NeuroSpot information for HCPs

Chronic stress & neuro-endocrine disorders

NEURO
SPOT

Table of contents

Acute and chronic stress
A phenomenon of modern daily life

Chronic stress can make you sick. According to information by the major German health insurance companies, the number of sick notes due to burnout syndrome has risen by 700 % between 2004 and 2011, the number of absentee days even by 1400 %.

> Where the reasons for the sick notes and absentee days are concerned, mental illnesses are in fourth place. Clinical pictures such as depressions, trouble sleeping, symptoms of anxiety, exhaustion, alcohol abuse and several others are facilitated by chronic stress, resulting in neuro-endocrine disorders.

In addition to the hormones of the hypothalamo-pituitary-adrenal (HPA) axis (in particular cortisol), the neurotransmitters serotonin, GABA and glutamate as well as the catecholamines dopamine, noradrenaline and adrenaline are an essential part of a body‘s ability to suitably react to stress.

The body‘s acute reaction to stress is initially a physiological reaction to be able to deal well with the regular stresses. Subsequently, if the body is then granted adequate time to recover, there will be no further consequences.

The following jobs in particular are subject to stress


Manger


Teacher


Single parents with several children


University students


Shift workers


Policemen/ policewomen


Secretaries

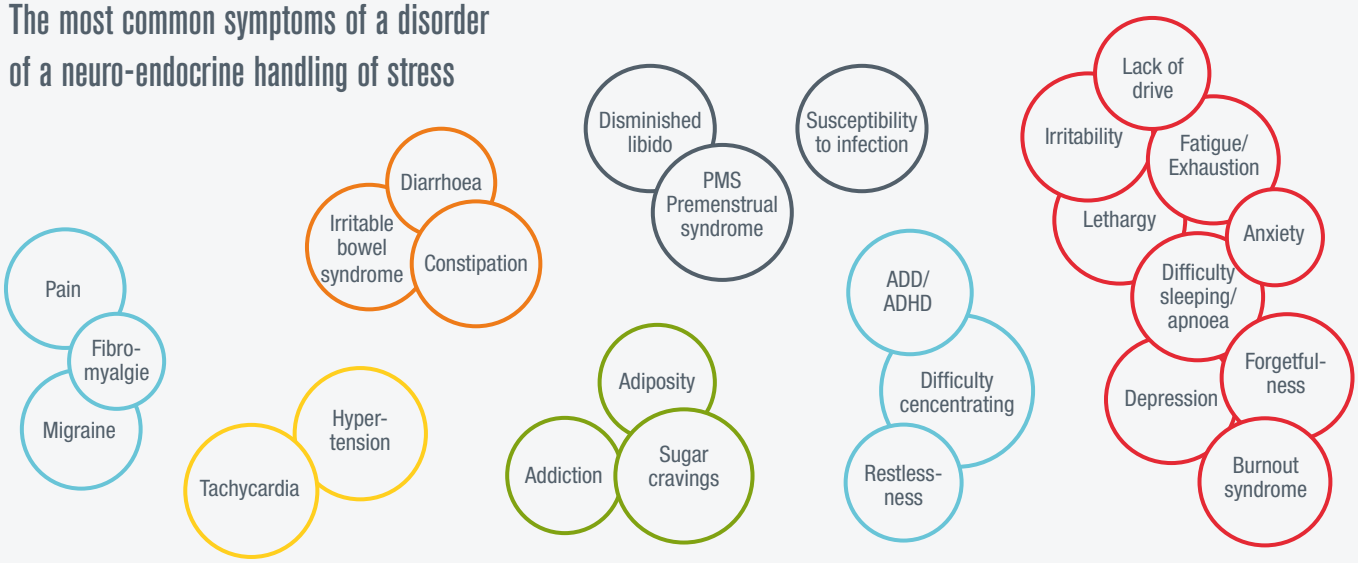

Physicians


Nusrsing stuff

However, if the recovery phases remain missing and if the stress becomes chronic, then the production of the messenger substances can shift and ultimately exhaust itself. The complicated neuro-endocrine interaction becomes off-balance – with far-reaching consequences for the health.

In 4th place of sick notes: Psychological disorders

The most common symptoms of a disorder of a neuro-endocrine handling of stress

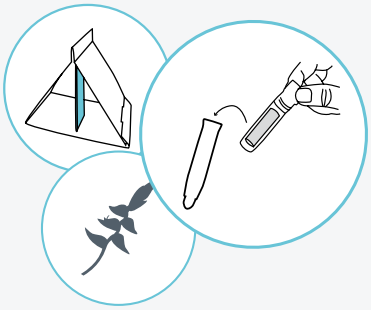


The NeuroSpot test in practice

- With the NeuroSpot it is possible to determine the body‘s actual stress level.
- It indicates disorders of the neuro-endocrine system that can occur with chronic stress.
- Detailed and patient-friendly result documents make a discussion with the patient easier and can increase compliance, due to better understanding.

Better, due to NeuroSpot technology

- **Only with NeuroSpot:**
  Patented DrySpot technology for urine samples, therefore excellent validity due to stable values
- Saliva test using Salivette®: simple handling and results of the highest quality



The profiles

NEURO SPOT BASIS

The following parameters are tested:
Serotonin
Dopamine
Noradrenaline
Adrenaline
DHEA (8:00 AM and 8:00 PM)
Cortisol level throughout the day (8:00 AM, noon and 8:00 PM)

Including GABA and glutamate

NEURO SPOT PLUS

For therapy control and in cases of symptoms of anxiety

The following parameters are tested:
Serotonin
Dopamine
Noradrenaline
Adrenaline
DHEA (8:00 AM and 8:00 PM)
Cortisol level throughout the day (8:00 AM, noon and 8:00 PM)
GABA
Glutamate

What is stress?

