

Hormones in Saliva



Easy and safe diagnostics and therapies for sexual hormones, cortisol and DHEA

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Structure Formula

Hormones control the human body and its functions in every second of life: Reproduction, growth, digestion, metabolism, immune system and many other functions are controlled by hormones. In this process the precise coordination of the various hormones is very important. If something goes wrong and the body is unbalanced, the person concerned quickly feels unwell or even ill although he is physically healthy. The hormone analysis will reveal if the complaints are caused by abnormal hormonal regulation. For this purpose **biovis** offers simple saliva hormone diagnostics: fast, patient-oriented and safe determinations of current hormone levels and diurnal progress - the basis for individual therapies.

The Human Endocrine System

The humane endocrine system is very complex. Many hormones interact, control, inhibit or strengthen each other and such regulate the wonderful fine-tuning of the body's function and their reactions to the environment. In spite of many hormone interactions there is a clear hierarchy. Most important is the hypothalamus – an area in the brain. It controls the pituitary gland, which is situated very close to the hypothalamus. Together these two brain structures influence all tissues of the body, which are able to develop and release hormones. They are the so-called endocrine organs: thyroid gland, pancreas, adrenal glands and gonads – ovaries in females and testicles in males.

Because of the direct neighbourhood of the nervous system and the most important control organ of the hormone system in the brain it is easy to explain, why our psychic condition is able to influence the hormone system – and vice versa.



Steroid Hormones

Steroid hormones are a group of chemically similar hormones. **Sex hormones**, the stress hormone **cortisol** and its antagonist **DHEA** – which at the same time is also active as sex hormone – belong to this group. . Our body develops all steroid hormones from cholesterol via various intermediate steps. Therefore the hormones already interact during their development.



Picture 2: Cholesterol is the base substance for all steroid hormones. This development cascade clearly shows that all steroid hormones interact. Hormone dysbalances therefore require precise, coordinated therapies accompanied by regular follow-ups.

Sex Hormones

As the term **'sex hormones'** already indicates, these hormones are mainly responsible for expressing gender, growth, sexuality and pregnancy. But they have influence on many other parts of the body, e.g. skin and hair, skeleton, brain, immune system and even our behaviour.

Oestrogens (mainly oestradiol, oestriol and oestrone), androgens (mainly **testosterone**) and gestagen (mainly **progesterone**) as well as **DHEA**, which can be metabolised to oestrogens as well as to androgens, belong to the group of sex hormones. These hormones are mainly produced in the gonads and also small additional amounts in the adrenal glands.

Fat tissue may be a noteworthy producer of oestrogen. Especially in case of obese patients one should always take this high oestrogen development into consideration if there are hormone dysbalances.

Females and males develop all sex hormones, only the ratio of the various hormones to each other and the responsiveness of the body (receptors) control the gender.

Analyses of sex hormones have long been established as basis for hormone therapies. Especially in the scope of gynaecology when treating **menstrual cycle and menopause disorders** or **unwanted childlessness** they are very common. In the meantime, however, many other diseases and complaints can be detected with the aid of hormone diagnostics and new therapies approaches can be established.

Of course **irregular**, **longer or shorter cycles** and the widely spread **premenstrual syndrome** in females are one part. But also in case of severe **aggressive behaviour**, **loss of performance** and **weakness**, preterm **male baldness**, **enlargement of breast tissue (gynaecomastia)** and of course **prostate disorders** in males one should take hormone analyses into consideration. Also **adiposity**, **weak bladder**, **oedema tendency**, **skin problems** (e.g. acne), **psychic complaints**, **weak libido**, **diffuse weight changes**, **loss of hair**, **headaches** and **migraine** as well as **deficient bone density** and even **severe forgetfulness** may be caused by imbalanced sex hormones. Simple hormone analyses can help to find new and successful therapeutic approaches.





Cortisol and DHEA

Cortisol is one of our most **important stress hormones**, which is exclusively developed in the adrenal cortex. It is responsible for stimulating certain metabolic processes (e.g. gluconeogenesis, lipolysis) in the body, as **stress consumes energy** and this energy is thus made available.

