



# NeuroHormone Analysis Education

## Saliva & Urine Test

Dr. Donna F. Smith

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## NeuroHormone Saliva & Urine Test

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The **NeuroHormone Saliva and Urine test** identifies current hormone levels of female and male hormones [Estrogens (E1, E2, E3), Progesterone and Testosterone], adrenal hormone levels of Cortisol and DHEA, as well as the following neurotransmitters of the brain, Serotonin, Dopamine, Norepinephrine, epinephrine, Glutamate, Gamma-aminobutyrate (GABA), Glycine, Histamine, Phenethylamine (PEA) and Creatinine.

Alterations or abnormal urinary neurotransmitter levels identified on the Neurohormone Urine Lab Report (aka Neuro-transmitter (NT) **Neuro Basic Urine Profile**) may be associated with the causes of symptoms, such as causes of Pain, Fatigue, Sleeping difficulties, Cravings, Addictions, Cognitive abilities, Mood swings, lack of motivation, even with the sex drive... to name a few.

Your Lab Report also included the answers on the questionnaires you completed when collecting your specimens so you can review the symptoms that actually apply to you.

Our **Neuro-Transmitter Health Questionnaire (NTAF)** identifies various symptoms that relate to imbalances in the Brain, Adrenals, Blood Sugar, Serotonin, Dopamine, Glutamine and Acetyl-Choline.

This document is a continuation of the brief description and explanation provided in the section of your lab report titled, **Neurotransmitter Comments**.



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## A Word About Self-Treating The Brain

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Prior to connecting with me for **Clinical Nutrition Testing and Therapy**, many people try self-treatment through a variety of direct sale (over-the-counter or online) supplements to boost or suppress the above list of neurohormones.

However, in respect to all abnormal test levels, including your **NeuroHormone Saliva and Urine Lab Report**, whether the Lab Report shows an clinical deficiency or excess in vitamins, minerals, proteins, carbohydrates, fats/oils, amino acids, neurohormones, or any other nutrient or hormone, keep in mind two things:

1. Over 90% of all supplements sold directly to the public are isolates and synthetically-made supplements that will manipulate your brain chemistry to suppress symptoms, just like pharmaceutical drugs, and thus cannot provide the nutrients the body requires to heal itself and in due time, will cause a myriad of other health issues.
2. The potency level of any supplement sold directly to the public is too low to have positive effects on abnormal Lab Report levels. However, how they are made, like those listed in #1 above, will determine whether they are toxic to your body or not.



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## Foods with Neuro-Transmitters

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An internet search today for “foods high or foods low” in each of these neurohormones will help you include, reduce or eliminate foods that would over-time perpetuate or cause neurohormone imbalances (i.e., levels too low or too high).

**However, keep in mind two things:**

1. Consume only the neurohormones found in vegetables, fruits, nuts, seeds or animal proteins (poultry, beef, fish, etc.).
2. Changing your diet is a key to preventing neurohormone levels from getting worse, since obviously, diet is one of the key sources for all nutrient imbalances, whether they are vitamins, minerals, proteins, carbohydrates, fats/oils, amino acids, hormones or neuro-transmitters. However, consistent improvements in your dietary intake require 3-4 months and longer to have a positive effect on Lab Report levels.

For example, everyone knows that oranges contain Vitamin C, so let’s say your lab report showed a clinical deficiency in Vitamin C. Therefore, for your diet to improve your level of Vitamin C on your next lab report would require the consumption of barrels of oranges every day – that, however, is costly, impractical, time-consuming and the Gastro-Intestinal System could not metabolize such an excessive daily intake of oranges.

Therefore, when your lab reports identify your current clinical deficiencies and/or excesses Clinical Nutrition Therapy is required, which includes therapeutic-grade 1) whole food vitamin/mineral supplements, 2) herbs, and/or homeopathic remedies.

Now, once you have restored optimal levels on your Lab Report through your Clinical Nutrition Therapy, then the specific and consistent dietary changes, required to maintain optimal test levels you attained through Clinical Nutrition Therapy, will help you reduce the chances of developing clinical neurotransmitter imbalances in the future.