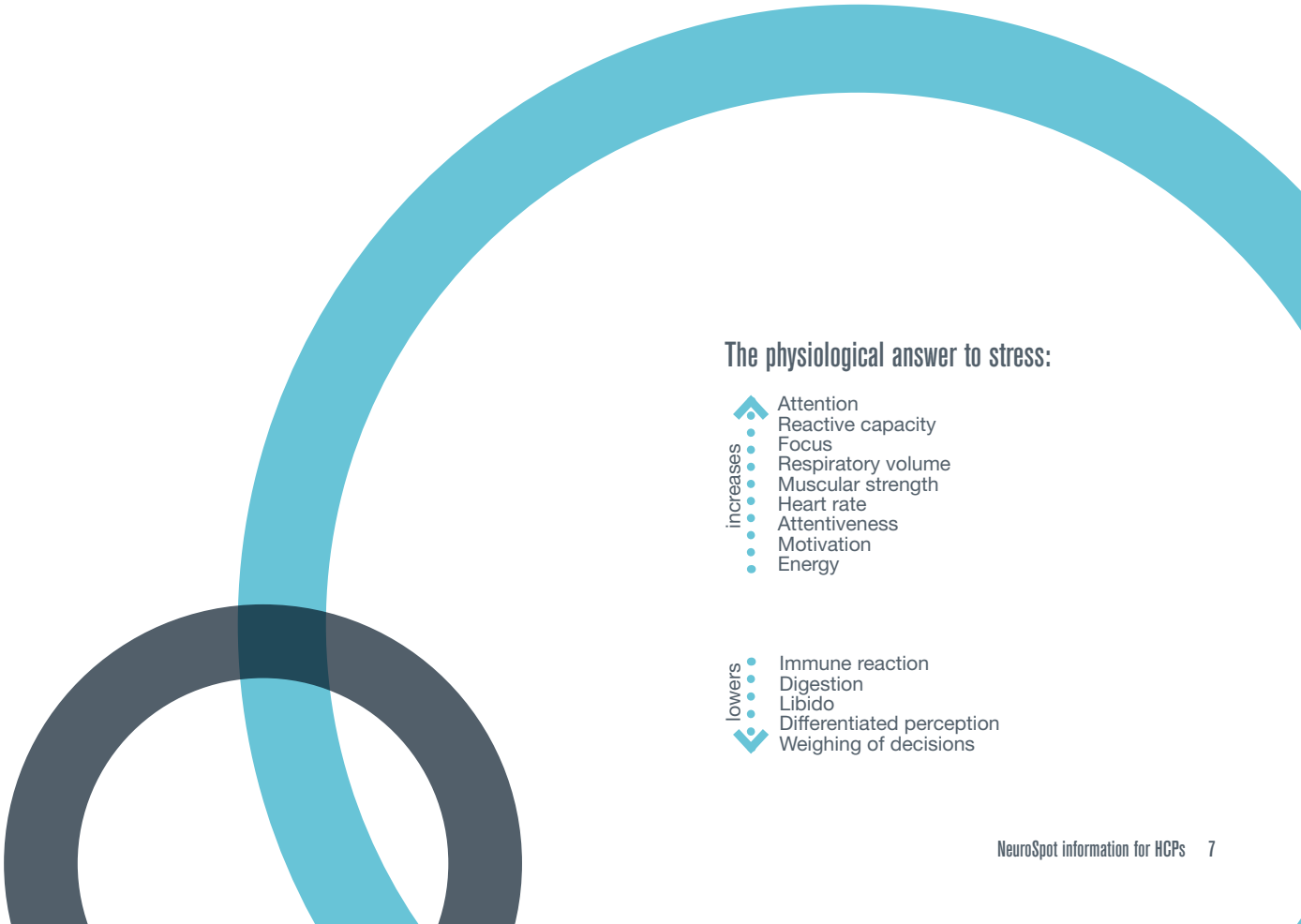
The founder of stress research, Hans Selye, defined stress as the “non-specific reaction of the body to any kind of demand.” I.e., in addition to the specific reaction to stimuli (such as fighting off an infection) the body always provides the same reaction to stress, regardless of the respective trigger.

> Excitatory and inhibitory hormones and neurotransmitters are part of the response to stress. To provide an adequate response to stressors, these must be in balance. Already slight deviations in this balance may lead to health complaints. (For the role the individual parameters play, see pg. 10-21).

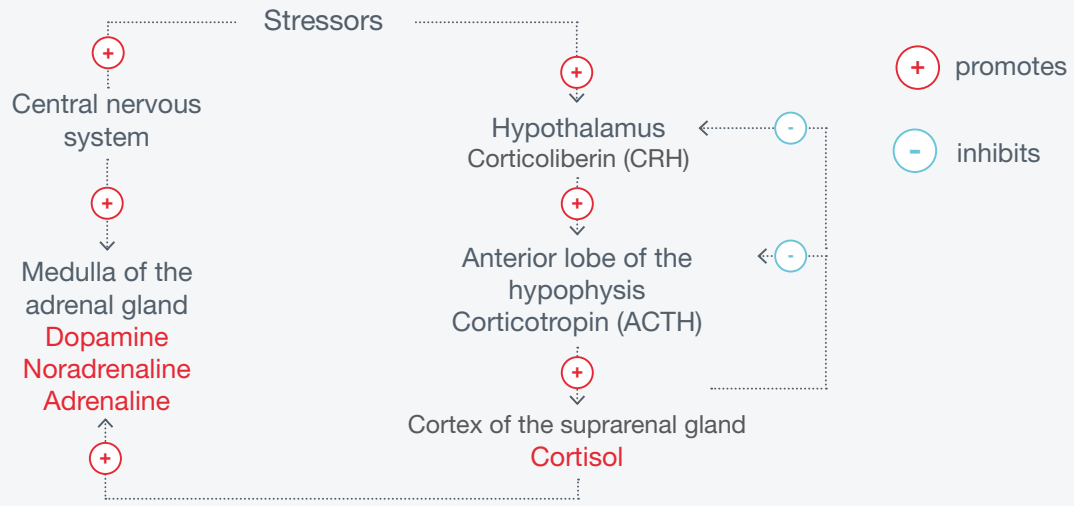
The most important excitatory and inhibitory messenger substances

Excitatory	Inhibitory
Cortisol	Serotonin
Dopamine	GABA
Noradrenaline	DHEA
Adrenaline	
Glutamate	

First, the catecholamines are secreted out of the medulla of the adrenal gland. Shortly thereafter, the hypothalamo-pituitary-adrenal axis is activated: the hypothalamus secretes corticoliberin (corticotropin releasing hormone – CRH). This stimulates the secretion of corticotropin (adrenocorticotropic hormone – ACTH) from the anterior lobe of the hypophysis which, in turn, stimulates the secretion of cortisol from the cortex of the suprarenal gland. The level of the individual messenger substances is regulated during every step of this chain of reactions, using negative feedback inhibition.



The hormonal stress axis



What causes stress?

The triggers of the endogenous stress reaction, so-called stressors, can be of a physical and psychological nature.

Physical & psychological stressors

- Acute & chronic infections
- Allergies
- Anxiety
- Unemployment
- Financial pressure
- Drinks containing caffeine
- Conflicts
- Lack of fresh food
- Medications
- Negative convictions
- Permanent lack of time
- Smoking and other narcotic agents
- Lack of sleep
- Poor or irregular diet
- Death of a loved one
- Overexertion
- Environmental poisons
- Recurrent stress situations
- Healing of wounds
- Not enough relaxation
- Sugar & white wheat products

What happens when there is chronic stress?

After phases of increased stress that has triggered the physiological stress reaction, the body needs regeneration phases during which the entire system returns back to normal. The used-up neurotransmitters can be produced again and stored in the neurons until the next time they are needed.

If these regeneration phases are missing, the stress becomes chronic. The body has no longer the chance to go back to the normal status. The need for messenger substances is continuous and elevated. Initially this leads to elevated levels with symptoms such as anxiety, hypertension, difficulty sleeping, but also to increased performance and similar. Later, this can lead to an overloading of the production. The body is then no longer able to synthesise sufficient amounts of these messenger substances. The storage areas in the neurons cannot be filled and empty out increasingly. The consequence is a decreased level of the messenger substances with deprivation symptoms such as lack of drive, depressive state, trouble concentrating, all the way to the burnout syndrome.

