen intake, blood flow, sexual function, and electrolyte balance.
- **Thyroid gland** - controls your growth and metabolism via the production of thyroid hormones. It also produces the hormone calcitonin, which may contribute to bone strength by helping calcium get incorporated into bone.
- **Parathyroid** - a set of four small glands behind your thyroid that control your levels of calcium and phosphorus.
- **Thymus** - a small gland in the lymphatic system that makes and trains T-cells (white blood cells that help fight disease and infection). It was once believed that the thymus gland was non-functional in adults. Newer research confirms that thymus continues to produce T-cells in adulthood but at a reduced rate compared to childhood.
- **Pancreas** - an organ is part of your digestive (produces digestive enzymes) and endocrine systems (produces insulin and glucagon).
- **Ovaries** (females) - these two organs make the hormones estrogen and progesterone. These hormones help develop breasts at puberty, regulate the menstrual cycle, and support a pregnancy.
- **Testes** (males) - are organs that make the hormone testosterone which plays a role in making sperm, penis growth, and helps men grow facial and body hair at puberty.



The HPA axis is one of the most important components of the gut-brain axis. Research supports the link between that the HPA axis, gut-brain axis, and cognitive processes, the ability to acquire, process, and utilize knowledge. Cognitive processes are involved in our working and long-term memory, learning new information, planning, organizing, attention and concentration, problem-solving, judgment, and processing information for motor and sensory functions.

- ADHD is associated with impairments in several key cognitive functions.
- Chronic stress can significantly impair cognitive function which negatively impacts memory, concentration, learning, and decision-making.
- Alterations in the gut microbiota due to diet, antibiotics, or other factors impacts the activity of the HPA axis and overall cognitive health.

HPA-axis dysfunction increases the risk of depression, anxiety, digestive and sleep problems, headaches, weight gain or loss, and heart disease. Fatigue, muscular weakness, excessive free radicals, mitochondrial dysfunction and increased levels of pro-inflammatory cytokines are also associated with HPA-axis dysfunction.

“Activation of the HPA axis during stress increases glucocorticoid levels, such as cortisol, which can disrupt gut microbiota composition and compromise intestinal barrier integrity. This allows microbial components like lipopolysaccharide (LPS)* to enter circulation, promoting systemic inflammation and worsening gut dysbiosis. Conversely, dysbiotic gut microbiota can influence the HPA axis by reducing the production of metabolites such as SCFAs, which are essential for neuroimmune signaling and stress regulation. Dysbiosis also affects neurotransmitter synthesis, such as GABA, intensifying the stress response”.³¹

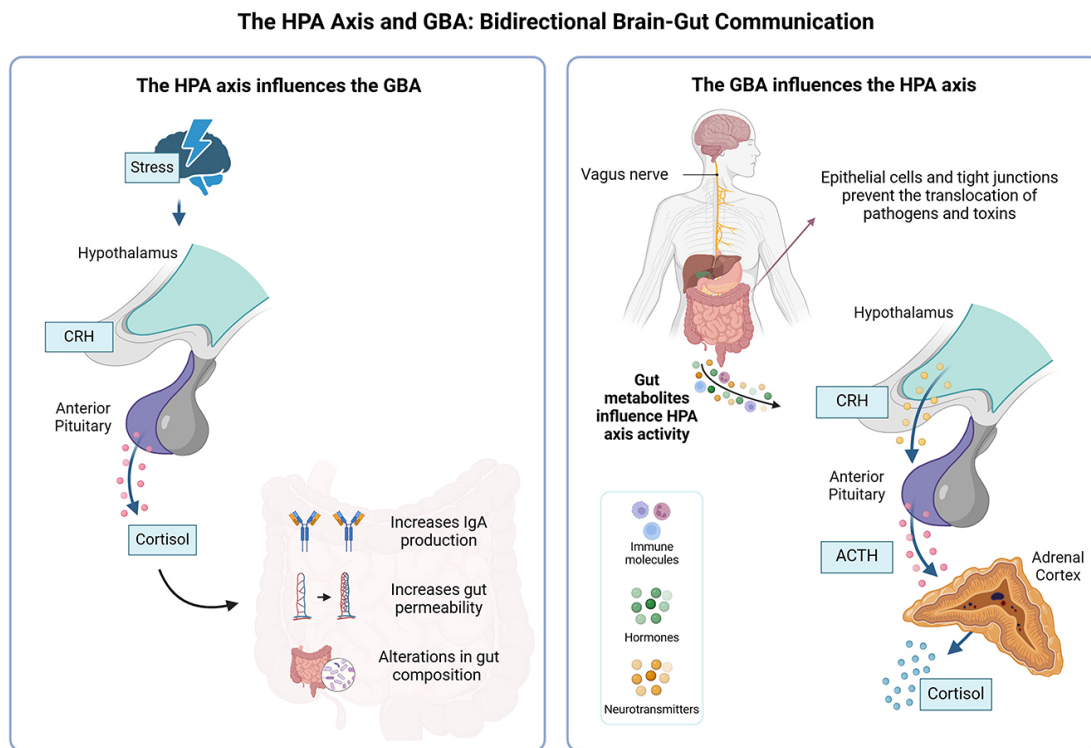


Image: <https://www.frontiersin.org/journals/neuroscience/articles/10.3389/fnins.2025.1541075/full>

*Lipopolysaccharide (LPS), also known as endotoxin, is a critical component of the outer membrane of Gram-negative bacteria, like *E. coli* and *Salmonella*.

1. Activation of the HPA axis begins in the hypothalamus with the synthesis of the corticotrophin-releasing hormone (CRH).
2. CRH stimulates the production of the adrenocorticotrophic hormone (ACTH) in the pituitary gland and activates locus coeruleus (LC) which increases noradrenergic activity in the brain. The LC is a small group of neurons located in the brainstem and it is the primary source of the neurotransmitter norepinephrine (noradrenaline) in the brain. It plays a crucial role in various physiological and cognitive functions.
3. ACTH production leads to the release of glucocorticoids, such as cortisol, from the adrenal cortex.
4. Control of the HPA axis involves a negative feedback loop - cortisol reduces its own secretion by signaling a feedback to the hypothalamus and the pituitary gland to decrease the production of CRH and ACTH.

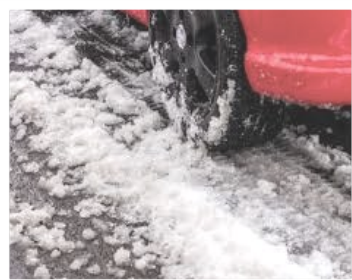
Chronic stress results in an abundance of cortisol and is detrimental to health but, appropriate concentrations of cortisol are essential for normal neurodevelopment and function. Cortisol, an essential steroid hormone produced by your adrenal glands, affects almost every organ and tissue in your body. Cortisol decreases inflammation and blood pressure, helps control your sleep-wake cycle, and is involved in regulating how your body uses glucose (sugar) for energy.