However, because other factors, such as stress (mental, emotional and physical), exercise or lack thereof, heredity, and toxicity (from the air, water, drugs and food additives, etc.), also affect their levels, it is prudent to monitor your NeuroHormone levels every 1-2 years, after



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your Clinical Nutrition Therapy has provided the therapeutic nutrients your body requires to restore optimal levels.



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## The Brain & Nervous System

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The **Nervous System** has two main parts:

1. The **Central Nervous System** is made up of the brain and spinal cord. The spinal cord transmits information for the brain to process.
2. The **Peripheral Nervous System** consists of everything else, i.e., it is made up of nerves that branch off from the spinal cord and extend to all parts of the body.

The **Peripheral Nervous System** is divided into two main parts:

1. **Autonomic nervous system (ANS):** Controls involuntary bodily functions, like the heart beating, and regulates glands.

Clients, who have completed the **Report of Findings Consultation for their Tissue Mineral Hair Analysis (TMA)**, may recall when I was explaining the role and importance of the specific mineral ratios, one of which was the minerals that transport the communications from the ANS to the rest of the body.

Therefore, symptoms of brain dysfunction, other hormone imbalances (thyroid, male/female, etc.) and their adverse effects on one or all other areas of the body, may be caused by mineral deficiencies or excesses, as well as NeuroHormone imbalances OR both.

2. **Somatic nervous system (SNS):** Controls muscle movement and relays information from ears, eyes and skin to the central nervous system.



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## Neurohormones, Neuromodulators & Neurotransmitters

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A Neurotransmitter is a chemical molecule that is released from the synaptic vesicle into the synaptic cleft that will eventually bind with the post-synaptic receptor.

A synapse is a junction between two neurons (i.e., the pre-synaptic and post-synaptic neurons). The electrical signal carried by the action potential is converted into a chemical signal (neurotransmitters) to be transmitted or relayed to the next neuron. A synapse is used to integrate all the information provided by the pre-synaptic neurons to produce the action potentials output that is represented by the firing or non-firing.

Chemical synapse provides two forms of communication – excitatory and inhibitory. Whether the synapse is excitatory or inhibitory depends on the post-synaptic receptor that binds with the neurotransmitter. Thus, the signal originating from the pre-synaptic neuron is transmitted to the next neuron.

- If the synapse is excitatory, stimulation by the pre-synaptic input would increase the probability of firing for the post-synaptic neuron.
- If the synapse is inhibitory, stimulation by the pre-synaptic input would decrease the probability of firing for the post-synaptic neuron.

Since a neuron has many synapses, some of them are excitatory and others inhibitory, the neuron can integrate all of the excitatory and inhibitory inputs to produce the output. Thus, a neuron can be considered as an integrator of signals.

**When the chemical is released from a neuron into the synaptic cleft, it is called a neurotransmitter. When the chemical is released from a neuron into the bloodstream, it is called a neurohormone.**

A chemical can be both neurotransmitter and neurohormone, depending on where it is released to. A couple of examples include norepinephrine and Dopamine, which are both.

The criteria to be classified as a neurotransmitter is the chemical has to be:

1. Stored in a synaptic vesicle,
2. Released from a pre-synaptic neuron into the synaptic cleft and then
3. Binds with the post-synaptic receptor locally at the synapse.

If all of the criteria above are not met, neuroscientists don't call them neurotransmitters.



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The post-synaptic neuron determines whether a synapse is excitatory or inhibitory, not the neurotransmitter with two exceptions: 1) Excitatory Glutamate and GABA (gamma-aminobutyric acid)

A neuromodulator is a chemical that is similar to a neurotransmitter, except it may not satisfy all the above criteria.

Neuromodulators, for example, regulates the function of other neurotransmitters and diffuses far beyond the local synapse. For example, Nitric Oxide is a neuromodulator. It is a gas, which is synthesized on demand by nitric oxide synthetase rather than stored in synaptic vesicles. Nitric Oxide (NO) diffuses into the synapse and neighboring synapses to produce its action.





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## How A Drug Affects Different Brain Functions

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Since drugs bind to “specific” receptors, they usually act on specific synapses, thus producing specific actions on neurons. For example, drugs that act on Dopamine will affect dopaminergic neurons, while sparing other neurons. The side effects are produced by the other neurons binding to the drug instead of or in addition to the intended dopamine neuron target sites.