In the development of chronic stress several stressors, which each actually could be dealt with successfully, can cumulate to such a great stress potential that an adequate stress reaction is no longer possible.

Neurotransmitters and stress hormones
Serotonin

Function

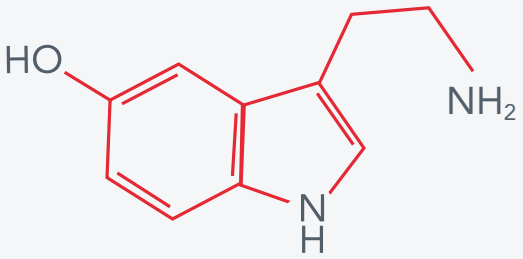
Serotonin is important for the **emotional balance** and the **good mood.** Acting together with adrenaline and dopamine, it **elevates the mood** and has a **motivating effect.**

Serotonin has a relaxing effect, promotes sleep and has an antidepressive effect. It lowers the pain threshold, controls satiety and regulates intestinal tract activity.

Symptoms

Lack of serotonin:
- Anxiety
- Lack of drive
- Depression
- Increased sensitivity to pain
- Exhaustion
- Eating disorders with weight gain
- Fibromyalgia
- Difficulty concentrating
- Migraine
- Difficulty sleeping
- Disquiet / nervousness
- Dyspepsia

Excess of serotonin:
- Very rare and to be determined differential-diagnostically.
- Are there symptoms of a serotonin syndrome?



Synthesis

Serotonin cannot overcome the blood-brain barrier. For this reason it must by synthesised in the brain cells. First, the amino acid tryptophan is oxidised into 5-hydroxytryptophan. This is then turned into serotonin. Serotonin is also a precursor to melatonin, the so-called “sleep hormone.” It is manufactured at night when it is dark and plays a decisive role in controlling the wake – sleep cycle.

Reasons for a lack of serotonin

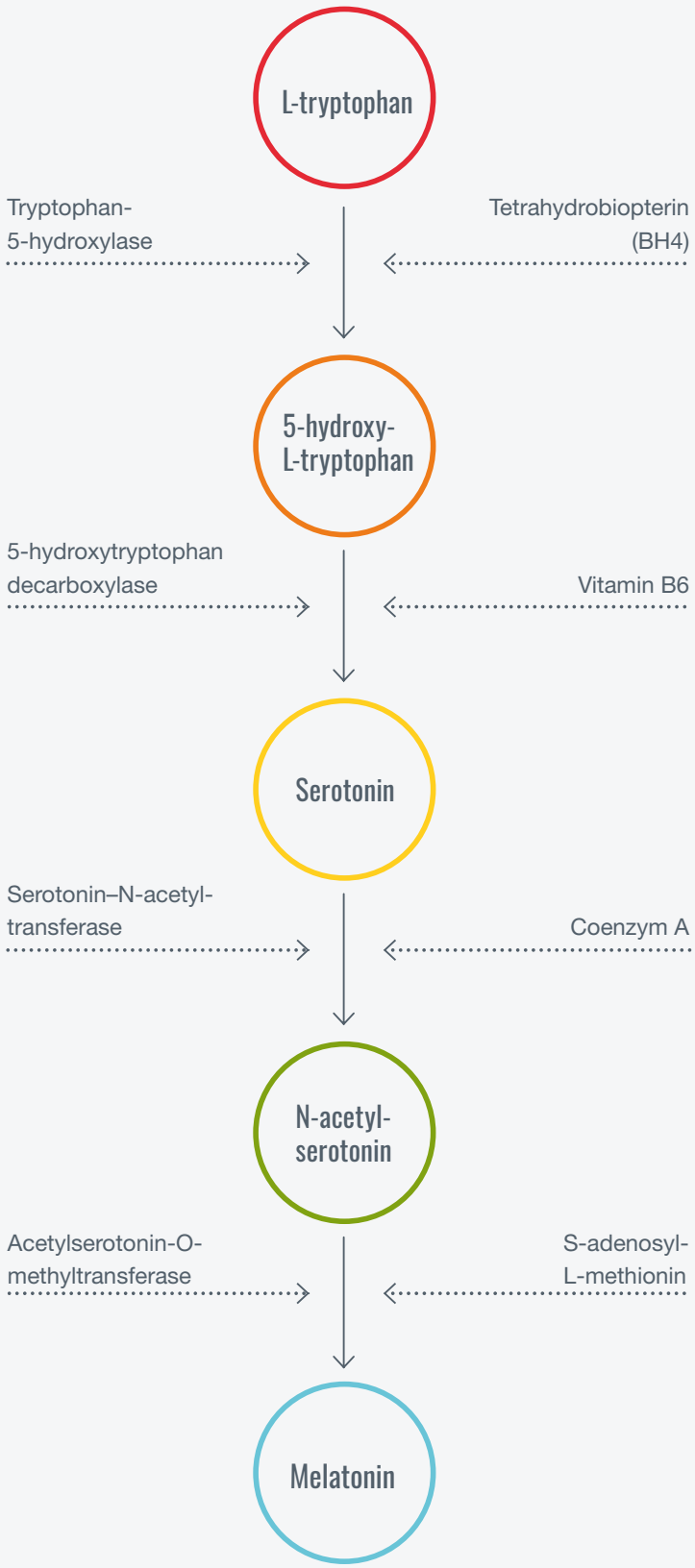
- Lack of micronutrients
- Lactose intolerance
- Malabsorption of fructose
- Chronic inflammations
- Virus infections
- Tumorous diseases
- Lack of movement

Only about 5 % of the existing tryptophan is converted into serotonin. Mainly other substances are made of that, in particular the kynurenines important for immune response.

A lack of micronutrients can originate from, among other things, the diet. Therefore, changing the diet can support the treatment for a lack of serotonin.

See page 25:
Therapeutic guide

Serotonin synthesis



The catecholamines

During stress, a secretion of the catecholamines takes place immediately. This means that very quickly the body will be able to react to the increased demands posed by the stress situation. The body is put into the so-called “Fright-Flight-Fight” mode. This reaction of the body harking back to ancient times originally served to react quickly to danger and to make a decision for fight or flight at lightning speed, depending on the situation.

Thus attention is increased, blood pressure and pulse are elevated, the ability to react quickly and make decisions is increased. On the other hand, those bodily functions that are not absolutely necessary at the moment are being put on the back burner. Those include, among other things, a differentiated perception, the precise weighing of decisions, digestion, sexual activity, sleep and the like.

Dopamine

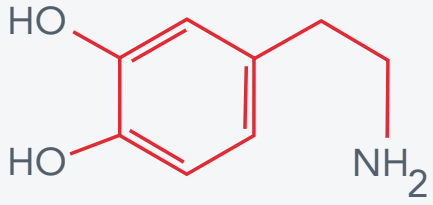
Function

Dopamine acts mostly in an excitatory manner. It is crucial for **coordination, motor functions, memory, learning, concentration** as well as **mental performance.** Acting together with serotonin, dopamine elevates the mood, it regulates the reward system and thus drive and motivation.

