BALANCED MIND

Background Information

HEALTHY-LONGER

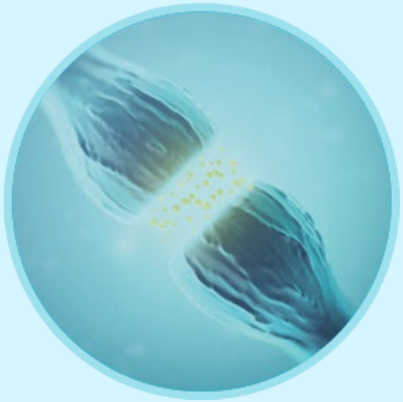
Dear Customer,

BALANCED MIND offers most modern insights into the key functionality of your brain and your potential imbalances of neurotransmitters causing symptoms such as depression / low mood, anxiety, low energy, sleep difficulties, poor memory, inability to think clearly, burn out, susceptibility to addictions etc. This document provides you with the background information about our service and its scientific basis. Our neurotransmitter balance depends on a complex system and interplay of substances such as minerals, amino acids, and enzymes most of which we get from our food. This system has evolved over millions of years and has been designed for the natural food that was available. The nutrient density of our industrially produced food is often not sufficient for our brains to function well. No wonder that mental health has become the most important illness of Western societies. BALANCED MIND helps you to address your individual imbalances with recommended personalized nutrients from unprocessed foods.

Enjoy reading this document.

Yours sincerely,

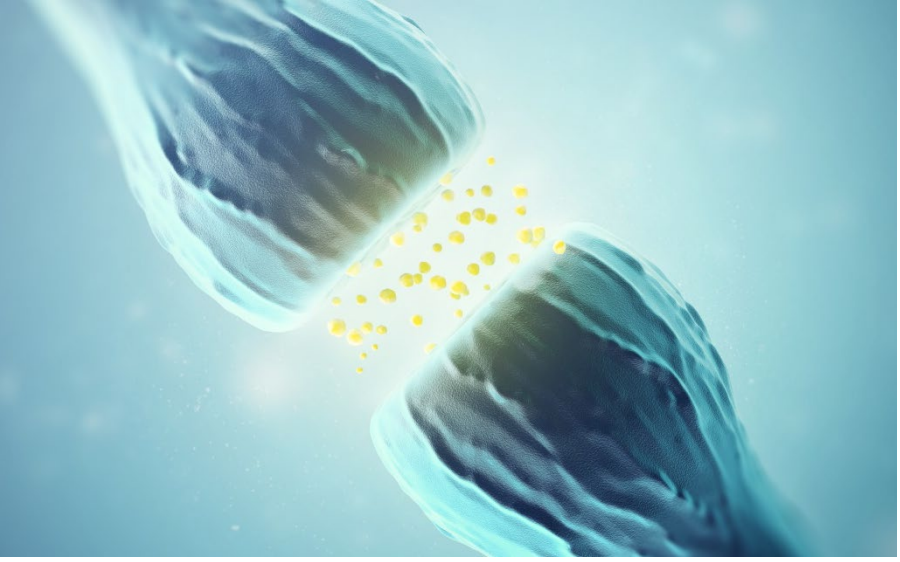
HEALTHY-**LONGER**



DISCLOSURE

BALANCED MIND is not intended to diagnose, treat, cure, or prevent any disease. The results and comments are for informational purposes only and are not to be construed as medical advice. Please consult your healthcare practitioner for a diagnosis and for potential treatment.

Table of Content



What are Neurotransmitters?

Neurotransmitters, **natural substances** in our body, are often referred to as **chemical messengers**. They tell our hearts to beat, lungs to breath, stomach to digest. They regulate mood, sleep, hunger, focus and concentration. They are the molecules used by the nervous system to transmit messages between neurons, or from neurons to muscles.