For instance, drugs targeting at nucleus accumbens (the neural interface between motivation and action), such as reward/reinforcement, may have action at the **substantia nigra** (the motor center), thus producing a side effect in motor function.

### Let’s look at Parkinson’s Disease.

Degeneration of dopamine neurons in the **nigrostriatal system** causes Parkinson’s disease. However, one of the drug treatments, l-DOPA, is formulated to increase dopamine released by the remaining dopamine neurons in the substantia nigra. However, one of its side effects is that too much dopamine can result in psychotic symptoms, such as Grandiosity and Paranoia, the side effects and dopaminergic neuron loss is different for each patient.

And one of the side effects of typical anti-psychotics that blocks Dopamine receptors is Extrapyrimal Syndrome (EPS), which is a variety of movement disorders caused by taking anti-psychotic (neuroleptic) drugs used to control Psychosis. So, when dopamine receptors are blocked, the symptoms are similar to Parkinson’s Disease.

Psychosis is the term for when people lose contact with reality, so the drug, l-DOPA, is also prescribed for some of the worst psychoses, like Schizophrenia.

Another side effect of anti-Parkinson’s drugs is that in addition to these drugs increasing dopamine levels in the brain and in the nigrostriatal system, they also adversely affect the mesolimbocortical system, thus producing psychotic symptoms, such as schizophrenic symptoms.

Additionally, blocking the dopaminergic neurons in the prefrontal cortex would block the executive functions, causing **Attention Deficit Hyperactivity (ADHD)** disorder. Also, hyperfunction of the dopaminergic system in the prefrontal cortex can lead to schizophrenia; demonstrated by over-stimulation by dopamine drugs like cocaine or amphetamine, which leads to drug-induced psychosis.

Fortunately, Clinical Nutrition Therapy provides therapeutic-grade nutritional formulations that provide the nutrients the body (mind/body) requires to produce the hormones it requires for healthy mind and body function.



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## Types, Purpose & A Few Symptoms

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For brevity's sake, I have listed only a few symptoms and health conditions related to high and low levels of the NeuroHormone levels indicated on your Lab Report.

### Serotonin

Serotonin is a neurotransmitter, a chemical that carries messages between nerve cells in the brain and throughout your body. Serotonin plays a key role in such body functions as mood, sleep, digestion, nausea, wound healing, bone health, blood clotting and sexual desire.

**HIGH:** Symptoms range from mild (shivering, heavy sweating, confusion, restlessness, high blood pressure, muscle twitches and diarrhea) to severe (anxiety, muscle rigidity, fever, fainting, abnormal heartbeat and seizures).

High Serotonin has been linked to fatigue because of its well-known effects on sleep, lethargy, drowsiness and loss of motivation. Severe Serotonin Syndrome can cause death if not treated.

**LOW:** Symptoms and health conditions include: sleep problems, digestive problems, memory and learning issues, chronic pain, problems with the body's internal clock, appetite issues, craving of sweets, depression and other mood problems, schizophrenia, anxiety, suicidal behavior, obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD) and panic disorders.



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## Dopamine

Dopamine is a neurotransmitter, **a chemical released in the brain that makes you feel good**. Having the right amount of dopamine is important both for your body and your brain. Dopamine helps nerve cells to send messages to each other.

Getting enough sleep, exercising, listening to music, reading the Bible and meditating (contemplating) its words, calm states of mind, and outdoor activities, especially in the sun, can all boost your dopamine level.

**HIGH:** Having too much dopamine, or too much dopamine concentrated in some parts of the brain and not enough in other parts, is linked to being more competitive, aggressive and having poor impulse control; i.e., which can also lead to making unwise decisions and Health Conditions, such as ADHD, binge eating, addiction and gambling.

Effects of overly high dopamine levels include high libido, anxiety, difficulty sleeping, increased energy, mania, and stress. On the other hand, when Dopamine levels rise, you subconsciously want more of the good feeling it gives you, so you are driven to concentrate on whatever you are doing to keep getting it, so in this sense, it can improve the ability to focus and learn, among others.

Too much dopamine is often a result of poor lifestyle choices, too much stress, too little sleep, poor diet, partaking of addictive substances, and/or engaging in risky behaviors. Lack of sleep is another highly detrimental lifestyle habit that can contribute to a rise in dopamine.