Good stress - Bad stress - Acute stress - Chronic stress

Good stress is positive stress, it is what we feel when we are excited. Positive stress includes activities like attending an event or going on a date, riding on a rollercoaster, accepting a fun challenge, working on a project that you enjoy, writing down your goals, and exercising. During positive stress our pulse increases and our hormones may surge a bit but, there are no feelings of threat or fear. Positive stress keeps us feeling happy, healthy, alive, and excited about life. Without “stress” we would feel bored, lack vitality, and feel generally ill.

When an event is perceived as a threat we respond to it differently than if it is seen as a challenge. Threats elicit a stronger stress response and create greater levels of anxiety while challenges range from enjoyable to exciting. Threats induce fear while challenges are opportunities to prove to ourselves how much we are capable of accomplishing. Good stress can become “bad” chronic stress if it is experienced in excess (adrenaline junkies). Excessive stress may result from a single strong stimulating event or by the accumulation of repeated stressors.

Acute stress is known as “bad stress” but, it is limited and comes from quick surprises that need a response. Acute stress is known as the “fight or flight” response. It triggers a surge of neurotransmitters from the nervous system and stress hormones from the endocrine system (especially the adrenals).



Have you experienced your car sliding instead of stopping at an icy intersection? The hypothalamus, located at the base of your brain, sets off an alarm system in body that alerts the adrenal glands of the danger. The adrenals release adrenaline which increases your heart rate, blood pressure, and energy rich molecules. The adrenals also release the primary stress hormone, cortisol.

Cortisol increases blood glucose levels and enhances the brain's ability to use glucose. It also slows the functions that are nonessential (digestion, immune system, reproductive system, etc.) during the emergency or perceived threat. Once the danger has passed your hormone levels of adrenaline and cortisol drop, your heart rate and blood pressure return to normal, and other systems resume their normal functions.

Chronic stress is a state of disharmony that occurs when we repeatedly face stressors that interfere with our quality of life. Examples of chronic/bad stress include ongoing financial worries, an unhappy home life, feeling as though you are under constant judgement, having a stressful job (not perceived as just a challenge). Children are not immune to chronic stress! Being rushed, feeling anxious about fitting in with a group, divorce/custody arrangements, or disharmony in the home are chronic stressors for children.

Chronic stress contributes to a chronic inflammatory state and it impairs the immune system. Chronic inflammation, a sustained low-grade inflammation in the body, can significantly impact mental health and increase the risk of various psychiatric disorders, including major depressive disorder (MDD), anxiety, bipolar disorder, and schizophrenia.

Chronic stress is associated with an increase in *Enterobacteriaceae* (*Klebsiella*, *Enterobacter*, *Citrobacter*, *Salmonella*, *Escherichia coli*, *Shigella*, *Proteus*, *Serratia* and other species) and a decrease in *Lactobacilli* spp.³² Dysbiosis affects neurotransmitter synthesis, such as GABA, which intensifies the stress response. Lactobacillus and Bifidobacterium probiotics have been found to restore stress-induced HPA axis dysfunction and improve learning, memory as well as depression- and anxiety-like symptoms.³³

A chronic infection produces almost the same hormone reaction as chronic stress. During an acute infection (physical stress) our appetite is reduced and energy-rich molecules (glucose, free fatty acids, amino acids, calcium, phosphorus, etc.) are released to supply the demands of the immune system. If an acute infection becomes a chronic disorder, the energy release continues and may result in insulin resistance, low androgen levels, low vitamin levels, increased cortisol levels, and increased activity of the sympathetic nervous system (linked to anxiety, panic attacks, and depression).

Chronic stress is associated with many symptoms.

- Anxiousness and/or restlessness
- Fatigue and/or depressive feelings
- Metabolic issues: elevated sugar levels and cortisol, increased abdominal fat, etc.
- Decreased detoxification (food allergies, chemical sensitivities, seasonal allergies)
- Constipation and/or diarrhea, gas and bloating, irritable bowels
- Decreased immune function
- Increased inflammation and muscle and joint pain
- High blood pressure, triglycerides, and/or cholesterol
- Premature aging, free-radical damage (oxidative damage)

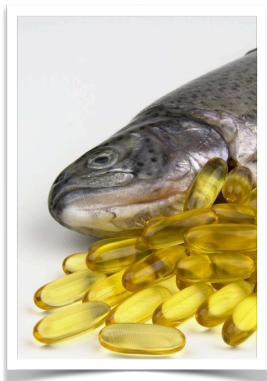
Both chronic emotional stress and chronic infections result in the ongoing release of cortisol and other steroidal glucocorticoids. Prolonged exposure to glucocorticoids can disrupt the interactions between the hypothalamus, pituitary gland, and adrenal glands (HPA axis). Chronic stress and HPA dysregulation further exacerbate gut dysbiosis, creating a pathological feedback loop.

Cortisol receptors are located on various cell types within the gut indicating a direct effect of cortisol on gut function. Cortisol also affects the gut microbiota by altering gut transit time, intestinal permeability, and available nutrients which can in turn can decrease the number of beneficial bacteria like *Bacteroides* spp. and an increase in harmful bacteria such as *Clostridium* spp.

Bipolar disorder: “Evidence from recent meta-analyses indicates that patients with bipolar disorder present with increased levels of cortisol (morning and post dexamethasone) and ACTH [pituitary], but not CRH [hypothalamus]. One of these meta-analyses revealed that higher cortisol levels are positively associated with manic phase and negatively correlated with the use of antipsychotics...As similar to major depression, these alterations also co-exist with aberrant immune-inflammatory processes”.³⁴

Studies indicate that the endocannabinoid system inhibits the HPA axis activity most likely via its action within the amygdala in the brain. Research has also revealed that the endocannabinoid system strongly influences neurotransmission and the neuroendocrine system which are dysfunctional in those with depression.

The most common antidepressants (SSRIs) have a direct impact on the expression of cannabinoid receptors throughout the brain. “Chronic antidepressant treatment modifies the expression of CB₁ receptors and endocannabinoid (EC) content in brain regions related to mood and anxiety control.”³⁵ However, clinical trials on the direct use of cannabinoids for depression and anxiety are limited and results are inconclusive.