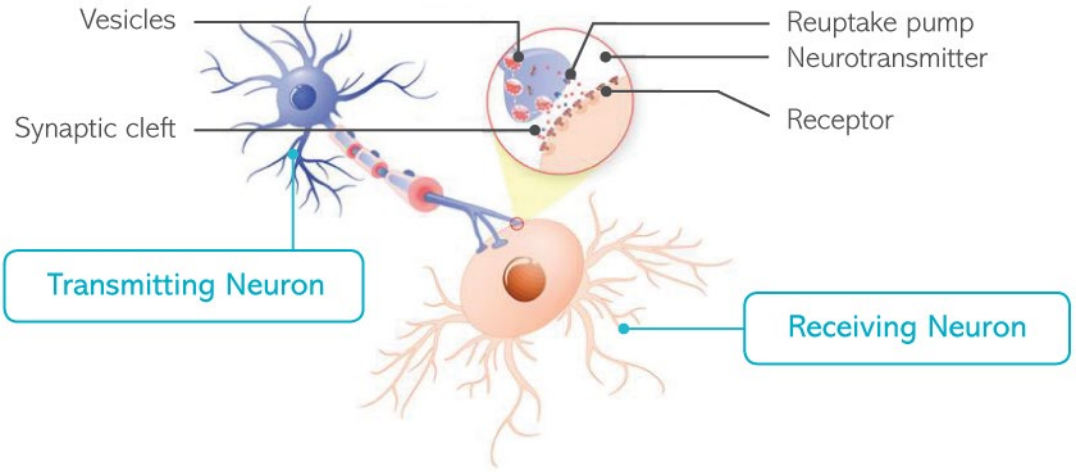
Neurons (nerve cells) and the supporting glial cells are the two fundamental units of the brain and nervous system. Neurons are responsible for receiving sensory input from the external world, for sending motor commands to our muscles, and for transforming and relaying the electrical signals at every step in between. More than that, their interactions define **who we are as people.**

Communication between two neurons happens in the synaptic cleft (the small gap between the synapses of neurons, where a synapse is a junction between two neurons). **Optimal neurotransmitter balance is required to maintain proper health and well- being.** Imbalances can cause the brain and the body to be over- or under stimulated, producing neurological or psychological symptoms.

The brain needs neurotransmitters to regulate many necessary **functions** (heart rate, breathing, muscle movements, sleep cycles, appetite, digestion, etc.), to optimize our **abilities** (attention and concentration, learning and memory, etc.) and to generate and communicate **emotions, thoughts, and feelings** (social behavior, mood and happiness, sexual desire, etc.).

After neurotransmitters deliver their messages, the body breaks them down or recycles them. A result of a breaking down process of their “parent” neurotransmitter is a **metabolite.**

TYPES OF NEUROTRANSMITTERS



A neurotransmitter influences a neuron in one of three ways: excitatory, inhibitory, or/and modulatory. An excitatory transmitter promotes the generation of the communication in form of an electrical signal, while an inhibitory transmitter prevents it.

Neuromodulators are a bit different, as they are not restricted to the synaptic cleft between two neurons, and so can affect large numbers of neurons at once. Neuromodulators therefore regulate populations of neurons, while also operating over a slower time course than excitatory and inhibitory transmitters. Some neurotransmitters function as well as neuromodulators (e.g., dopamine, histamine, norepinephrine, serotonin).

Inhibitory neurotransmitters and their metabolites which decrease the chances of the target cell taking action:

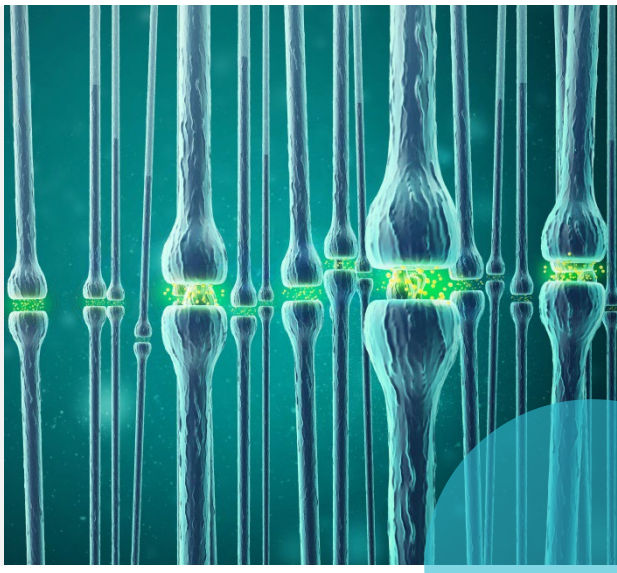
- Serotonin
- 5-HIAA (5-hydroxyindoleacetic acid, metabolite of serotonin)
- GABA (Gamma-aminobutyric acid)
- Glycine