Obviously, it is a balance in Dopamine levels that are required for optimal brain function and behavior.

**LOW:** Symptoms and health conditions include Restless Legs Syndrome, hand tremors or other tremors at rest, loss of balance or coordination, increased muscle/limb stiffness, muscle cramps (symptoms of Parkinson's disease). Having low levels of dopamine can make you less motivated and excited about things. It's linked to some mental illnesses including depression, schizophrenia and psychosis.



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### Norepinephrine

Norepinephrine (NE), also called noradrenaline, is both a neurotransmitter and a hormone. As a neurotransmitter, it is a chemical messenger that helps transmit nerve signals across nerve endings to another nerve cell, muscle cell or gland cell.

Together with adrenaline, norepinephrine increases heart rate and blood pumping from the heart. It also increases blood pressure and helps break down fat and increase blood sugar levels to provide more energy to the body.

Norepinephrine has been shown to play a role in a person's mood and ability to concentrate. Low levels of norepinephrine may lead to health conditions such as attention deficit hyperactivity disorder (ADHD), depression, and hypotension (very low blood pressure).

Health conditions associated with having elevated NE levels include anxiety disorders. Norepinephrine activates the amygdala, the part of the brain implicated in producing fear-related behavior. The amygdala can also enhance long-term storage of stressful memories in the hippocampus and striatum.

**HIGH:** Symptoms and health conditions include High blood pressure (hypertension), anxiety, excessive sweating, blood in the urine, fluid buildup in the lungs, cold or pale skin, severe headaches, blindness, nervous feeling, jitters, rapid or irregular heartbeats, inflamed heart tissues or heart attack and Pheochromocytoma, an adrenal gland tumor.

**LOW:** Symptoms and health conditions include anxiety, depression, lack of concentration, Attention Deficit Hyperactivity Disorder (ADHD), headaches, memory problems, lethargy, fatigue, sleeping problems, low blood pressure (hypotension) and low blood sugar (hypoglycemia).



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### Epinephrine

Epinephrine, also known as adrenaline, is both a neurotransmitter and a hormone. It plays an important role in your body's “fight-or-flight” response.

It is also used as a medication to treat many life-threatening health conditions. For example, Epinephrine injection is used for emergency treatment of severe allergic reactions (including anaphylaxis) to insect bites or stings, medicines, foods, or other substances. It is also used to treat anaphylaxis caused by unknown substances or triggered by exercise.

The main causes of low epinephrine levels are problems with the adrenal and pituitary glands or genetic disorders, all of which are fairly rare. These diseases often cause deficiencies in other hormones, such as norepinephrine and cortisol, as well, and people do experience the symptoms of nutritional imbalances, toxicity and organ/gland dysfunctions that precede the disease stage of these disorders.

**HIGH:** Symptoms and health conditions include High blood pressure (hypertension), rapid or irregular heartbeat, excessive sweating, cold or pale skin, severe headaches, nervous feeling, and jitters. An Epinephrine overdose can lead to high blood pressure, stroke and death.

**What causes an ongoing overproduction of epinephrine?** Adrenaline is a hormone released from the adrenal gland as a normal response to stress (fight or flight), infections, medications (especially antidepressants), caffeine and other stimulants.

A lifestyle that includes an ongoing frequency of stress (mental, emotional and physical) as well as frequently consuming stimulants for months and months, then years and years, will maintain a state of overproduction of epinephrine. Prolonged overproduction of epinephrine leads to heart attacks.

The adrenal glands can also produce excess adrenaline due to a type of adrenal tumor called Pheochromocytoma.

I highly recommend you read, *“Coffee – Regular or Decaffeinated! Improving Health After Years of Drinking Coffee!”* in the **Articles by Dr. Smith / Library of Articles** webpage on our Client website.

**LOW:** Symptoms and health conditions include anxiety, depression, headaches, sleeping problems, low blood sugar (hypoglycemia), changes in blood pressure, and heart rate.



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### Glutamate

Glutamate is the most abundant excitatory neurotransmitter in your brain and central nervous system. It's needed to keep your brain functioning properly. Glutamate plays a major role in shaping learning and memory. Glutamate needs to be present at the right concentrations in the right places at the right time. Glutamate release is higher during wakefulness and is reduced during sleep in several brain regions.