Inflammation is strongly associated with mental health disorders and evidence supports the theory that hypofunction of the endocannabinoid system directly leads to pro-inflammatory processes. Polyunsaturated fatty acids, omega-3 or omega-6, are precursors for endocannabinoids and supplementation with EPA and DHA has beneficial effects on depression symptoms. In addition, the use of supplemental DHA and EPA or EPA alone reduce inflammation.³⁶ For anxiety, a study by Harvard Health found that doses of 2,000 mg a day of omega-3s were the most effective.

Schizophrenia: “In recent years, increasing attention has been paid to the importance of the HPA axis and gut-brain axis in the pathogenesis of schizophrenia. One of the possible pathways leading to the development of schizophrenia seems to be the activation of inflammation associated with chronic stress. Elevated levels of C-reactive protein, the pro-inflammatory transcription factor NF- κ B and IL-6 have been observed in such patients. Chronic stress can lead to neurodevelopmental disorders and dysregulation of the HPA axis. It should be noted that IL-6 activates the HPA axis at every level.”.³⁷

There are several nutrients that abundantly used by the HPA axis. The adrenal glands require high levels of vitamin C and B6 when a person is experiencing acute or chronic stress. Vitamin C, in the adrenals, works as an antioxidant and a cofactor in the synthesis of epinephrine and norepinephrine - hormones involved in the "fight-or-flight" response. Vitamin C also supports immune function which is compromised by chronic stress.

Vitamin B6 is a cofactor for enzymes involved in the synthesis of GABA, serotonin, epinephrine and dopamine and evidence suggests that Vitamin B6 may help downregulate cortisol receptors - the impact of cortisol. Vitamin B6 is essential for regulating neurotransmitters and hormones, including those produced by the pituitary gland.

Approximately 35% of adults have problems falling asleep or staying asleep and insomnia rates rise to 69% for those with a chronic medical condition. Depression, anxiety, post-traumatic stress disorder and other mental health disorders lead to sleep issues and insomnia can worsen mental health disorders - a cyclical relationship. Insufficient B6 can contribute to the psychological distress that leads to insomnia and vitamin B6 is also involved in the production of melatonin (the hormone that regulates the body's natural sleep-wake cycle, or circadian rhythm).

Vitamins B5 (pantothenic acid) is essential for the production of hormones like cortisol and DHEA. Pantothenic acid also plays a role in reducing histamine levels in the body which could reduce allergy symptoms. Some sources recommend 300-500 mg daily, in addition to a B complex, when a person has a mental health challenge and severe allergies.

Folate is involved in the synthesis of SAME which supports mood and adrenal function. Folate levels are also linked to the cortisol awakening response, which is the natural rise in cortisol levels upon waking. Low folate levels impair this response which leads to fatigue and difficulty waking up. Vitamin B3, or niacin, helps detoxify excess steroid hormones and contributes to overall endocrine health. Vitamin B12 is vital for nervous system function and deficiencies can impact hormone regulation.

Nutrient research has found a strong link between the dietary consumption of polyphenol-rich foods and the prevention and treatment of mental health disorders. "Polyphenols, particularly flavonoids, have been shown to have a broad range of therapeutic effects, such as anti-inflammatory, antioxidative, immunomodulatory, anti-carcinogenic, cardioprotective, and neuroprotective activity."³⁸

Polyphenols also modulate the microbiota (gut-brain axis) and the HPA axis. Resveratrol modulates HPA axis hyperactivity and stimulates serotonergic neurotransmission.³⁹ There are several flavonoids (polyphenols) in our whole foods and herbs. Gut microbial enzymes, enzymes produced by microbiome in the intestine, transform flavonoids into metabolites that can then be absorbed or excreted. Therefore the composition of the microbiome will determine which metabolites can be produced from ingested flavonoids.⁴⁰

Section Three: Herbal and Supplement Considerations

A healthy gut microbiome is essential for mental health.

1. Correct the diet and determine any food sensitivities (these may clear after nourishing the body and correcting any leaky-gut and blood-brain barrier issues).
2. At minimum use a food-based multivitamin/mineral supplement, additional magnesium, and take omega-3 fatty acids. Consider an extra B vitamin complex that includes 15-30 mg of B6 if the multivitamin has minimal B vitamins (only 100% RDA).
3. Also consider NAC, CoQ10, resveratrol, quercetin, and amino acids. Low nutrients and insufficient ATP production by mitochondria can cause or contribute to mental health symptoms.
4. Reduce/correct any small-bowel bacterial overgrowth, parasites, and/or fungus.
5. Use probiotics (switch bacterial species and brands) for 6-12 months.

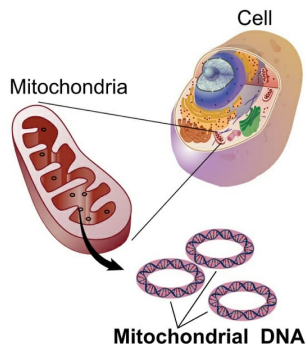
An estimated 60% of individuals diagnosed with anxiety or depression also have symptoms of intestinal dysfunction.

Herbal Combinations for Mental Health

1. Adaptogen
2. Supporting tonic herb(s) with affinity for nervous system
3. Supporting tonic herb with digestive component
4. Consider sleep issues/insomnia

Adaptogens paired with supporting herbs will be more effective and provide faster results. Choosing herbal combinations is highly individual!

Keep in mind that the body systems are interconnected. The gut-brain axis, enteric nervous system, HPA-axis (and thyroid), vagus nerve, the central nervous system (brain and spinal cord), and the immune system communicate and influence each other. In addition we need to remember that we live and die, have health or dysfunction, at the cellular level. Every cell in the body needs nutrients, energy, and protection.



Mitochondria are organelles within cells that convert nutrients into energy (ATP). Mitochondrial dysfunction plays a significant role in mental health conditions by affecting energy production, neurotransmitter regulation, and stress response mechanisms. CoQ10 is a vital component of the mitochondrial electron transport chain, playing a key role in energy production. NAC (N-acetylcysteine) is a precursor to the antioxidant glutathione which helps reduce oxidative stress within the cell and within mitochondria.

Adaptogens help the human body adapt to stress, support normal metabolic processes, and restore balance which provides an overall feeling of wellness and vitality. Another way of saying this is that adaptogens increase the body's resistance to physical, biological, emotional, and environmental stressors and promote normal physiologic function through endocrine, neuroendocrine, and immune modulation.

Adaptogens support the entire neuroendocrine system which includes the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic-adrenomedullary system (SAS). The HPA axis has a direct influence on the immune system therefore, all adaptogens help modulate and/or enhance the immune system. Adaptogens also help prevent cortisol-induced mitochondrial dysfunction and help regulate cellular energy use by improving the function of the neuroendocrine system. The phytochemicals of adaptogenic herbs have beneficial effects throughout the body and may safely be used daily.

