

External ID

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|-----------------|------------------|-----------------|-------------------|-----------------|---------------------|
| Name | Muster | Date of Birth | 08.01.1962 | Order ID | 11617146 |
| First Name | Muster | Sex | Male | Order Date | 08.11.2018 |
| Sampling Date | 07.11.2018 09:00 | Validation Date | Thomas Gugerel | Findings Status | Final Report |
| Sample Material | U, SP | Validation on | 12.11.2018 | Findings Date | 12.11.2018 |

| Test | Result | Unit | Standard Range | Previous Result |
|------|--------|------|----------------|-----------------|
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Endocrinology

Neurotransmitter Plus

| | | | | | |
|-----------|--------------|-------------|-----------|--|---------------|
| Serotonin | 68,14 | µg/g Crea | 140 - 230 | | U A) ELISA |
| Glutamate | 18,60 | µmol/g Krea | 8 - 25 | | U A) RECHN |
| GABA | 2,05 | µmol/g Krea | 1,5 - 5,0 | | U A) LCMS |

Catecholamines (HPLC)

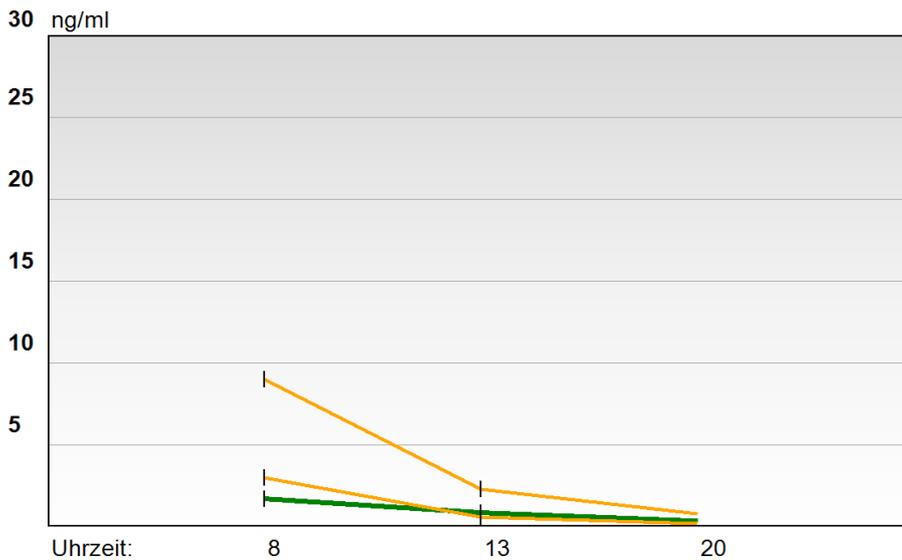
| | | | | | |
|--------------------------------|--------------|-----------|------------|--|---------------|
| Adrenalin | 1,80 | µg/g Crea | 4 - 10 | | U A) ELISA |
| Noradrenalin | 10,19 | µg/g Crea | 32 - 58 | | U A) ELISA |
| Dopamine | 69,54 | µg/g Crea | 150 - 280 | | U A) ELISA |
| Noradrenalin / Adrenalin Ratio | 5,66 | Quotient | 3 - 6 | | NA) RECHN |
| Creatinine enzymatic (Urine) | 823 | mg/l | 400 - 2780 | | U A) PHOT |

Saliva Analytics

Cortisol - DHEA - Diurnal Profile

Cortisol Diurnal Profile in Salvia

| | | | | | |
|-----------------------|-------------|-------|-----------|--|----------------|
| Cortisol | 1,72 | ng/ml | 3 - 9 | | SP A) ELISA |
| Cortisol (13 o'clock) | 0,87 | ng/ml | 0,6 - 2,3 | | SP A) ELISA |
| Cortisol (20 o'clock) | 0,36 | ng/ml | 0,2 - 0,8 | | SP A) ELISA |



Diurnal Profile DHEA in Salvia

| | | | | | |
|-----------------|--------------|-------|----------|--|----------------|
| DHEA | 76,00 | pg/ml | 90 - 460 | | SP A) LUMIN |
| DHEA (Saliva 3) | 71,23 | pg/ml | 90 - 460 | | SP A) LUMIN |

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Neurological Stress

Neurotransmitter tests for acute or chronic stress

Constant nervous tension **eats up the body's power reserves**. This can be very damaging to health. The hormones and messengers responsible for the stress response and its regulation in the body can be an **early warning system** telling us when we've pushed ourselves too hard, before it's too late - so that we can react, preferably before **burnout** or a **chronic fatigue syndrome** occurs.