Avoid Caffeine as it increases the amount of dopamine in our brain by blocking its reabsorption into our bodies. It doesn't increase the amount of dopamine our bodies make and it slows the rate at which dopamine leaves our brains and returns to our bodies.

**HIGH:** Symptoms indicative of a high level of glutamate include anxiety, depression, restlessness, inability to concentrate (ADD / ADHD), headaches, insomnia, fatigue, and increased sensitivity to pain (Hyperalgesia).

**LOW:** Glutamate deficiency in the brain may cause such symptoms as insomnia, lack of concentration, mental exhaustion, and low energy.

### Gamma-Aminobutyrate (GABA)

Gamma-aminobutyric acid (GABA) is a neurotransmitter, a chemical messenger in your brain that slows down your brain by blocking specific signals in your central nervous system (your brain and spinal cord). GABA is known for producing a calming effect. GABA also helps to prevent seizures.

GABA then helps diminish the signals to feel anxious and help you feel more at ease in social situations. GABA regulates your nervous system, which regulates your mood and helps you avoid extreme emotions, like fear or anxiety.

**HIGH:** Too much GABA means not enough brain activity and can lead to hypersomnia or daytime sleepiness, when levels are severe. Other symptoms and health conditions include anxiety, stress and fear.

**LOW:** Symptoms and health conditions include mood issues (anxiety and depression), irritability, restlessness, poor sleep, seizures, and epilepsy.

Stress and other factors can affect the development of the nervous system and GABA activity. This can lead to too little GABA, which may play a role in disorders related to brain function and mood, including schizophrenia, autism, depression, and anxiety.



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### Glycine

Glycine is an Amino Acid, not a Neurotransmitter. However, Glycine plays an important role in central nervous system neurotransmission which means brain signaling, so optimal glycine levels may actually lead to lower levels of negative mental states, improve cognition, positive mood, and possibly be useful for memory loss, when its cause is Glycine-related.

In the central nervous system, Glycine functions as an inhibitory (calming) neurotransmitter. Glycine slows down the firing of neurons reducing anxiety and protecting the brain from overstimulation.

The body can make Glycine on its own, but it is also consumed in the diet, such as when eating meat and fish.

Glycine also helps a gut hormone increase the ability of insulin to remove Glucose from the bloodstream. (A process that is compromised in people with type 2 diabetes). Glycine encourages normal insulin response in healthy people and may help prevent or manage diabetes.

Research shows oral Glycine elevates Serotonin, reduces symptoms of insomnia, and improves sleep quality. Other studies suggest it may help you bounce back to healthy sleep cycles after a period of disrupted sleep.

Without enough Glycine, your body produces less Glutathione, which could negatively affect how your body handles oxidative stress over time. In addition, because Glutathione levels naturally decline with age, monitoring Glycine levels through this NeuroHormone test is important as you get older.

**HIGH:** Damage caused by elevated levels of Glycine in the brain and cerebrospinal fluid is responsible for the characteristic seizures, breathing difficulties, movement disorders, and intellectual disability.

**LOW:** Glycine levels are low in diabetes, hypothyroidism, obesity, and after intense exercise. Clinically, low Glycine levels are suspected in depression and possible generalized tissue loss, since Glycine is part of the nitrogen pool and important in gluconeogenesis.





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### Histamine

Histamine is a monoamine neurotransmitter that is synthesized from Histidine via l-histidine decarboxylase (HDC). There is a high density of Histamine receptors on medium spiny neurons within the striatum, specifically H2 and H3 receptors.

Histamine is located in some of the body's cells and is released from cells in response to an antibody called immunoglobulin E (IgE). This antibody may be secreted in response to an invading pathogen such as a virus, bacteria, or an allergenic substance such as pollen. Histamine can also be released in response to injury caused by toxins. Therefore, Histamine is a compound released by cells in response to injury and in allergic and inflammatory reactions, causing contraction of smooth muscle and dilation of capillaries.

Histamine causes many of the symptoms of allergies, such as a runny nose or sneezing. However, when a person is allergic to a particular substance, such as food or dust, the immune system mistakenly believes it is harmful to the body, though it is not.

Histamine works with nerves to produce itching. In food allergies it can cause vomiting and diarrhea, and it constricts muscles in the lungs, making it harder to breathe. The worst is when histamine causes anaphylaxis, a severe reaction that is potentially fatal.