There are many herbs touted as adaptogens but do not fit the strict criteria. "Unfortunately, in Western literature the terms tonic and adaptogen have become intermingled and confused. As such, many tonic herbs (such as astragalus, jujube date, amla, and dang gui) that do not fit the definition of an adaptogen have been called adaptogens, due to ignorance or marketing hype. All adaptogens have tonic effects, but not all tonics are adaptogens." Winston, David. *Adaptogens: Herbs for Strength, Stamina, and Stress Relief* (pp. 72-73). Inner Traditions/Bear & Company.

Tonic herbs: Tonic is a general term for any herb that may be used safely for long periods of time and they have positive effects on your overall health. Hawthorn is a tonic herb with an affinity for your heart. Nettles are a tonic herb that is also a nutritive - an herb with a high profile of minerals and/or vitamins. Skullcap is a nervine tonic.

Nervine herbs help restore, balance, and bring ease or a sense of relief to our nervous system. Depending on the individual, nervines may be used to calm and focus, uplift and move, relax and unwind, or bring ease to the mind and heart. There are three main nervine categories:

- Nervine tonics nourish, restore, and strengthen the nervous system over time.
- Nervine relaxants reduce tension in the nervous system - calming, relaxation.
- Nervine stimulants invigorate, enliven the nervous system - alertness and focus.

Adaptogens and tonics can be and should be used long-term. In general, an specific adaptogen is used for 6 months to a year. It is not uncommon to use more than one adaptogen but, if the adaptogen is chosen correctly, supporting herbs provide a more precise mode of action. Changing herbs and herbal combinations should occur as the body changes. If a person was using herbs to help calm excessive nervousness, they may need less of an herb or a different herb when positive changes have occurred in the diet and their gut health has improved.

Adaptogens

There are seven true adaptogens (more may be identified).

1. American Ginseng (*Panax quinquefolius*)
2. Ashwagandha (*Withania somnifera*)
3. Red Asian/Korean Ginseng (*Panax ginseng*) (Chinese: ren shen)
4. Eleuthero (*Eleutherococcus senticosus*)
5. *Schisandra chinensis*
6. *Cordyceps militaris* (mushroom)
7. *Rhodiola rosea*

Note: A tincture with a ratio of 1:5 is much weaker than 1:1 or 1:2 so lower the doses depending on your herbal source! All herbal dosages are general recommendations and based on using only one herb. Herbal combination often create synergy and require a lower dosage of each herb. **Example:** I have 1:1 bulk tinctures on my shelf and I am combining Ashwaganda, Lemon balm, and Milky oats. I would recommend taking 30 drops three times a day (or 45 drops twice a day).

Ashwagandha / *Withania somnifera*



Taste/Energy: Bitter, warm, dry

*Nightshade family *Avoid if you have hyperthyroid

Tincture: (1:5): 2-4 mL (40-80 drops), up to three times per day

Capsule: studies found 225 mg - 400 mg per day effective, some recommend 500 mg twice per day

Ashwagandha is a calming adaptogen, enhances endocrine function, antioxidant, anti-inflammatory, antispasmodic, antitumor, diuretic, nervine, thyroid stimulant (for mild cases of hypothyroidism), and immune balancing. It is a very effective nervine and useful for nervous exhaustion, anxiety, stress-induced insomnia and fatigue. Studies have shown that ashwagandha may help improve memory, focus, and mental clarity by reducing oxidative stress in the brain. Withanolides are the phytochemicals largely responsible for the herb's therapeutic properties.

Ayurvedic: Ashwagandha is considered a rasayana and used for general weakness, enhancing vigor, improving sex for both men and women, and recuperating from illness. It is used in India for malnutrition, coughs, edema, impaired cognitive function, rheumatism, low back pain, and various diseases and fevers.

Eleuthero / *Eleutherococcus senticosus*



Taste/Energy: Sweet, slightly bitter, slightly warm

Tincture: (1:5): 3-5 mL (60-100 drops), 3-4 times per day

Capsules: 300 to 400 mg per day

Eleuthero is a non-stimulating adaptogen that is especially suited for those who work long hours, stay up all night to get more done, and push themselves until they are “stressed-out”. It is also well-suited for those with ADHD. Eleuthero has anti-inflammatory, anti-tumor, anti-depressive, anti-steatosis (steatosis is fatty liver disease), and neuro-protective effects. It may also reduce blood pressure and is valued for its ability to reduce cardiovascular stress and improve chronic fatigue. Research suggests that it may be useful in the prevention of gastric ulcer induced by stress.

American Ginseng / *Panax quinquefolius*



Taste/Energy: Sweet, bitter, slightly warm, moist

Tincture (1:5): 3-5 mL (60-100 drops), three times per day

Capsule: Two 500 mg capsules, twice per day

American ginseng is a mild bitter tonic, mild central nervous system stimulant, mild demulcent (soothes mucous membranes), antioxidant, and immune balancing. It has shown potential benefits for mental health by improving cognitive function, stress management, and mood regulation. It is an excellent choice for mild to moderate HPA-axis dysfunction - starting to experience a decrease in restful sleep, energy, strength, or endurance. Also benefits those with autoimmune disease with dryness, allergies, allergic asthma, insomnia with chronic fatigue, stressed nervous system, and type 2 diabetes.

Cordyceps militaris / *Ophiocordyceps sinensis*



Taste/Energy: Sweet, slightly acrid, warm, moist

Tincture: (1:5): 1-2 mL (20-40 drops), up to three times per day

Capsules: (Mycelial Extract): Two capsules per day

Cordyceps has shown strong anti-inflammatory, antioxidant, neuroprotective, antiaging, antitumor, antiproliferation, antimetastatic, and immunomodulatory effects. Cordyceps is an adaptogen used for depressive states, night sweats, ringing in the ears, dizziness, and fatigue. It enhances aerobic capacity, improves lung function (bronchitis, asthma, COPD), improves cellular energy stores, reduces heart muscle oxygen consumption, prevents immunosuppression, and balances immune function. It is also a kidney tonic and supports those with kidney diseases. *Excessive amounts can cause edema, anxiety, and headaches.

Red Asian / Korean Ginseng / *Panax ginseng*



Taste/Energy: Sweet, bitter, warm, moist

Tincture: (1:5): 1-2 mL (20-40 drops), up to three times per day

Capsule: Two 400-500 mg capsules of powdered herb, 2-3 times per day

Panax is **not appropriate for those who experience bipolar mania episodes or extreme anxiety or panic attacks**. Use the lower doses for those who have chronic insomnia, hypertension, or experience high anxiety. They should also not drink coffee while using *Panax ginseng*.