In situations of chronic stress, long-term consumption of stress hormones and messengers (neurotransmitters) continues until the neurons are emptied, a condition which often involves pronounced symptoms of psychological or physical exhaustion and requires extensive therapeutic measures. Depending on the situation, these measures include movement, relaxation techniques (e.g. autogenic training), psychotherapy and orthomolecular measures. These measures replenish the stores of stress substances by administering amino acids and cofactors. The sooner these measures are taken, the faster success is achieved. The aim of diagnostics is to detect stress-induced changes in neuroendocrine function in terms of stress hormone and neurotransmitter levels at an early stage and to identify specific counter-measures.

The neurotransmitters tested are **adrenaline**, **noradrenaline** and **dopamine**. All three belong to the group of catecholamines and can be produced in nerve cells from the amino acid **tyrosine**. Tyrosine, in turn, can be absorbed from the diet or synthesised from another amino acid, **phenylalanine**. The tyrosine is then transformed into L-DOPA, which is further converted to dopamine. This results in noradrenaline and finally in adrenaline.

Serotonin, which is formed from the essential amino acid **tryptophan**, is also tested. The amount of available tryptophan derived from food and absorbed via the intestine has an influence on serotonin levels.

The **effects of stress** include the following:

Adrenaline increases the pulse, cardiac output, blood pressure, mental activity and inhibits cellular defences in the body. **Noradrenaline** also increases blood pressure and, together with **dopamine**, promotes motivation, concentration and motor skills. Noradrenaline and dopamine also inhibit cellular defences in the body and thus increase susceptibility to infections. Lastly, **Serotonin** works to relieve stress, regulate blood pressure, intestinal motility, promote relaxation, boost the mood, regulate sleep, relieve anxiety and provide an antidepressant and positive effect on many brain activities. Serotonin also regulates the perception of pain, appetite and body temperature. Serotonin can be converted into melatonin, which plays an important role in controlling the sleep-wake rhythm.

The **interaction of all these stress substances** makes for a healthy stress reaction in the body. For people who are under constant stress or who are already suffering from chronic fatigue or burnout, this **fine-tuned cooperative action** has come out of balance.

Stress and burnout

Adrenaline, **noradrenaline** and **dopamine** are **reduced**, indicating sustained consumption due to chronic stress. All three catecholamines are formed from the amino acids tyrosine or phenylalanine. If adrenaline, noradrenaline and dopamine levels are below normal, tyrosine, phenylalanine, and the necessary cofactors of vitamins and minerals that support endogenous production of neurotransmitters should be provided to counteract further depletion of neurons.

When selecting the right product, make sure that it not only contains **tyrosine** or **phenylalanine**, but also all **co-factors** that are important for synthesis (vitamin B6, folic acid, calcium). Good products often contain further **active substances from plant extracts** that alleviate the effects of acute or chronic stress and have shown good results in cases of a lack of energy, weakened drive, fatigue and depressive moods in studies.

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These active substances include *catuaba* or *yam root*. For example, Stress Guard® contains L-tyrosine as a raw material for the production of dopamine and noradrenaline in the brain. Vitamin B6, folic acid and calcium support this metabolic pathway. These additional plant extracts, such as *rhodiola*, *Mucuna pruriens*, *catuaba* and *yam root*, increase memory, concentration, receptiveness, productivity and promote stress relief. The daily dosage is 2 - 6 capsules/day. Alternatives with a similar composition or indication are: Aminoplus Burnout®, Anti-Stress PURE 365® or MyConcentration®.

Serotonin levels are reduced.

Serotonin is produced from tryptophan and thus replacement of that amino acid and the corresponding cofactors is recommended as part of orthomolecular therapy. 5-hydroxytryptophan (5-HTP), which is formed from tryptophan and is the direct precursor of serotonin, can also be administered.