**Vitamin C** is a natural antihistamine, when it comes from whole foods or whole food supplements, i.e., not synthetic or isolated Vitamin C, which means it can lower histamine levels and alleviate or lessen allergic reactions and symptoms. So, for prevention, consume plenty of Vitamin C-rich foods, like tropical fruits, citrus fruits, broccoli and cauliflower, and berries.

Other Histamine-rich foods are dried fruits, avocados, eggplant, spinach, shellfish, strawberries, bananas, pineapple, pears, eggplant, avocado, tomatoes, olives, dried meats, fish and fermented foods, like sauerkraut.

**Coffee** is high in Histamine, which triggers what looks like an allergic reaction. However, it doesn't occur through the typical allergy mechanism. Instead, the Histamine from the coffee causes an inflammatory reaction that can be quite severe in some people. Again, I recommend reading my article on Coffee so you can understand the real cause for the "so-called benefits" people think comes from drinking Coffee.

Histamine levels drop when consuming a diet of white flour, white sugar, and other highly processed carbohydrates, which can cause thiamin deficiency (B1). At first, seemingly unrelated symptoms, such as fatigue and irritability, may occur, but in due to severe B1 deficiency, called Beriberi, can affect the nerves, muscles, heart, and brain.





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Though symptoms of Histamine intolerance vary widely, you can recognize Histamine symptoms when you feel flushing, difficulty regulating body temperature, hives, rashes, eczema, swelling, itchy skin, racing heart, palpitations, arrhythmia, and sudden, excessive sweating.

**HIGH:** Symptoms and health conditions include bloating, rashes, hives, or eczema, headaches or migraines, diarrhea, unexplained itching, low blood pressure, itchy eyes, runny nose, congestion, premenstrual cramping or headaches.

**LOW:** Symptoms and health conditions include headaches or migraines, nasal congestion or sinus issues, fatigue, hives.

Regarding the connection between Histamine and mental disorders, symptoms like hyperactivity, obsessive-compulsive behavior, panic, anxiety, and depression are often observed among those who suffer from histamine imbalance.



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### Phenethylamine (PEA)

Phenethylamine, as a neurotransmitter, is an organic compound, natural monoamine alkaloid, and trace amine, which acts as a central nervous system stimulant in humans, and whose molecular mechanism of action differs from biogenic amines, such as Serotonin or Dopamine.

However, PEA has stimulant effects which lead to the release of so-called biogenic amines, including dopamine and serotonin. For examples, PEA increases the actions of dopamine (wellbeing, pleasure, reward circuitry), norepinephrine (wakefulness, sustained concentration and attention), acetylcholine (memory and clarity of thought), and serotonin (mood, sleep, appetite and impulse control).

Most Phenethylamines act as either central nervous system stimulants or as hallucinogens. Stimulants mediate the actions of dopamine, norepinephrine and/or serotonin, mimicking the effects of traditional drugs such as cocaine, amphetamine, methamphetamine, and ecstasy.

The stimulating effects of PEA improve mood, increase attention and energy, and promote a feeling of well-being. PEA is made from the amino acid l-phenylalanine, which is naturally found in food. Serotonin, dopamine, and norepinephrine are other brain chemicals that relate to mood.

Foods that naturally contain PEA are eggs, Natto (a Japanese food made with fermented soybeans) cocoa beans (healthy food) and chocolate (which is the refining or processing of cocoa beans with added refined white sugar). Though today some companies manufacture organic chocolate using cocoa beans and healthy sweeteners, like stevia, maple syrup, whole cane sugar, etc.

Note: refined white sugar is the result of processing “whole cane” sugar. Whole cane sugar is considered a healthy food because it is a whole plant, i.e., as nature made it; however, it is the least preferred of natural sweeteners.

The reason Dark Chocolate is known to stimulate feelings of love, is because it releases Phenylethylamine and Serotonin. The chemical Phenylethylamine is a chemical much like amphetamine that is released in the brain when individuals feel love.

**HIGH:** Symptoms and health conditions include a rapid heart rate, heart palpitations, anxiety/nervousness, shaking, shivering, agitation, muscle stiffness and confusion. High levels of PEA in the body can also cause too much Serotonin to accumulate in the brain, which has a number of negative effects.