Symptoms

Lack of dopamine:
- Lack of drive
- Movement disorders
- Depression
- Eating disorders (attacks of ravenous hunger)
- Difficulty concentrating
- Parkinson‘s disease
- Loss of motivation
- Muscle weakness
- Addiction problems
- Daytime fatigue
- Forgetfulness
- Diminished libido

Excess of dopamine:
- Problems concentrating
- Mental illness (schizophrenia)
- Restlessness
- Difficulty sleeping
- Daytime fatigue
- Inability to recover
- Dyspepsia



Noradrenaline

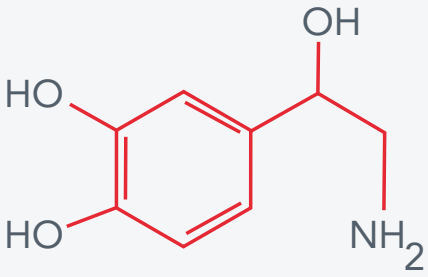
Function

Noradrenaline has the effect of **increasing blood pressure, attention, alertness, concentration, willingness to perform, motivation** and **motor functions.** It is also involved in the control of a multitude of hormones.

Symptoms

Lack of noradrenaline:
- Lack of drive
- Lack of energy
- Impaired sensitivity to pain
- Difficulty concentrating
- Depressive state

Excess of noradrenaline:
- Symptoms of anxiety
- Hypertension
- Hyperactivity



Adrenaline

Function

The main function of adrenaline is to put the body very quickly into a state where, i**t is ready to perform at a higher level.**

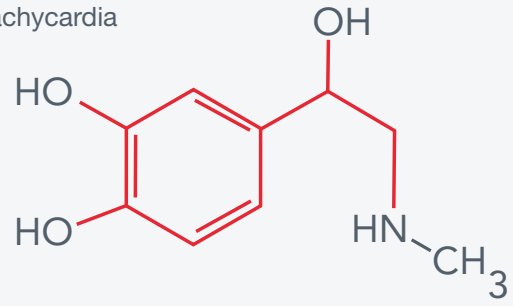
It has a bronchodilatory effect and **increases the respiratory volume. Blood pressure, as well as the heart rate are elevated,** (positive chronotropic, bathmotropic, dromotropic and inotropic). Altogether, the body thus has more oxygen available, thus increasing **attentiveness** and generally mental activity and **motivation.** It has a vasodilative effect (increased supply) in the skeletal muscles, whereas in the skin and the intestine it has a vasoconstrictive effect.

In addition, the increased lipolysis and gluconeogenesis **increases the blood glucose level** and thus quickly makes more energy available to the muscles and the brain. On the other hand, it **inhibits** the **secretion of insulin,** the **digestion** and the **libido.**

Symptoms

Lack of adrenaline:
- Lack of drive
- Hypotension
- Difficulty concentrating
- Fatigue with strong urge to sleep, all the way to extreme exhaustion
- Depressive state
- Difficulties in losing weight

Excess of adrenaline:
- Anxiety
- Difficulty sleeping
- Disquiet
- Tachycardia



A lack of micronutrients can originate from, among other things, the diet. Therefore, a change in the diet can support the treatment for a lack of catecholamines.

See page 25:
Therapeutic guide

Synthesis of the catecholamines

Building on each other, the catecholamines dopamine, noradrenaline and adrenaline are synthesised in this sequence from the essential amino acid phenylalanine. It is first turned into L-tyrosine, which is an amino acid also contained in foodstuffs. From this L-DOPA and dopamine are built in sequence (mainly in the substantia nigra in the midbrain), noradrenaline and lastly adrenaline (both in the medulla of the adrenal gland). The thyroid gland hormone L-thyroxine, which is also synthesised from L-tyrosine, is important to the entire neuro-endocrine balance.

Reasons for a lack of all catecholamines

(dopamine, noradrenaline, adrenaline)

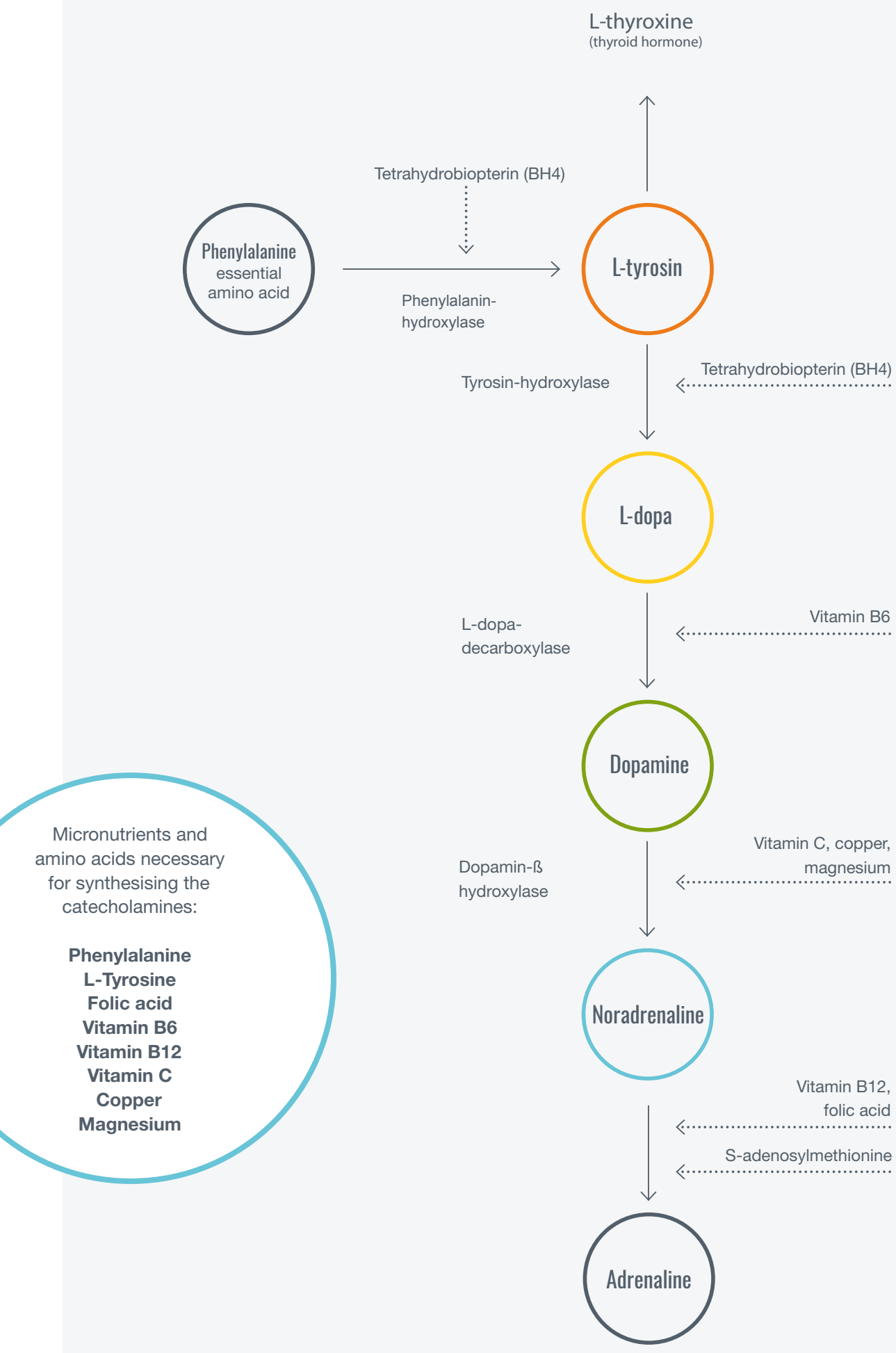
- Lack of phenylalanine and L-tyrosine
- Lack of nutrients (vitamin B6, vitamin B12, folic acid, vitamin C, copper, magnesium)
- Diminished ability of the intestine to take up nutrients
- Chronic stress