Panax ginseng is considered the most stimulating of all adaptogens and is well suited for those who feel cold/poor circulation, are exhausted, feel weak, are depressed, and lack vitality. While very stimulating it is also deeply nourishing and suitable for general anxiety at lower doses. Asian ginseng has the ability to strengthen immune function for those with cancer, low white blood cell counts, chronic Lyme disease, autoimmune disorders, excessive allergy responses and allergic asthma. Adrenal exhaustion (dark under the eye circles, quivering tongue, etc.) also responds well to *Panax ginseng*.

Schisandra / *Schisandra chinensis*



Taste/Energy: Sweet, sour, salty, bitter, pungent, warm, dry

Tincture: (1:5): 2-4 mL (40-80 drops), 3-4 times per day

Capsules: One 500 mg capsule, 3-4 times per day

* Avoid if you have epilepsy, acid reflux, or peptic ulcers.

“It [Schisandra] has an unusual dual effect on the nervous system. It enhances the reflexes, work performance, alertness, and mental activity. At the same time, it is calming and helps relieve anxiety and stress-induced asthma or palpitations”. - Winston, David

Schisandra (“Five Flavor Fruit”) possess the five flavors of classical Chinese medicine: sour, bitter, sweet, salty, and pungent. It is used for gastrointestinal tract diseases, respiratory failure, excess phlegm, wheezing and coughs, cardiovascular diseases, body fatigue and weakness, excessive sweating, and frequent urination. It also reduces hunger, delays the aging process, increases vitality, and improves mental health and insomnia. Research suggests that Schisandra may be beneficial for congestive heart failure, diabetes, obesity, hepatitis, polycystic ovary syndrome, menopause, cognitive performance, high cortisol levels, heavy metal toxicity, and physical stamina.

Rhodiola / *Rhodiola rosea*



Taste/Energy: Sweet, slightly bitter, spicy, cool, drying

Tincture: (1:5): 2-3 mL (40-60 drops), 3 times per day

Capsules are often standardized (3% rosins; 1% salidroside): 75-100 mg, one to two times per day

*Avoid if sensitive to stimulants like caffeine

*Avoid if you have bipolar disorder/manic episodes

*Avoid if you have a dry condition (dry cough, vaginal dryness, etc.)

*Avoid if in an active autoimmune state

Rhodiola is a very stimulating adaptogen as well as an immune system stimulant. It is known for increasing longevity, elevating stamina, and having cardio-, neuro-, and hepatoprotective effects. Studies have shown that Rhodiola prevents stress-induced heart damage and improves heart muscle strength. It is also anti-depressant, antiviral, anti-inflammatory, antibacterial, and improves cognitive function.

"I regularly use rhodiola for people with deficient (asthenic) depression or stagnant depression, for altitude sickness (used with cordyceps, reishi, and holy basil), and for adult attention deficit hyperactivity disorder (ADHD) as well as to help people recover from head trauma injury. For head trauma injuries, I combine it with gotu kola, bacopa, white peony, standardized ginkgo extract, holy basil, or Chinese polygala". Winston, David. *Adaptogens: Herbs for Strength, Stamina, and Stress Relief* (p. 180). Inner Traditions/Bear & Company.

Choose one or two adaptogens based on nervous system response (lean towards depression or anxiety) and the individuals other health challenges.

- **Depression, Depression and Fatigue:** Korean Ginseng (*Panax ginseng*), Eleuthero, American Ginseng (*Panax quinquefolius*) Schisandra, Cordyceps, Rhodiola, or Ashwagandha.
- **Generalized Anxiety:** Eleuthero, Schisandra, or low dose red Asian/Korean Ginseng (*Panax ginseng*) if they also slip into extreme fatigue and it is not relieved with nutrient corrections (B vitamins, etc.).
- **Bipolar*:** Eleuthero, possibly Ashwagandha (some studies show promising results, research on individuals with bipolar disorder is still limited)

*Remember that Bipolar is difficult because the person can experience long states of deep depression and fatigue followed by manic states - opposites! If you meet with them when they are deeply depressed you may want to give them a very stimulating herb but this is not the best approach. Do not forget magnesium!

Tonic Herbs

Choosing one, two, or even 6 tonic and nervine herbs for one formula is appropriate for most individuals but 2-3 is sufficient when also using an adaptogen. If using them as a tea it is important that the dose is sufficient, the herbs are of great quality, and the herbs are allowed to steep in boiling water with a cover on the mug for at least 5 minutes. Add additional hot water to if the tea is not as hot as preferred. If the herbs is a seed, root, or stem it needs to be crushed/ground/powdered to use a tea (the plant chemicals need to be released from the cells - not just the ones that have color). Do not use the microwave to boil the water or to reheat the tea!

Making tea 3-4 times a day can be a challenge. A person may prefer having some of the herbs as a tincture or capsule for the morning or afternoon and enjoy the tea before bed. Remember that adaptogenic and energizing herbs should be used in the morning and/or possibly at lunch. Calming herbs can be used anytime of the day as needed.

While herbs often have a primary action or affinity for a particular organ, gland, or system, most also have additional actions. Herbs also have synergistic effects when combined. This makes it difficult to categorize the herbs into “for anxiety” or “for depression”. Many of the herbs listed in this section are useful for anxiety or depression so please read the descriptions and do additional research if needed.

In General

Anxiety: California poppy, Catnip, Chamomile, Gotu cola, Hops, Kava-kava, Lavender, Linden, Lemon balm, Milky oats, Mother wort, Passion flower, Rehmannia, Skullcap, Valerian, and Wood betony.

Depression: Holy basil, Lavender, Lemon balm, Milky oats, Mimosa bark, Rosemary, Turmeric, Saffron, St. John's wort, and Vervain/Verbena. Consider Chasteberry and/or Black Cohosh for menopausal depression.

Nervous Exhaustion (chronic stress that has resulted in depression or anxiety, overwork, overthinking,): Milky oats, Skullcap, Holy basil, Lemon balm,

ADHD: Consider Rehmannia, Bacopa, and supporting herbs depending on presentation of symptoms (insomnia, anxiety, etc). Herbs found useful in study include Lemon balm, Chamomile, and Valerian.

Bipolar: Milky oats, Skullcap, Wood Betony

Cognitive impairment with anxiety or depression: Bacopa, Ginkgo, and Gotu kola paired with tonic herbs matched to the individual.

Adult premenstrual syndrome (PMS) consider Chasteberry and supportive tonics and magnesium. For **teenagers** with premenstrual stress consider Lemon Balm with supportive herbs such as Linden, and magnesium.