Excitatory neurotransmitters and its metabolites which encourage a target cell to act:

- Glutamate
- Hystamine
- PEA (beta-phenylethylamine)
- Dopamine, DOPAC (3,4-dihydroxyphenylacetic acid, metabolite of dopamine) and HVA (Homovanillic acid, metabolite of dopamine)
- Norepinephrine (noradrenaline) and Normetanephrine (metabolite of norepinephrine)
- Epinephrine (adrenaline) and VMA (Vanillylmandelic acid, metabolite of norepinephrine and epinephrine i.e., adrenaline)

MEASUREMENTS OF NEUROTRANSMITTERS - STRENGTHS AND LIMITATIONS

Given the physiological importance of neurotransmitters as signaling molecules in the nervous system, the measurement of neurotransmitters has significant potential to help therapeutic effectiveness and to enable clinicians to make more informed decisions. The method chosen by HEALTHY-LONGER to measure urinary levels of neurotransmitters is stable, sensitive, and non-invasive, and consists of 4 different measures during a period of 24 hours to achieve a desired accuracy.



Limitations and strengths of the analysis

The analysis is informative and not diagnostic, requiring interpretation of results in the context of individual history.

The neurotransmitter levels are representative of both peripheral and central activity, meaning the analysis reflects the total levels of neurotransmitters throughout the body rather than only the brain. The urinary neurotransmitter levels are strongly associated with mental health issues. Analyzing the parent neurotransmitters together with downstream metabolites reflects also their absorption and metabolism. Given the importance of these levels to correctly interpret neurotransmitter results and subsequent treatment plans, we offer a range of 21 neurotransmitters together with metabolites in our testing.

Please observe that risk mitigation plans focus on main neurotransmitters and not on their breakdown products (metabolites).

DO THESE SYMPTOMS SOUND FAMILIAR?

Like hormones, neurotransmitters require a delicate balance to keep the body functioning at a peak level. Genetics, environment, chemicals, and nutritional deficiencies are a few factors that can result in over- or under-production of neurotransmitters. Once out of balance, the nervous system begins to compensate - which, in time, can lead to neurological or psychological symptoms. If you regularly suffer from any of these symptoms below, you might have a neurotransmitter imbalance and benefit from the information on possible risk mitigations.

Psychological symptoms

- Continuous low mood or sadness
- Feeling hopeless, helpless, anxious, or burned out
- Having low self-esteem
- Feeling tearful or guilt ridden
- Feeling irritable and intolerant of others
- Being not motivated/interested in things
- Finding it difficult to make decisions
- Forgetfulness
- Not getting any enjoyment out of life

Physical symptoms

- Moving or speaking more slowly than usual
- Changes in appetite or weight
- Unexplained aches and pains
- Lack of energy
- Low sex drive (loss of libido)
- Disturbed sleep - for example, finding it difficult to fall asleep at night or waking up very early in the morning

Social symptoms

- Avoiding families and social situations
- Working without a break
- Having difficulty keeping up with work and family responsibilities
- Displaying abusive, addictive or controlling behaviors