Additional reasons for lack of dopamine in particular

- Tumorous diseases
- Taking drugs

Additional reasons, in particular for an excess of adrenaline

- Phaeochromocytoma



Micronutrients and amino acids necessary for synthesising the catecholamines:

Phenylalanine
L-Tyrosine
Folic acid
Vitamin B6
Vitamin B12
Vitamin C
Copper
Magnesium

DHEA

Function

DHEA is also called the **“anti-aging hormone”**.

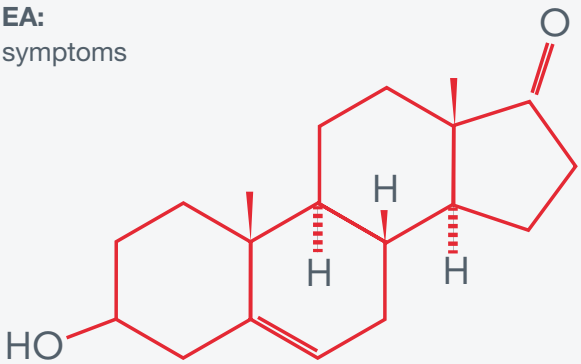
The production of DHEA decreases continually as we age, from age 25 on. The lowered DHEA level is responsible for a number of degenerative processes in the body. That is why the DHEA level can be used so well to determine the biological age of a human. Not only that, DHEA is also the precursor for the sex hormones testosterone and oestrogen.

DHEA is a direct counteragent to cortisol, it **balances the stress reaction** caused by cortisol and thus helps in dealing with stress. In the vessel wall it inhibits the growth of the smooth muscles and thus counteracts atherosclerosis. DHEA has an **anti-inflammatory effect** and **activates the immune system.**

Symptoms

Lack of DHEA:
- Depression
- Menopause problems
- Learning difficulties
- Lack of sex hormones
- Malaises
- Forgetfulness
- Diminished ability to deal with stress
- Enhances the effect of cortisol

Excess of DHEA:
- No negative symptoms



Reasons for a lack of DHEA

- Chronic stress

Synthesis

DHEA is made from cholesterol, mainly in the cortex of the suprarenal gland.

Cortisol

Function

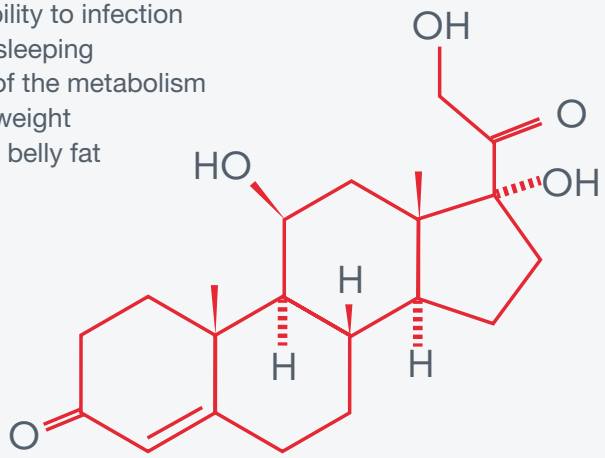
Cortisol, also called the **“activity and stress hormone”** generally effects the body‘s adaptation to stressors. An important function of cortisol is that it **activates the metabolism,** to **mobilise energy reserves.** Through promoting the gluconeogenesis, it increases the blood glucose level; through promoting the lipolysis, it increases the triglycerides. It also stimulates the break-down of proteins out of the muscle fibre. If the energy made available is not needed after all, it will be stored as fat deposits mainly in the belly region and the neck. Due to the increased bone loss, the risk for osteoporosis is increasing over the long term.

Due to the increased secretion from various glands, such as that of the stomach and the pancreas (e.g. increased formation of hydrochloric acid in the stomach) the risk of getting gastric ulcers and duodenal ulcers increases. Cortisol has an antiproliferative, analgetic, immuno-suppressive and anti-inflammatory effect. The multitudinous effects of cortisol also includes increased appetite as well as changes in emotional sensitivity.

Symptoms

Lack of cortisol:
- Difficulty concentrating
- Lack of energy
- Addison‘s disease
- Passivity and apathy
- Difficulty to get up in the morning and become really awake
- Constant fatigue, despite sufficient sleep
- Forgetfulness
- Sugar cravings
- Diminished ability to deal with acute stress

Excess of cortisol:
- Tenseness
- Hypertension
- Increased cholesterol levels
- Susceptibility to infection
- Difficulty sleeping
- Disorder of the metabolism with overweight
- Increased belly fat



Reason for a lack of cortisol

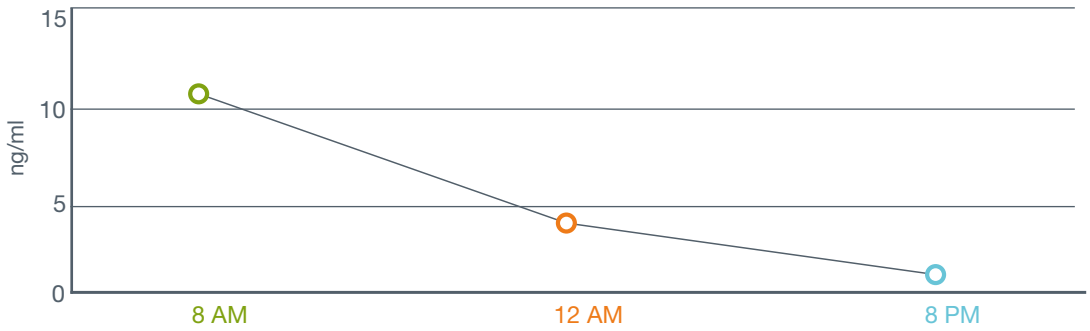
- Chronic stress

Reason for an excess of cortisol

- Acute and beginnings of chronic stress

Synthesis

The production of cortisol from cholesterol takes place in the cortex of the suprarenal gland and is subject to a circadian rhythm. While sleeping, during the second half of the night, the body manufactures the most cortisol, so that in the morning, shortly after getting up, the cortisol level is at its highest. It quickly drops by the early afternoon and then slowly drops further until the late evening. During the course of the second half of the night it increases again greatly.