The advantage of providing **5-HTP** is that it can no longer be degraded to kynurenine and thus approximately 90 % is converted into serotonin. In addition to tryptophan or 5-HTP, the cofactors for serotonin synthesis should also be supplied in sufficient amounts. The essential cofactors are **folic acid** (vitamin B9) and **pyridoxine** (vitamin B6). Niacin (vitamin B3) is especially important when tryptophan is administered, because it prevents the use of tryptophan for niacin synthesis. Niacin also inhibits tryptophan-2,3-dioxygenase, an enzyme which degrades tryptophan into kynurenine.

Therapy with 5-HTP

5-HTP is highly bioavailable when obtained as an ingredient from **Griffonia** (African black bean). Clinically, this results in a mood-enhancing, calming, anxiety-suppressing and often depressive-reducing effect. Burnout Guard® provides these benefits as it contains 100 mg of 5-HTP, 0.5 mg of folic acid and 10 mg of activated vitamin B6. The dosage should start at 1 capsule and be increased to 2 capsules/day. Possible alternatives with a similar composition or indication are Stress Balance® or Serotonin®.

Therapy with tryptophan

When tryptophan is used to increase serotonin levels, it should be taken between meals. The patient should follow a diet rich in carbohydrates and low in protein where possible. This results in the release of insulin, which increases the uptake into muscles of amino acids of which compete with tryptophan for transport at the blood-brain barrier, so that more tryptophan can enter the brain via the blood-brain barrier. Tryptophan and cofactors are found for example in Aminoplus Neurostress®, Balance® or L-Tryptophan 250®.

WARNING:

Patients undergoing therapy with serotonin reuptake inhibitors (SSRIs, such as citalopram or fluoxetine) should not be treated with tryptophan or 5-HTP. Therapy with tryptophan/5-HTP is also not advised when MAO inhibitors, tramadol or migraine therapy with triptans or ergotamine derivatives are used, since unpredictable interactions are possible in such cases. Caution is also advised during treatment with tricyclic antidepressants. Tryptophan or 5-HTP should only be used very carefully (example starting dose of 125 mg tryptophan or 10 mg 5-HTP).

GABA

Gamma-aminobutyric acid (GABA, 4-aminobutyric acid) is quantitatively the largest and most important inhibitory neurotransmitter in the central nervous system. GABA is synthesised endogenously with the aid of the enzyme glutamate decarboxylase from the excitatory neurotransmitter glutamate with which GABA is in equilibrium. Since the activity of glutamate decarboxylase cannot be determined, glutamate intake (e.g. excessive use of taste enhancers) should be reduced with the replacement of GABA.

Gamma-aminobutyric acid (GABA) lies in the **normal range**.

Glutamate

Glutamate (= glutamic acid) is the most important excitatory neurotransmitter. The concentrations of the transmitters glutamate and GABA are about 1000-fold higher than the concentrations of noradrenaline or

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dopamine. Glutamate is of great importance among other things for learning, memory and motor skills. Glutamate can be produced in various ways, for example by transaminases from α -ketoglutaric acid.

The **glutamate level** is **normal**.

Cortisol day profile for the evaluation of your individual stress level

Stressful or load situations result from a disproportion between requirements and available coping possibilities and are perceived as a threat. Stress can arise from work (workload, performance or time related) or social environment (existential fear, problems in partnership, fear of school). In addition, physical factors like pain or injuries can cause stress. The body has the ability to cope with stressful situations by using neuroendocrine mechanisms.

Cortisol is the most important **stress hormone** being released in the adrenal glands in the event of psychic or physical stress.

Cortisol is mainly produced in the second half of the night and is available for stress management in the morning between 7:00 and 8:00 am. During the day the Cortisol level decreases strongly so that there is only 10 % of the morning level still available in the evening.

Cortisol is responsible for adjusting the body to acute or persistent load situations. It activates metabolism and provides energy if needed. In order to achieve this, Cortisol promotes the supply of blood sugar and lipids; it changes the psychic reaction situation and interferes massively into the immune defence system.