**LOW:** Symptoms and health conditions include severe headache, heart problems, shivering, confusion, depression, and anxiety and is associated with ADHD.



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### Creatinine

Creatinine is a breakdown product of Creatine Phosphate from muscle and protein metabolism. It is released at a constant rate by the body. It helps your muscles produce energy during heavy lifting and high intensity exercise.

Therefore, Creatinine is a waste byproduct of the chemical compound called Creatine and as a waste product, Creatinine is filtered out of the blood by the kidneys and removed from the body in urine.

Creatine has been recently suggested as a potential neuromodulator of true neurotransmitters. Creatine may also aid brain function by increasing dopamine levels and mitochondrial function.

In relation to the brain, Creatine has been shown to have antioxidant properties, reduce mental fatigue, protect the brain from neurotoxicity, and improve facets/components of neurological disorders like depression and bipolar disorder.

Creatine supplementation for seven days, in a clinical trial, was able to increase plasma dopamine and decrease cortisol levels associated with an improvement in the mood of subjects with sleep deprivation.

Creatine treatment resulted in significantly increased densities of GABA-immunoreactive (-ir) neurons, although total neuronal cell number and general viability were not affected.

Creatine exists in a steady state with Creatinine. Creatinine can also be measured in lab tests as a marker of kidney function. Creatinine is passed out of your body in the urine. Your body must release stored Creatine each day to keep normal levels, however, the amount depending on your muscle mass.

As a waste product that comes from the normal wear and tear on muscles of the body, everyone has Creatinine in their bloodstream. Healthy kidneys filter Creatinine out of your blood through your urine. Therefore, both, Creatinine urine or serum (blood) testing, measures how well your kidneys are working.

Note: A Creatinine blood level of greater than 1.2 for women and greater than 1.4 for men may be an early sign that the kidneys are not working properly. As kidney disease progresses, the level of Creatinine in the blood rises.

Dehydration causes serum Creatinine to rise and the estimated glomerular filtration rate (eGFR) will fall, accordingly. The degree of change is generally proportional to the degree of dehydration. Severe dehydration can actually cause acute kidney injury and may lead to a need for dialysis therapy.

Drinking more water could lower the serum Creatinine level, but does not change kidney function. Forcing excessive water intake is not a good idea.



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Your body requires one-half your body weight in ounces of reverse-osmosis purified water. For example, a person who weighs 120 pounds requires 60 ounces of R. O. purified water daily.

The above Formula for daily water intake is one of five components to attain and maintain sufficient Hydration; the other four will be introduced at one of your upcoming Progress Reporting consultations. Hydration is essential for all organ, gland and body system functions, not just the kidneys.

Lastly, poor liver function or liver disease interferes with Creatine production, which can cause low Creatinine. Low Creatinine levels mean something is affecting Creatine production in the body. This will often result from a person having low muscle mass or body weight.

However, low Creatinine levels may also indicate a person has chronic kidney disease, reduced kidney function, malnutrition, or significant fluid overload, and is also seen in increased renal clearance in pregnancy.

**HIGH:** Symptoms and health conditions include swelling, fluid retention (particularly in your lower body), passing low amounts of urine, feeling weak or fatigued, confusion, nausea, shortness of breath, muscle cramps, vomiting, changes in urination frequency and appearance, irregular heart rate, high blood pressure, and chest pain.

**LOW:** Symptoms and health conditions include jaundice, abdominal pain, swelling, and pale, bloody, or tar-colored stools, kidney dysfunction or disease, and malnutrition.



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## About Dr. Smith

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**Dr. Donna Smith** has a Ph.D. in Clinical Nutrition, is a Doctor of Naturopathy (N.D.), a Board Certified Clinical Nutritionist (C.C.N.), Certified Dietitian-Nutritionist (C.D.N.), and a Canadian Chartered Herbalist (C.H.).

Dr. Smith is also a Free Lance Nutritional Health Writer and has written over 100 articles for Internet and traditional magazines and newspapers, such as **The Villager**, a South Denver, Colorado, publication and the **American Chiropractic Magazine, the largest chiropractic magazine in the United States**. You may also request a list of her best-selling e-books on a variety of topics.