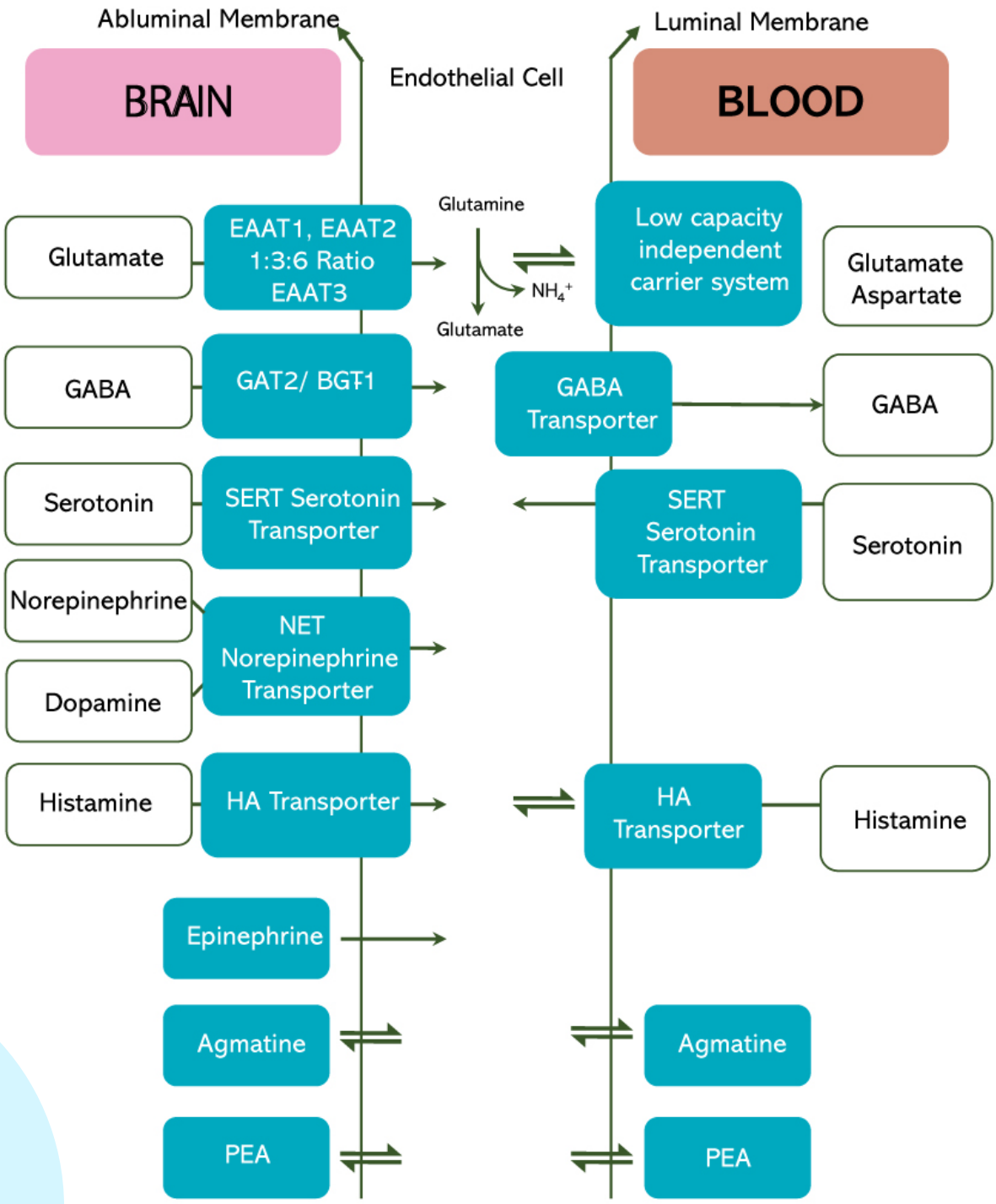
What can I do to bring my brain into balance?

There are many ways to balance your brain. Scientific studies reveal many different therapies that have been shown to have a significant impact on the levels of neurotransmitters in our bodies. One of the most important ways to balance your neurotransmitter levels is through your diet. Let's look at how this works.

How can food influence your neurotransmitter levels through the Blood-Brain Barrier?

Nutrients from the food and precursors (compounds which participate in a chemical reaction that produces another compound) to neurotransmitters can enter the central nervous system inclusive brain despite the Blood-Brain Barrier. Most of the central nervous system's (CNS) key neurotransmitters are produced from nutrients (amino acids) obtained from the diet. The blood-brain barrier has facilitative "transporters" that shuttle compounds into the central nervous system to produce neurotransmitters. In that respect, food can be seen a natural source of neurotransmitters.

Studies have demonstrated intact neurotransmitter transport out of the central nervous system, into the periphery, via blood-brain barrier transporters. Researchers have provided examples of urinary neurotransmitter measurements that correlate with Central Nervous System tissue concentrations (e.g., Koslow et al., 1983; Roy et al., 1986 a,b; Hence, Lechin et al., 1996; Dantonello et al. 1998; Grossman and Potter, 1999; Hughes et al., 2004). Please find further studies on www.healthy-longer.com/news&research.