Chronic situational depression, chronic grief, or PTSD is from a traumatic event (this is highly individual) or loss of a loved one that has resulted the inability to move on, forgive, find peace, or except the outcome. This individual will either think about or talk about what happened over and over without relief. Keep in mind that everyone works through death and traumatic events in different stages and situational depression, grief, and/or anxiety is a natural response. Also keep in mind that the event may not seem like a big deal- to you. Consider Bacopa, Rosemary, Lemon balm, Mimosa bark, and Milky oats.

HERBS TO CONSIDER

Milky Oats (*Avena sativa*): Milky oats is a tonic and trophorestorative - an herb that restores nourishment. Milky oats, also called wild oats, needs to be used as tincture - the non-ripe oat seeds need to be fresh, have the active “milky” component. Milky oats deeply nourish and restore the nervous system and adrenals overtime. Individuals with chronic anxiety and those who are overworked, stressed to exhaustion, unable to concentrate, have episodes of deep sadness, feel like their limbs are weak, or they may feel jittery, startle easily, and or easily agitated, will benefit greatly by taking milky oats for 3-6 months.

Rehmannia (*Rehmannia glutinosa*) - Rehmannia is useful for anxiety, depression, and ADHD. It is antioxidant, anti-inflammatory, anti-infective, immunomodulatory, anti-cancer/anti-tumor, neuroprotective, hepatoprotective, nephroprotective, cardiovascular and cerebrovascular-protective. In traditional Chinese herbal medicine Rehmannia is also known for reducing pain, nerve damage repair, and anti-depressant and sedation qualities. Rehmannia is also used in traditional Chinese medicine for attention deficit hyperactivity disorder (ADHD).

Skullcap (American skullcap) (*Scutellaria lateriflora*) has a long history of use for nervous anxiety, worry, nervous or mental exhaustion (overwhelmed), insomnia and depression. Skullcap is slow working, must take for a long time, but it has a deep and lasting effect. It tonifies the central nervous system and sympathetic nervous system. King’s American Dispensatory describes skullcap as an antispasmodic nervine tonic that is calming in all cases of nervous excitability, restlessness, or wakefulness.

Skullcap (Chinese skullcap) (*Scutellaria baicalensis*) is primarily used for its anti-inflammatory, antiviral, and antibacterial properties, often used in combination with other herbs for conditions like bronchitis, hepatitis, and inflammation. Studies have revealed that the active constituents baicalin and baicalein found in Chinese skullcap are effective for depression - “reduce the degree of behavioral despair”. Great for angry, irritable, cranky conditions arising from mental over-work. “Multiple studies have indicated that baicalin and baicalein reduces the severity of depression, stroke, and disorders of the central nervous system”.⁴¹ Baicalin and baicalein are also found in the roots of American skullcap but in lesser amounts - synergy at work.

Wood Betony/Betony (*Betonica officinalis*) is a nervine tonic/relaxant and as such is often used to calm the nervous system - reduce anxiety and promote relaxation. Betony also soothes an upset stomach, reduces tension headaches, nerve pain, muscle spasms, and menstrual cramps. for anxiety, nervous tension, and stress, particularly where there's a feeling of being overwhelmed or "highly strung".

Lemon Balm (*Melissa officinalis*) has been used for centuries to treat nervous system disorders, such as anxiety, insomnia, depression, and tension. Research has shown that lemon balm extract can improve mood and attention, reduce stress, acute and chronic anxiety, and nervous digestive issues. One mechanism responsible for the reduction of anxiousness and worry is that lemon balm slows the breakdown of GABA so it "hangs around" longer.

- Lemon balm combined with Valerian (after about 30 days) significantly improves sleep and daytime concentration in children with restlessness and concentration issues. Study dosage: lemon balm capsules up to 320 mg and valerian tablets up to 640 mg.
- For adults or children with sleep issues, lower doses (120 mg Valerian and 80 mg of Lemon balm) were effective in other studies - always find the minimum needed.
- "Lemon balm has also been shown to reduce pre-menstrual symptoms in adolescent females aged 14–18. Supplementing 1200 mg lemon balm daily over three consecutive menstrual cycles significantly reduced anxiety, depression, and insomnia scores... Heydari and colleagues found significant decreases in insomnia, anxiety, depression, and social dysfunction scores following 1200 mg lemon balm relative to placebo".⁴⁵
- Gut microbiota: Lemon balm influences the gut microbiota through antimicrobial, anti-inflammatory, and antioxidant properties. Lemon balm exhibits antimicrobial activity against several strains of bacteria, reduces inflammation which protects gut cells from oxidative stress, and may have prebiotic effects which modulates the overall composition of the microbiota. Taken together, these actions promote an environment that supports beneficial bacteria.⁴⁵

Hops (*Humulus lupulus*) have been used for centuries for nervous system issues such as insomnia, anxiety, restlessness, and digestive issues (stimulate appetite and relax the digestive system). The German Commission E. Approved hops for mood disorders, anxiety, and restlessness. Hops contains humulone and xanthohumol which promote relaxation and sleep by binding to the GABA_A receptors.

Valerian and Hops for Sleep: "Valerian has an adenosine-like action and supports the readiness to fall asleep. The control of the sleep-wake rhythm induces sleep when the time-related interaction is operating properly. The control is closely related to endogenous melatonin secretion. Hops act in a similar way to melatonin. Therefore, the efficacy of a valerian and hops combination in sleep disorder can scientifically be explained".⁴³

Valerian (*Valeriana officinalis*) is useful for anxiety, inducing sleep, poor blood circulation to the brain & nervous systems, hypertension, and stress related heart symptoms. Dr. Sharon Tilgner also recommends valerian for those who feel intoxicated, floating in the air, and are oversensitive with a tendency to personality changes. The European Medicines Agency recommends valerian for sleep disorders and nervous tension.

- **Sleep:** Studies have confirmed that aqueous and ethanol extracts [tea and tinctures] have a clinical effect on sleep disorders, especially in elderly patients. Use 300-600 mg of valerian root 1 hour before going to sleep. **Tea:** Add 1-2 teaspoons of dried and crushed or powdered valerian root soaked to one cup of boiling water, cover and let steep for 10-15 minutes. Always start with the lowest dosage.
- **Nervous tension:** the European Medicines Agency recommends 400–600 mg valerian root extract or 0.3–3 g of powdered valerian root up to 3 times daily.

Note on Synergy

Gamma-aminobutyric acid (GABA) is an amino acid that functions as a neurotransmitter in the brain and nervous system. The amount of, the balance between, GABA and glutamate neurotransmitters directly connected to sleep and mood. GABA has relaxing properties. Glutamate has an excitatory effects - stimulates nerve cells to transmit signals and plays a vital role in learning and memory.