Within this basic rhythm, the level of cortisol **rises in case of acute stresses** during the day **briefly** and **slightly**. In times of stress, this basic rhythm can be broken through. Therefore, the **deviations of the level of cortisol from their normal course** are a good indicator of the **current stress load.**

> In acute **stress situations,** the morning-time outpouring of cortisol increases and normalises in the course of the day. In the case of **continuous stress,** the entire daily curve moves upward, meaning that the cortisol level is elevated permanently. If the stress load remains and turns into **chronic stress,** the daily rhythm may become “chaotic”, meaning that the level of cortisol moves outside of the normal values for the time of day. If the chronic stress continues to persist, then, at some point, the production of cortisol ceases and the level of cortisol sinks under the normal level. Lowered cortisol values are being measured in, for example cases of burnout syndrome.

People **who exercise regularly** have a lower level of cortisol than those who do not exercise. And the short-term increase in cases of acute stress during daily life is less marked than in people who do not exercise. For this reason, the body‘s stress reaction is less pronounced.

In **older people,** the short-term increase under acute stress is very often much more distinct. The body‘s stress reaction is accordingly more pronounced.

GABA and glutamate

GABA (inhibitory) and glutamate (excitatory) work as direct opponents and **control, together, the activity level in the brain.** Therefore, an optimal relationship of both neurotransmitters to each other is necessary. The interaction with serotonin, which enhances the effects of GABA, is important, as well. Therefore, a lack of serotonin can also limit the effectiveness of GABA.

GABA (Gamma-Amino Butyric Acid)

Function

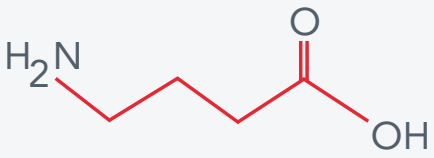
Where stress is concerned, GABA plays a major role. It has a calming effect, since it influences the amount of the stress hormones and is also called the **"body's natural sedative".**

GABA is very important for memory and learning. It prevents sensory overload, has an effect that is anxiety-resolving, relaxing, sleep-enhancing, pain-reducing, anti-spasmodic and it stabilises blood pressure.

Symptoms

Lack of GABA:

- Anxiety
- Hypertension
- Chronic pain
- Depression
- Epilepsy
- Sugar cravings
- Racing heart
- Muscular tension
- Night sweat
- PMS
- Restlessness
- Numbness
- Tinnitus
- Difficulty sleeping
- Forgetfulness



Reasons for a lack of GABA

- Medication with sedatives

During states of anxiety, in particular, the level of GABA is very often decreased.

Reasons for an excess of GABA

- During stress as a counter-regulating measure to increased excitatory messenger substances

CAVE: Normal catecholamine values with elevated GABA might be an indication of increased stress.

Glutamate

Function

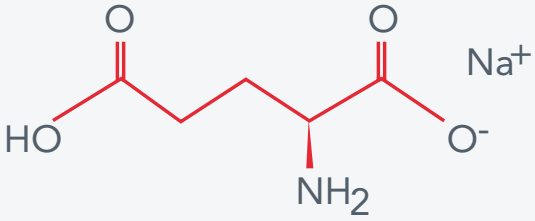
Glutamate has various important functions in the brain. It is essential for the **demanding tasks of the brain,** such as learning and memory, for the intentional, controlled movements as well as for the ability of the brain to perceive the environment and to adapt to it. In addition, glutamate participates in the metabolic processes, such as **detoxifying the brain of ammonia.**

Glutamate has neuro-toxic characteristics that result in excitotoxicity (over-excitation all the way to cell death). For this reason it is being removed very quickly from the synaptic cleft and stored in the nerve ends and/or turned to glutamine in the glia cells.

Symptoms

Lack of glutamate:
- Fatigue and exhaustion
- Schizophrenia
- Perceptual disturbances

Excess of glutamate:
- Anxiety
- Brain cell atrophy
- Epilepsy
- Hyperactivity
- Cramps
- Parkinson‘s disease and other dementia illnesses
- Depressive state
- Disquiet



Synthesis

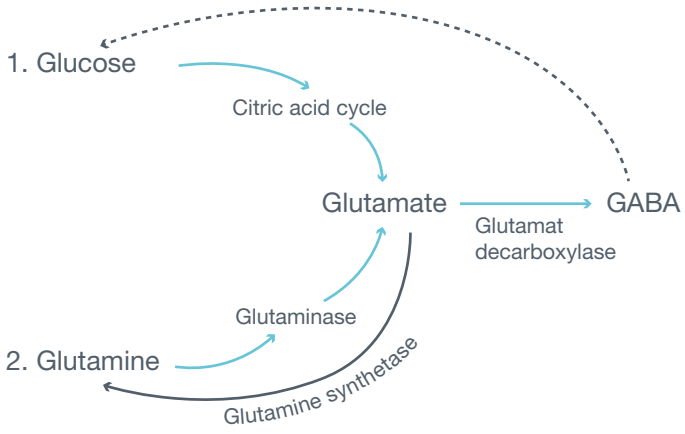
In the glia cells, the creation of glutamate and GABA is very strongly linked to each other.

The amino acid glutamate is synthesised in two ways:

1. from glucose via the citric acid cycle
2. from glutamine by the glutaminase enzyme

GABA is synthesised from the glutamate amino acid via the enzyme glutamate decarboxylase.

> After several metabolic steps in between, GABA enters into the citric acid cycle, in which glutamate is synthesised in turn.



Diagnostics
Urinary diagnostics for neurotransmitters

The **second urine of the morning** has proven to be the best-suited media for analysing the catecholamines (dopamine, noradrenaline, adrenaline) and the neurotransmitters serotonin, GABA and glutamate. As a rule, the first urine of the morning, immediately after getting up, is usually too concentrated and therefore not suitable.

Generally, **liquid urine samples** are used for analysis in the laboratory. However, for the unstable catecholamines and for glutamate this has some disadvantages: The concentration of the parameters to be analysed depends very strongly on the conditions during transport, i.e. on duration and temperature. The validity of the values then at last measured in the laboratory can therefore clearly be limited.

For this reason it is better to work with a technology where the parameters to be analysed are transported in a stable manner.

Patented dryspot technology with excellent validity

With the NeuroSpot **the validity of the test result is guaranteed,** thanks to the innovative DrySpot technology. By drying the urine sample, the normally unstable substances are stabilised. The parameters to be analysed in the sample thus continue to correspond to those at the time of taking when they arrive at the laboratory. The result is a reliable value regarding the stress parameters of your patient.