Under stress measured Cortisol levels rise. Values above normal can be found. Under persistent stress situations Cortisol reservoirs are more and more consumed until, eventually, no more sufficient Cortisol can be released. Eventually, a burnout syndrome can occur which is a chronic state of exhaustion with feeling of illness under which the morning Cortisol level (8:00 am) or all 3 measured values are significantly below normal.

Cortisol day profile

Reduced levels of morning Cortisol were measured - a sign for **chronical stress load** with continuing consumption of Cortisol. With such a result, a transition into a clinically manifest burnout syndrome with physical or psychic state of exhaustion cannot be excluded. In the further course of the day Cortisol release decreases below normal. As confirmatory test, a control is recommended (if necessary also in serum).

Patients with manifest burnout syndrome or distinct physical or psychic state of exhaustion are recommended to be treated by experienced therapists. Depending on the situation, therapy can include **physical activity, relaxation techniques** (e.g. autogenic training), **psychotherapy** and the administration of allopathic, orthomolecular or phototherapeutic preparations.

Notice:

The sleeping quality should possibly be examined to exclude relevant physical stress factors during sleep.

An administration of **5-HTP** has the advantage that it cannot be decomposed to kynurenine anymore and thus be transformed by 90 % into serotonin. Apart from Tryptophan or 5-HTP, also the cofactors for serotonin development should be sufficiently supplied. The essential cofactors are **folic acid** (vitamin B9) and **pyridoxine** (vitamin B6). Niacin (vitamin B3) is mostly important for administration of Tryptophan because thereby a transformation of Tryptophan is prevented for niacin synthesis.

Furthermore, niacin inhibits the Tryptophan 2,3-dioxygenase, an enzyme that decomposes Tryptophan into kynurenine.

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Therapy with 5-HTP

5-HTP possesses a high bioavailability if absorbed as Griffonia (African black bean). Clinically, a boost of mood, a calming effect, a reduction of anxiety and often an antidepressant effect can be achieved.

The medical preparation Burnout Guard fulfils the specified requirements. It contains 100 mg 5-HTP, 0,5 mg folic acid and 10 mg activating vitamin B6. The dosage begins with 1 capsule / day and is increased to 2 capsules / day. Possible alternatives with similar composition or indication are Stress Balance or Serotonin.

Therapy with Tryptophan

If Tryptophan is used to increase the serotonin level, it should be taken in between the meals. If possible, the patient should keep a diet rich in carbohydrate and protein. The hereby released insulin infiltrates into the muscular system amino acids located at the blood brain barrier competing with Tryptophan for transport into the muscular system so that through the blood brain barrier more Tryptophan reaches the brain. Tryptophan and cofactors are for example contained in the preparations Aminoplus Neurostress, Balance or L-Tryptophan 250.

WARNING:

Patients under therapy with serotonin reuptake inhibitors (SSRIs e.g. Citalopram or Fluoxetin) are not recommended to be treated with Tryptophan or 5-HTP. Also for MAO inhibitors, Tramadol or migraine therapy with triptans or ergotamine derivate a therapy with Tryptophan / 5-HTP has to be refrained because incalculable interactions are possible. Careful consideration must also be given to a therapy with tricyclic antidepressants. Tryptophan or 5-HTP should be taken only very carefully (starting dose e.g. 125 mg Tryptophan or 10 mg 5-HTP).

DHEA Diurnal Profile in Saliva

The DHEA value in both samples is reduced. There should be a control determination of DHEA-s in serum (morning blood withdrawal) and possibly a DHEA-S substitution therapy.

With kind regards

Your Biovis-Diagnostik

Attention: *The recommendations given are only advice based on the compiled findings and possible clinical information. They are exclusively addressed to the therapist/physician and are **not intended** for direct transfer to the patient. They cannot replace diagnosis and therapy of the treating therapist. The recommendations for therapy are a suggestion. The responsibility for the final selection/measure/dosage lies with the medical professional/therapist responsible for each individual case. Please also note that there may be contraindications/interactions associated with the recommended medication/nutritional supplements for pre-existing primary diseases and when taking certain medication. These must be investigated by the medical professional/therapist before starting therapy.*