“The role of GABA has long been regarded as central to the modulation of anxiety and this neurotransmitter system is the target of benzodiazepines and related drugs used to treat anxiety disorders. It has been estimated that at least one-third of all CNS neurons utilize GABA as their primary neurotransmitter, and **GABA inhibition is essential for maintaining a balance between neuronal excitation and inhibition**”.⁴²

Chronic stress, even chronic mild stress, reduces brain levels of GABA while increasing the glutamate levels (excitatory effect). Excitatory is a word easily associated with anxiety however, low GABA is also involved in major clinical depression. Stress and sleep, neurotransmitter balance, HPA axis, gut-brain axis - everything is interconnected.

Stress Model Test⁴²:

- Lemon balm and Valerian show different patterns of activity.
- Glutamate brain levels: Valerian given alone counteracts the increase of glutamate induced by stress, while Lemon balm given alone is less effective. However, the **combination of Valerian and Lemon balm** reduced the glutamate brain levels significantly compared to Valerian given alone.
- “Remarkably, upon extract combination treatment, the brain level of GABA at the end of the period of stress was close to the basal values”.

Chamomile (*Matricaria recutita*) is excellent for all ages (children to elderly). It calms the nervous system and is useful for nervous irritability, restlessness, nervous indigestion (stomach aches, gas), emotional sensitivity, and helps with sleep. For nervous irritability it pairs well with hops and valerian. Chamomile is also anti-inflammatory and can soothe kidney and bladder irritation. Works excellent as a tea but remember to cover the tea mug and let steep for at least 4-5 minutes. Use 1 tablespoon of dried chamomile.

Passionflower (*Passiflora incarnata*) calms anxiety, especially acute anxiety - situational anxiety and helps you fall asleep. The effects of passionflower on sleep tend to be mild and it is often combined with valerian, lemon balm, or other calming herbs. Scientists believe passionflower works by increasing levels of gamma aminobutyric acid (GABA) in the brain. GABA lowers the activity of some brain cells, making you feel more relaxed.

Linden (*Tilia spp.*) flower is a gentle but effective herb for stress, anxiety, muscle tension, menstrual cramps, and tension headaches. Like chamomile, linden also helps with stress induced digestion issues and works well for all ages. Linden's antispasmodic properties are attributed to p-coumaric acids and flavonoids.

Holy Basil/Tulsi (*Ocimum tenuiflorum*): Studies have shown that Holy Basil can help reduce stress and anxiety caused from overwork or overthinking, improve sleep quality, and reduce cortisol levels. It's used in Ayurvedic medicine for its calming and stress-relieving properties. Literature is mixed on whether Tulsi is a true adaptogen but it does have many adaptogenic properties.

St. John's wort (mild-to-moderate depression): 300 mg-1800 mg per day - always start with a low dose and increase every few days. Divide the dose so you are taking 300-600 mg at a time. It takes 4-6 weeks to have a therapeutic effect.

- Do not use St. John's wort with antidepressants.
- Potential switch to mania in bipolar disorder.
- Do not use St. John's wort if the individual is taking blood thinners
- Do not use St. John's wort with elderly patients (or any person) taking warfarin, digoxin or cyclosporine.

"A 2008 Cochrane meta-analysis of 29 trials including 5489 adult patients found significant results from 18 studies in favor of St. John's wort (SJW) versus placebo. SJW appeared equivalent to selective serotonin reuptake inhibitors (SSRIs). A 2016 review of 35 studies involving nearly 7000 adult patients found that SJW monotherapy for mild-to-moderate depression was superior to placebo in improving depression symptoms, and it was about equivalent in effect to antidepressants. In research studies, the dose ranged from 300 mg to 1800 mg per day. Most preparations used in research contained standardized 0.3% hypericin and 2% to 5% hyperforin". - Beata Bliss Lewis, MD

Vervain/Verbena (*Aloysia citrodora*), specifically lemon verbena, has anti-anxiety, antioxidant, antimicrobial, and anti-cancer properties. Studies show that 400 mg lemon verbena significantly improves sleep and also increases melatonin production. As an essential oil, lemon verbena has been shown to have a calming effect that could potentially lower the heart rate and blood pressure. The plant chemical known to contribute to the actions is verbascoside, a polyphenol. Verbascoside, among other things, increases the expression of dopamine, serotonin, and noradrenaline.

Turmeric (*Curcuma longa*) helps with depression, depression with inflammation. It has antioxidant, neuroprotective and neurotransmitter regulatory effects - 1000 mg per day with 10 mg piperine. Curcumin has low bioavailability, meaning the body doesn't absorb it well. Therefore, using enhanced formulations like curcumin with piperine (found in black pepper) to improve absorption is often recommended.

California poppy (*Eschscholzia californica*) is well suited for all ages (children to elderly) to calm anxiety, reduce stress and tension, help insomnia, and reduces pain. As a cooling nervine it counters the heated and agitated nervous system that can occur with overthinking and worry.

Saffron (*Crocus sativus*): A 2013 meta-analysis showed that saffron can improve major depressive disorder and a 2014 systemic review showed that saffron had antidepressant activity similar to synthetic antidepressants. A study in the Journal of Behavioral and Brain Science found that a saffron extract increased dopamine levels in the brain without changing the levels of other brain hormones so it may be useful for those with bipolar. Saffron also has high antioxidant and anti-inflammatory properties. **Dosage:** 30–90 mg of Saffron (stigmas, not the petals, contain the highest concentrations of the bioactive compounds crocin, crocetin, and safranal, which are believed to be responsible for its antidepressant properties.) Possible concern in those with low blood pressure.

Saffron may offer neuroprotective benefits for individuals with Parkinson's disease. Preclinical studies suggest saffron can inhibit the buildup of alpha-synuclein and protect dopaminergic neurons. Dopamine is a neurotransmitter that plays a crucial role in regulating movement, mood, and other brain functions. In Parkinson's, the nerve cells that produce dopamine in the brain gradually die, leading to a decrease in dopamine levels.

Mimosa (*Albizia julibrissin*) is calming and uplifting. It is used for depression, chronic stress induced anxiety, grief, and PTSD. In Traditional Chinese medicine it has a long history of use as an antidepressant. Both the bark and flowers of the mimosa tree are used. The bark, often referred to as "happiness bark" or "collective happiness," is primarily used for its mood-supporting and stress-relieving properties. The flowers are also used, often in teas or tinctures, and are known for their calming and mood-lifting effects.