The **DrySpot technology** is protected by LDN (Labor Diagnostika Nord GmbH & CO. KG) with a European patent and is available in Germany exclusively with the **NeuroSpot.**

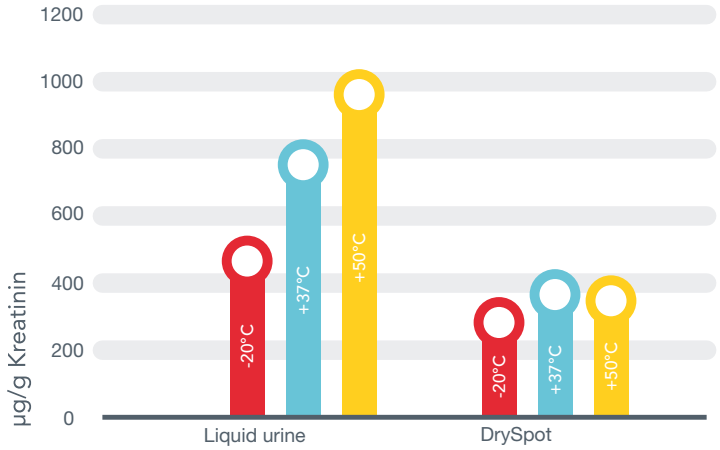
Only with NeuroSpot:

- Patented DrySpot technology for urine samples, therefore excellent validity due to stable values
- Saliva sample using Salivette®: simple handling and results of the highest quality

Comparison of liquid urine and DrySpot using dopamine as an example

In liquid urine, dopamine is an extremely unstable parameter, since bound dopamine is released via hydrolysis in the course of time. And, the higher the temperature is, the more dopamine is released. With DrySpot the values remain stable for at least a week, even during higher temperatures. In the image below, samples that were stabilised by means of deep-freezing are serving as comparative basis.

Dopamin measurement values after one week of storing the samples Excerpts from 42 samples



The concentration of dopamine in **liquid urine increases greatly** with increasing temperature during transport / storage.

With **DrySpot,** the concentration of dopamine **remains stable.**

Saliva diagnostics of stress hormones

Saliva samples are used to analyse for cortisol and DHEA. Although both parameters can also be determined from serum, it is only possible to determine the free cortisol, from which the current stress level can be deduced, from saliva. Since cortisol is subject to a circadian rhythm, the times for taking a sample are defined precisely. DHEA as well has different concentrations in the morning and evening.

With the NeuroSpot test, the saliva sample is taken by means of **Salivette®.** This makes it easy for the patient to take a sample, due to the **simple handling.** Due to tested materials that do not react with cortisol and DHEA, the saliva diagnosis of the NeuroSpot tests delivers a reliable finding. And the danger of the samples leaking during transport into the laboratory, which makes them unsuited for an analysis at the laboratory, is reduced greatly with Salivette®.

Sample taking with Salivette®

Anamnesis

Associated illnesses

- AD(H)S
- Adiposity
- Asthma
- Bipolar disorder
- Burnout syndrome
- CFS
- Chronic and/or recurring respiratory diseases
- Chronic headaches
- Ulcerative colitis
- Diabetes / insulin resistance
- Fibromyalgia
- Malabsorption of fructose
- Hypertension
- Lactose intolerance
- Liver disease/ kidney disease
- Addison‘s disease
- Bechterew‘s disease
- Crohn‘s disease
- Cushing syndrome
- Parkinson‘s disease
- Migraine
- Multiple sclerosis
- Osteoporosis
- Rheumatic diseases
- Thyroid diseases, hypothyroidism, Hashimoto’s disease, Basedow’s disease
- Schizophrenie
- Thrombose

Symptoms

Head
- Headache
- Dizziness

Heart
- Feeling of tightness
- Pounding heart (e. g. at night)
- Sharp pains

Skeleton/musculature
- Arthritis
- Dysmenorrhoea
- Joint pains
- Muscle pains
- Back pains

Stomach/intestines
- Hiccup
- Stomach ache
- Bloating
- Diarrhea
- Irritable bowel syndrome
- Nausea
- Overweight
- Underweight
- Constipation
- Feeling of fullness

Skin
- Acne
- Eczemas

Psyche
- Aggressions
- States of anxiety
- Lack of drive, in particular in the morning
- Lack of appetite
- Depressions
- Problems sleeping through
- Problems falling asleep
- Exhaustion
- Eating disorders
- Feeling that daily life is overwhelming, that everything is difficult
- Emotional instability
- Crying often
- Attacks of ravenous hunger
- Hyperactivity
- Difficulty concentrating
- Nervousness / restlessness
- Panic attacks
- Sudden aversion to meat
- PMS
- Thoughts of suicide
- Excessive need for sleep
- Forgetfulness
- Afraid of the future

Anamnesis survey

- What **medications** are you taking?
- Medications such as antihypertensive and anticonvulsive drugs, antibiotics, beta blockers, cortisol spray or cortisol tablets and diuretics can **affect the level of some neurotransmitters.**
- What nutrition supplements (vitamins and minerals and the like) are you taking?
- Have you **gained or lost** more than 5 kg recently?
- Are you **pregnant or breastfeeding?**
- Do you **exercise** regularly?
- Do you **smoke** or have you stopped smoking a short time ago?
- Do you drink **alcohol** or have you stopped drinking alcohol completely not so long ago?
- Do you drink **beverages containing caffeine,** like coffee, tea, cola, energy drinks?
- Do you consume a lot of **sweeteners?**
- How many hours do you **sleep** at night?
- What do you estimate your **stress level** to be - on a scale from 1 to 10?
- Do you regularly eat **foods rich in protein,** such as for example soy, legumes, peanuts, cashews, sunflower kernels, wheat germs, cheese, eggs, poultry, meat and fish?
- Are you aware of foods that, after eating them, cause an immediate **allergic reaction** or another type of **incompatibility** reaction in you?
- Are you currently **able to work?**

Therapeutic guide
Concept to regulate the neuro-endocrine household

Being in a depressive state, in a bad mood and lack of drive very often are symptoms of stress. Many of those affected are already being treated with **antidepressants.** Others do not like that.

If there is an imbalance in the neurotransmitter balance that is the cause of the symptoms, then there are **other treatment options.**

It is known that most stress patients have a reduced level of serotonin. For this reason, the **first treatment step** is to adress the issue of **normalising the level of serotonin.** Here, the initial focus is on replacing the required **micronutrients and amino acids.**

> **CAVE:** Serotonin is removed from the synaptic cleft by being taken up in the neurons again. The breakdown of serotonin is performed via the enzyme monoamino-oxidase (MAO). For this reason there must not be any replacing of tryptophan or 5-HTP when medicating with Serotonin-reuptake inhibitors (SSRI) or MAO inhibitors.

After about 6-8 weeks, the **NeuroSpotPlus** test should be carried out for **therapy control** purposes. During this time, the level of serotonin should have increased markedly. And the levels of other parameters that were imbalanced might have already improved by correcting the serotonin level.

The NeuroSpotPlus test also analyses the neurotransmitters GABA and glutamate, which play an important role in controlling the entire neuro-endocrine stress system. After the initial improvement by means of the serotonin treatment it now makes sense to also take these parameters into account as well.

During the **second phase** the **other out-of-balance parameters** are corrected step-by-step, as well. Potent **naturopathic preparations** are available for this.