Public speaking engagements include NBC and ABC local networks, and clubs, hospitals, universities, corporations and scientific conferences, on a variety of nutrition and health-related topics, such as, the national groups of scientists and biochemists at the **American Society of Clinical Laboratory Science (ASCLS), International and American Associations of Clinical Nutritionists (IAACN), Stephen F. Austin University, Midwestern State University**, Optimist Clubs, Toastmasters, Business and Professional Women's Club, Women Entrepreneurs, Worksite Wellness, American Heart Association, Parkinson's Group, and St Gobain Corporation, to name a few.

Dr. Smith owns **Advanced Clinical Nutrition (est. 1981)** in Wichita Falls, Texas, where she provides a **Clinical Nutrition Analysis or Interpretation of Laboratory Tests (blood, urine, saliva, stool, and hair)** to identify Clinical and Sub-Clinical Nutritional Deficiencies and Excesses, Toxicity, Biochemical Imbalances, and Organ, Gland and Body System Dysfunctions, which are the stages the body progresses through first in the development of degenerative diseases. Correcting each of these preliminary stages is the key to reversing the disease process, restoring health, and preventing future disease.

From her Clinical Nutrition Analysis findings of these scientific Laboratory Reports, Dr. Smith designs and dispenses therapeutic, whole food supplements, available through nutritional health care providers, and provides a Therapeutic Dietary Plan, which is a list of foods selected for their specific food chemistry effect on the individual's biochemistry as identified in their test results.

Dr. Smith's Clinical Nutrition Services are also provided to **Healthcare and Fitness Providers**, who want to offer clinical nutrition services to their patients/clients, yet do not have the time or training to do so.

**Clinical Nutrition Testing, Therapy, and Personalized Dietary and Lifestyle Education Services** are provided by mail, e-mail, and telephone consultations. A.C.N. clients save money as there are no gas expenses to/from appointments, money required for babysitters, time away from home and/or



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Dr. Donna F. Smith

having to be away from the workplace to receive nutritional services. Lab Kits are mailed to the clients' homes, where they collect their specimen samples and then mail them directly to our Labs.

Dr. Smith has successfully assisted every client who has contacted her in how to improve their health, no matter what their health challenge, such as; but not limited to, increasing energy, balancing hormones, improving mental and emotional function, strengthening the nervous system, muscles, joints, and immune system, restoring over-all organ/gland and body system function (including the hair system to restore its grow hair and in some cases even restoring natural color), managing weight, preventing/reversing disease processes and enhancing life and/or sports performance.

Dr. Smith's clientele resides in 37 U.S. States and seven international countries.

**For more information, to order** a Clinical Nutrition Analysis of the Laboratory Reports from testing your biochemistry (blood, urine, hair, saliva and stool), including genetic testing, Bone Resorption and Telomere Length Testing, and to contact Dr. Smith, call (940) 761-4045.

Meanwhile, please browse her website at [www.AdvancedClinicalNutrition.com](http://www.AdvancedClinicalNutrition.com) and while there subscribe to Dr. Smith's FREE Newsletter and read Free Articles by Dr. Smith. You may also connect and/or follow her on [www.linkedin.com/in/drdonnafsmith](http://www.linkedin.com/in/drdonnafsmith) and [www.Facebook.com/DonnaFSmithPhD](http://www.Facebook.com/DonnaFSmithPhD). Though she is more active on LinkedIn; than other social media formats.

## Disclaimer

Information is provided for nutritional education purposes only and not for the diagnosis or treatment of any medical condition, disorder or disease. Present laws indicate that the author must advise you to seek medical attention for your disease, if you have one. Choosing to do so, or not, is your constitutional right and you are ultimately the only person who is responsible for any decisions, risks or actions you take regarding the care of your mind and body.

This author's intention is to provide health care education from a nutritional biochemical and bioenergetic perspectives so you are equipped to make an informed decision regarding your health care. It is also the author's intention to help you understand the importance of Clinical Nutrition Testing and Therapy, which is foundational to identifying the nutrients the body requires to heal its cells and tissue and thereby, the organs, glands and body systems within all living beings, both human and animal. Because Public Health Education in the United States is still focused on medical (drugs/surgery), not health (non-medical) education some of the information in this document may be new to you. ***The health of your cells determines the health of your body.***