Abluminal Membrane
Luminal Membrane
BRAIN
Endothelial Cell
BLOOD
Glutamine
Glutamate
NH_4^+
Glutamate
EAAT1, EAAT2
1:3:6 Ratio
EAAT3
Low capacity
independent
carrier system
Glutamate
Aspartate
GAT2/ BGT1
GABA Transporter
GABA
SERT Serotonin
Transporter
SERT
Serotonin
Transporter
Serotonin
NET
Norepinephrine
Transporter
HA Transporter
HA
Transporter
Histamine
Epinephrine
Agmatine
Agmatine
PEA
PEA

APPENDIX

MAIN ROLE AND FUNCTION OF EACH NEUROTRANSMITTER (SIMPLIFIED)

Serotonin - mood, happiness & sleep

What is it?	Generally regarded as the “happiness molecule”, it is an important chemical and an inhibitory neurotransmitter in the human body.
Its function?	Impacts every part of the body, ranging from emotions, sleeping, eating, digesting to motor skills.
Where is it made?	Mainly secreted by enterochromaffin cells in the gastrointestinal system which produce around 95% of all serotonins in the body (streptococcus and enterococcus), and, to a lesser extent, by neurons within the central nervous system (CNS). Serotonin secretion causes a cascade of effects as it is picked up by a variety of cells that store the hormone for later use.
What is it made from?	The essential amino acid tryptophan, which cannot be produced by the body and needs to be obtained from food.
Disposed by the body?	Yes, serotonin is metabolized mainly to 5-HIAA (mainly by the liver), the indole acetic-acid derivative, which is then excreted by the kidneys.

5-HIAA (5-Hydroxyindoleacetic acid) - metabolite

What is it?	A metabolite of serotonin.
Its function?	5-hydroxy indoleacetic acid is useful in characterizing a variety of diseases and disorders.
Where is it made?	In the liver, then it joins a general circulation.
What is it made from?	Made of serotonin.
Disposed by the body?	Yes, as the major metabolite of serotonin 5-HIAA is excreted in the urine.

MAIN ROLE AND FUNCTION OF EACH NEUROTRANSMITTER (SIMPLIFIED)

GABA (Gamma-Aminobutyric Acid) - “off-switch” and sleep

What is it?	Functions as the “off” switch in the brain as the major inhibitory neurotransmitter in the brain.
Its function?	Improves mood, relieves anxiety, and promotes sleep.
Where is it made?	Produced in nervous system, pancreas, and by Lactobacillus and Bifidobacterium species in human gut.
What is it made from?	Primarily synthesized from glutamate via the enzyme glutamate decarboxylase (GAD) with pyridoxal phosphate (the active form of vitamin B6) as a cofactor in the body but is also present in some foods.
Disposed by the body?	Yes, GABA is excreted in the urine.

Glycine - sleep and repair

What is it?	An inhibitory neurotransmitter and nonessential amino acid
Its function?	Serves as a building block to proteins, improves sleep quality, calms aggression, and serves as an anti-inflammatory agent. It exerts widespread influence over our bodies’ systems, structure, and general health, including cardiovascular, cognitive, and metabolic health. Glycine helps the body make serotonin with a significant effect on sleep and mood. It also influences key receptors in the brain that affect learning and memory. Glycine is one of three amino acids that your body uses to make glutathione, a powerful antioxidant that helps protect your cells against oxidative damage caused by free radicals/ageing). Improves mood, relieves anxiety, and promotes sleep.
Where is it made?	Produced via inter-organ metabolism involving primarily the liver and kidneys.
What is it made from?	The body can make glycine from amino acids serine, as well as threonine, choline, and hydroxyproline, but it is also consumed in the diet.
Disposed by the body?	Yes, glycine is excreted in the urine.

MAIN ROLE AND FUNCTION OF EACH NEUROTRANSMITTER (SIMPLIFIED)

Glutamate - sleep, memory, learning

What is it?	A major excitatory neurotransmitter and nonessential amino acid CH2CH2COO.
Its function?	Improves mood, relieves anxiety, and promotes sleep, learning and memory.
Where is it made?	Is synthesized in the central nervous system.
What is it made from?	Made from glutamine, conditional amino acid (in opposite to glutamic acid, CH2CH2COOH, non-essential amino acid) serves as metabolic precursor for the neurotransmitter GABA. Glutamine is produced mainly by muscle tissue and requires protein in nutrition.
Disposed by the body?	Yes, glutamate is excreted in the urine.