Therapeutic options in the case of chronic stress with neuro-endocrine disorders

- Change in diet
- Replacing amino acids, vitamins, minerals and trace elements necessary for the synthesis of neurotransmitters
- Homeopathic and phyto-therapeutic preparations
- Colon therapy
- Stress management: movement / balance / relaxation, coaching, fresh air, light

Changing the diet

A lack of micronutrients can originate from, among other things, the diet. Therefore, changing the diet can support the treatment for a lack of neurotransmitters.

A resorption disorder due to damage to the intestinal mucosa (e. g. via a treatment with antibiotics, chronic inflammation, food allergies and much more) may also be the reason for a nutrient deficiency. It is therefore recommended that a check-up of the intestines with subsequent colon therapy be carried out.

The following micronutrients and amino acids are needed for synthesising:

- Serotonin and melatonin
  tryptophan, vitamin B6
- Catecholamines
  (dopamine, noradrenaline, adrenaline)
  Phenylalanine, L-tyrosine, folic acid, vitamin B6, vitamin B12, vitamin C, copper, magnesium

Sources of nutrition that contain a lot of...

...Tryptophan:
Soy beans and mung beans, peanuts, cashews, sunflower seeds, some types of cheese (e. g. Parmesan, Emmental, Edam, Brie, Camembert, Gruyère), eggs, meat, fish (in particular tuna, salmon, mackerel and trout), oatmeal and wheat germs

...Phenylalanine or tyrosine:
Poultry, eggs, meat, fish, legumes (e. g. soy beans, lentils), seeds and nuts
Only if tolerated well: Milk products

...Folic acid:
Liver, legumes (e. g. soy beans, lentils), seeds and nuts, endive lettuce, parsley, cauliflower, broccoli, brussels sprouts and leeks

...Vitamin B6:
Whole wheat products, potatoes, bananas, legumes (e. g. soy beans, lentils), avocados, carrots, brussels sprouts, sunflower seeds, walnuts, liver, meat and fish

...Vitamin B12:
Liver, kidneys, saltwater fish (in particular tuna, herring and mackerel), salmon, seafood, meat and eggs. Only if they are being tolerated well, milk products and cheese (in particular Gouda, Edam, Camembert) are a good source of vitamin B12

...Vitamin C:
Citrus fruits, strawberries, kiwis, guava, black currants, papayas, fennel, broccoli, peppers and brussels sprouts

...Magnesium:
Amaranth, quinoa, legumes (e. g. soy beans, lentils), seeds and nuts

...Copper:
Calf and beef liver, amaranth, quinoa, millet, prawns, oysters, legumes, (e. g. soy beans, lentils), seeds and nuts (in particular pumpkin seeds and cashews)

NeuroSpot pre-analytics

Exclusion criteria

The following exclusion criteria describe conditions where the body is in an exceptional state. Thus a representative measurement of hormones and neurotransmitters is not possible.

- Severe diseases like kidney failure, cirrhosis of the liver or severe infects
- In case of an antibiotic therapy, test should only be performed after improvement of the symptems and completion of the antibiosis
- During or short after a fasting diet
- Women during menstruation
- During pregnancy and until two weeks after delivery

Important

Fill in medical history including symptoms and medications that are taken regularly in the laboratory order. These factors can have an impact on the neurotransmitters and must be considered in the interpretation of findings.

Period	Abstinence	Effect
1 week before taking samples	no flight that involves a different time zone	Moving of the day-night rhythm and the hormones involved in that
3 days before taking samples	no contrast agent examination	
30 minutes before taking a saliva sample	no smoking, do not eat anything, no mouthwash, do not brush teeth, among other things, to avoid blood in saliva	Can increase cortisol-, DHEA- and catecholamine values. Blood and leftover food are breeding grounds for bacteria and fungi that degrade saliva hormones

Urine sample

- Second morning urine: The next urine over the course of the morning after getting up and after the first morning urine (Going to the toilet during the night does not count in this content)

Saliva samples

- 1st Sample 0,5 hours after getting up
- 2nd Sample at 12:00 noon
- 3rd Sample at 8:00 PM

Storage

- Urine samples should be dried at room temperature
- Saliva samples should be refrigerated until transport

Shipping

- Joint shipping by mail of the dried urine sample (including closed drying agent bag) and the three saliva samples

Processing time

- In the laboratory: approx. 10 working days

Literature

Specialised literature:

Bear, M.F. Neuroscience, Exploring the Brain. Lippincott Williams & Wilkins, Baltimore/Philadelphia, Second Edition 2011

Horn, F. Biochemie des Menschen, Das Lehrbuch für das Medizinstudium. Georg Thieme Verlag, Stuttgart, 5. Aufl. 2012, ISBN: 978-3131308856

Kandel, E. et al. Neurowissenschaften, Eine Einführung. Spektrum Akademischer Verlag, Heidelberg, 1995, ISBN: 978-3827429056

Rockstroh, S. Lehrbuch: Einführung in die Neuropsychopharmakologie. Verlag Hans Huber, Bern, 2001, ISBN: 3456838034

Rossow J. et al. Duale Reihe Biochemie. Georg Thieme Verlag, Stuttgart. 3.Aufl. 2011, ISBN: 978-3131253538

Vogelreuter, A. Nahrungsmittelunverträglichkeiten. Wissenschaftliche Verlagsgesellschaft Stuttgart, 2012, ISBN: 978-3804729384

Ahn, R.-S., et al. Salivary cortisol and DHEA levels in the Korean population: Age-related differences, diurnal rhythm, and correlations with serum levels. Yonsei Medical Journal 2007, 48(3):379-388

Elmasry, A. et al. Obstructive sleep apnoea and urine catecholamines in hypertensive males: a population-based study. Eur Respir J 2002, 19:511-517

Giuliano, F., J. Allard. Dopamine and male sexual function. Eur Urol 2001, 40:601-608

Heim, C. et al. The potential role of hypocortisolism in the pathophysiology of stress-related bodily disorders. Psychoneuroendocrinology 2000, 25:1-35

Hughes, J.W. et al. Depression and anxiety symptoms are related to increased 24-hour urinary norepinephrine excretion among healthy middle-aged women. Journal of Psychosomatic Research 2004, 57:353-358

Marc, D.T. et al. Neurotransmitters excreted in the urine as biomarkers of nervous system activity: Validity and clinical applicability. Neuroscience and Biobehavioral Reviews 2011, 35:635-644

Panconesi, A. Serotonin and migraine: a reconsideration of the central theory. J Headache Pain 2008, 9:267-276

Snow, A.B. et al. Catecholamine alterations in pediatric obstructive sleep apnea: Effect of obesity. Pediatric Pulmonology 2009, 44:559-567

Whetzel, C.A., L.C. Klein. Measuring DHEA-S in saliva: time of day differences and positive correlations between two different types of collection methods. BMC Research Notes 2010, 3:204-208

Patient information:

Ross, J. Was die Seele essen will. Die Mood Cure.Klett-Cotta, Stuttgart, 4. Aufl. 2013, ISBN: 978-360894 7106

Wilson, J. Grundlos erschöpft? Nebenniereninsuffizienz – das Stress-Syndrom des 21. Jahrhunderts. Wilhelm Goldmann Verlag, München, Deutsche Erstausgabe 2011, ISBN: 978-3422219469

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