Rosemary (*Rosmarinus officinalis*) is an aromatic herb, a soothing nervine and a cognitive enhancer that is useful for depression or anxiety. It has a reputation of 'gladdening the heart' and the essential oil when inhaled tends to make people feel happy. Rosemary (whole herb) has anti-inflammatory and antioxidant properties contribute to its neuroprotective potential. Rosemary extracts have been shown to protect dopaminergic cells and increase dopamine levels which may be useful for neurodegenerative conditions like Parkinson's disease. "...inhalation of rosemary essential oil decreased stress by reducing serum corticosterone level and increased brain dopamine level *in vivo*." - <https://pmc.ncbi.nlm.nih.gov/articles/PMC7491497>

Lavender (*Lavandula spp.*) is often overlooked because it is so common. Lavender improve sleep, reduce feelings of depression and anxiety, calm cranky babies and soothe the elderly with dementia. A review study found that lavender aromatherapy is, clinically, superior in short-duration, while consuming whole lavender (80 mg), tinctures (1:5, 30-60 drops), or infusions/cover tea mug (1-2 teaspoons) is preferable for long-term treatment of anxiety. **Essential oil:** Some individuals are more sensitive (one drop of essential oil equals a large amount of lavender), especially children with autism, ADHD, etc. and they may react differently to the essential oil by becoming more restless, anxious, or irritable.

Catnip (*Nepeta cataria*) tea is made by steeping the dried leaves in hot (but not boiling) water. It is helpful for anxiety, restlessness, nervousness, insomnia, and digestive upset. As a soothing nervine it is excellent for all ages and is typically used before bedtime. It pairs well with passionflower or wood betony as a daytime tonic. Nepetalactone is the plant chemical likely responsible for the calming effects in both cats and humans. It is similar to the valepotriates found in valerian.

Kava-kava (*Piper methysticum*) is best known as a muscle relaxant and for helping individuals fall to sleep. It works fast and wears off fast so it should be taken right before lying down. For stubborn insomnia add passion flower for a synergistic effect. Kava-kava is not just for sleep! It is also an excellent herb to use within a formula for the added benefits of relieving acute situational anxiety, restlessness, muscle tension or spasms. Do not use long-term - use for short term situational events. Not appropriate for children or if drinking alcohol (can make you very drowsy).

BRAIN SPECIFIC

Bacopa (*Bacopa monniera*) is useful for cognitive impairment, anxiety, depression, and nervous exhaustion. It also improves concentration, sharpens the mind and intellect, enhances memory, and has been found useful for those with ADHD and dementia. Research has also shown that Bacopa may protect the brain from oxidative damage when exposed to mercury and decrease inflammation in the central nervous system.

Ginkgo (*Ginkgo biloba*) - is useful for cognitive impairment, anxiety, depression and it helps increase blood flow to the brain, arteries and heart. Ginkgo is also antioxidant and anti-inflammatory. It is not sufficient on its own for ADHD but would support Bacopa.

Gotu kola (*Centella asiatica*) - is useful for cognitive impairment, anxiety, depression, reduces inflammation in the brain, and may help improve mitochondrial function, which is important for brain health and energy production.

“...*Centella asiatica* can enhance mitochondrial function, promote antioxidant response, and improve cognitive deficits in mouse models of aging and Alzheimer’s disease (AD). Because neuroinflammation is also prevalent in the AD brain and there is growing evidence that the interplay between oxidative stress, mitochondrial dysfunction, and neuroinflammation play a central role in the progression of AD...”⁴⁴

HORMONE SPECIFIC

Men/Andropause (gradual decline in testosterone) - David Winston: “As men age, by their late 50s and 60s it is not uncommon for them to begin to re-evaluate their lives (mid-life crisis). While there are social reasons for this phenomenon, it is also a time of dropping testosterone levels, increasing cortisol levels and andropause. I find it is not uncommon for some men to develop what I call “**grumpy old man syndrome**”. They become increasingly isolated, irritable, with a lack of motivation and patience. Saw Palmetto, Black Cohosh, Muira Puama, Fresh Oat and Pulsatilla are useful for this condition. The supplement propionyl L-carnitine has also been found to relieve depression, fatigue and sexual dysfunction in andropausal men...The supplement acetyl-L-carnitine (500 mg daily) has also been found to relieve depression in the **elderly**.”

Black cohosh is useful for nervous tension due to hormonal balance but it is not appropriate for those with bipolar as it may lead to a mania state. Black cohosh is often effective for menopausal symptoms, premenstrual syndrome, and painful menstrual periods. When using black cohosh to promote hormone balance it is important to consider nutritional factors (especially B vitamins, fat-soluble vitamins, and fatty acids like GLA), liver congestion/dysfunction, and gut microbe balance.

Traditional Chinese and Western herbalism used black cohosh to reduce muscle pain and spasms, pain associated with periods and childbirth, to calm the nervous system, support liver function, and tonify the kidneys and uterus.

Chasteberry/Chaste tree (*Vitex agnus-castus*) has an affinity for the pituitary and promotes progesterone production via a decrease in prolactin and other mechanisms. Prolactin is often elevated in several conditions, including hypothyroidism. Vitex is beneficial for premenstrual tension syndrome (PMS), premenstrual dysphoric disorder (PMDD), irregular periods, polycystic ovary syndrome (PCOS) painful periods, enhancing

fertility, breast tenderness, and symptoms of menopause (hot flashes, dryness, etc.).

The HPA axis is believed to play a role in hormone imbalances that lead to PMS and menopausal symptoms - choose an appropriate adaptogen to support the action of chasteberry. Common PMS symptoms include breast pain, headache, backache, lack of energy, clumsiness, tension, anxiety, irritability, depression, food cravings, and bloating.

“An uncontrolled study using a blend of *V. agnus castus* combined with green tea extract and nutrients (l-arginine; vitamins E, B6, and B12; folate; as well as iron, magnesium, zinc, and selenium) administered to 30 women who had been unsuccessful in their attempt to conceive despite trying for 6 to 36 months also observed beneficial results. After 5 months of treatment, 5 women out of 15 in the treatment group were pregnant (33% vs. 0%, $P < 0.01$). Four of the five women had healthy live births. - 2020, Textbook of Natural Medicine (Fifth Edition), Leah Hechtman MSc (RHHG), BHSc (Nat), ND

“Vitex may interfere with certain antipsychotic drugs...Little is known about the effect of Vitex in women taking hormonal birth control. It is true that Vitex modulates your natural hormones and as such, it may theoretically interfere with synthetic hormones found in birth control”. - Dr. Jolene Brighten, board certified naturopathic endocrinologist.

This manual is intended for informational purposes only and should not be considered a substitute for professional medical advice. The information provided herein does not constitute medical advice, diagnosis, or treatment. Always consult with a qualified healthcare professional before making any decisions about your health or treatment. The author is not responsible for any adverse effects or consequences resulting from the use of the information presented in this manual.

Resources

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