Histamine – wakefulness, immune response

What is it?	An excitatory neurotransmitter and immunomodulator.
Its function?	As a signaling molecule, histamine sends messages between cells (e.g., it tells stomach cells to make stomach acid or sends signal to the brain to stay awake). As an immunoregulator, histamine increases the permeability of the capillaries to white blood cells and some proteins, and through this boosted blood flow allows them to engage and fight pathogens (e.g., allergy triggers i.e., allergens) in the infected tissues. In short, histamine increases metabolism, promotes wakefulness, regulates immune response, and suppresses appetite.
Where is it made?	In humans, histamine is found in nearly all tissues of the body, where it is stored primarily in the granules of tissue mast cells (immune defense cells present in connective tissues throughout the body). The white blood cells called basophils also harbor histamine-containing granules.
What is it made from?	Produced from histidine which the body has to intake from the diet[1].
Disposed by the body?	Yes, histamine is excreted in the urine[1].

MAIN ROLE AND FUNCTION OF EACH NEUROTRANSMITTER (SIMPLIFIED)

PEA (Phenylethylamine) - energy, attention, immune defense, sleep

What is it?	A major excitatory neurotransmitter.
Its function?	Promotes energy, elevates mood, regulates attention, aggression, and serves as a biomarker for ADHD.
Where is it made?	Produced naturally in the body. In addition to its presence in mammals, phenethylamine is found in many other organisms and foods, such as chocolate, especially after microbial fermentation.
What is it made from?	Produced from the amino acid L-phenylalanine by the enzyme aromatic L-amino acid decarboxylase via enzymatic decarboxylation.
Disposed by the body?	Yes, PEA is excreted in the urine.

Dopamine - addiction, attention, motivation

What is it?	An excitatory neurotransmitter.
Its function?	Generally regarded as the brain's pleasure and reward center, plays the central role in addiction behaviours, improves attention, focus and motivation, and modulates movement control.
Where is it made?	Mainly synthesized in areas of the central and peripheral nervous systems and produced by chromaffin cells within the dopaminergic regions of the brain. Dopamine is also produced by escherichia and bacillus species in human gut.
What is it made from?	Produced from the amino acid's tyrosine and phenylalanine, both of which can be obtained from protein-rich foods.
Disposed by the body?	Yes, dopamine is excreted in the urine.

MAIN ROLE AND FUNCTION OF EACH NEUROTRANSMITTER (SIMPLIFIED)

Vanillylmandelic Acid (VMA), HVA (Homovanillic Acid) and DOPAC

What is it?	VMA is a metabolite of norepinephrine and epinephrine, while DOPAC and HVA are metabolites of dopamine.
Its function?	Those metabolites are important indicators of if the metabolism of neurotransmitters functions properly.
Where is it made?	Those metabolites are released from different parts of the body (brain, liver etc.).
What is it made from?	DOPAC arises from the degradation of dopamine via the actions of monoamine oxidase enzymes. VMA is a norepinephrine and epinephrine metabolite formed via the actions of monoamine oxidase (MAO), catechol-O-methyl transferase (COMT), and aldehyde dehydrogenase. Homovanillic acid (HVA) is a major catecholamine metabolite that is produced by a consecutive action of monoamine oxidase and catechol-O- methyltransferase on dopamine.
Disposed by the body?	Yes, those metabolites are excreted in urine.

Norepinephrine - concentration & attention, Normetanephrine (metabolite of norepinephrine), Epinephrine - fight or flight, wakefulness (sleep), immune response

What is it?	Norepinephrine (also referred to as noradrenalin) and epinephrine (adrenalin converted from norepinephrine), are excitatory and stimulate neurotransmitters in the central nervous system.
Its function?	As neurotransmitters and hormones that regulate the “fight or flight” response, elevate blood pressure and heart rate, stimulate wakefulness, and reduce digestive activity.
Where is it made?	Norepinephrine is produced in the inner part of the adrenal glands (human stress response organs), nerve cells, and by bacillus and escherichia species in human gut.
What is it made from?	Produced from metabolism of dopamine.
Disposed by the body?	Yes, through cardio exercise, and excreted in the urine.