But not only stress leads to the release of cortisol. It is a vital hormone. Without this hormone man can only survive a few days. Cortisol analyses of humans without stress show a regular 24-hour rhythm of cortisol release in the body: its lowest level can be measured around midnight. Then the stress hormone level slow-ly and continuously increases until it reaches a high level in the morning, which makes us wake up. About half an hour after waking up the highest level is reached – the so-called "Cortisol Awakening Response", which makes us fit for the day. In the morning cortisol values clearly decrease again and keep reducing in the further course of the day until they reach the lowest point around midnight.

If there are acute **stress situations** in the course of the day, additional cortisol is released, which is expressed in fast increase and subsequent decrease of the daily curve.



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Picture 3: Diurnal Curve – Cortisol Values in Saliva



Aside from its metabolism stimulating effects cortisol suppresses the immune system and slows down inflammatory reactions. This physical reaction triggered by the hormone is used therapeutically for hydrocortisone therapies. Furthermore cortisol is important for the body's water and electrolyte balance, its protein metabolism and the control of blood sugar levels during prolonged starvation.

If the patient suffers from chronic stress the diurnal cortisol release curve is massively altered: All in all there is always significantly more cortisol available and additional stress situations only lead to slight increases of already high levels. In spite of high levels, however, there are still lower cortisol values during the night, an increase in the morning and continuous decrease in the course of the day. But the levels are generally higher. In case of long term chronic stress this may lead to manifest **burn-out syndromes**. The **adrenal cortex is exhausted** due to long lasting overload and cannot provide the required amounts of cortisol any more. The measurable diurnal curve of the stress hormone release is **generally too low and often completely arrhythmic**. This has considerable consequences for diurnal process and well-being of the patient: **total exhaustion, enormous susceptibility to stress, forgetfulness, sleeping problems and many more**.

DHEA is the hormone wich is produced the most. Aside from its effect as **sex prohormone** it is also the **cortisol antagonist**. Furthermore it positively influences the **cardiovascular system**, seems to have **neurotransmitter** functions in the brain and protects the mitochondria – the cellular "power plant" for energy production in all our cells. Endogenic DHEA production, however, significantly decreases in the course of life. Therefore one assumes a correlation between **aging processes** and DHEA-level. The decreasing level of the cortisol antagonist may lead to lower stress tolerance and increased susceptibility to infections when getting older. Thus Low DHEA levels may for example increase the complaints of chronic stress and burn-out syndrome and also play a role in case of **imbalanced sex hormones** or **psychic problems**.

Often DHEA is called "anti-aging hormone" as it may temper some aging factors. If it actually has a live-extending effect has, however, not been proven yet. It is a fact that the effect of DHEA differs considerably in males and females. Its sex prohormone effect tends to go more in direction of testosterone in females and in males more in the direction of oestrogens.



Steroid Hormones – the Saliva Test and its Advantages

So far the steroid hormones for respective diagnoses were determined in blood. In this case one had to keep in mind that the hormones to be analysed in blood are predominantly bound to transport proteins, the so-called sex hormone binding globulins (SHBG), transcortin or albumins. All **steroid hormones** are lipophilic substances and thus only very low fractions can flow freely in blood. But **bound hormones are not active**; they cannot fulfil their function in the body, as the transport proteins interfere. If steroid hormones are tested in blood the entirety of all hormones in blood, active, free and inactive bound to transport proteins are tested. If one wants to determine only the concentrations of free active hormones in blood the transport proteins would have to be measured in an additional analysis and subtracted from the hormone value. Much simpler and more accurate on the other hand is the determination of **hormones in saliva**. **Naturally only the free active hormones** are in saliva– the determination and calculation of possible transport molecules is not required. One saliva analysis suffices and saliva does not require further processing. This is a **true improvement** in the field of hormone analyses.



There are even more benefits: First of all no blood has to be drawn for the analysis of steroid hormones . Patients can simply take the sample themselves. This is very important for hormone determinations as hormone concentrations in the body are subject to strong fluctuations. There is, for example, the natural female menstruation cycle, which comes along with different values on each cycle day. Or analyses of the stress hormone cortisol, which has a certain release rhythm every day (circadian rhythm) and which reacts to environmental influences to adapt the body's functions accordingly. To get an exact picture of the patient's hormonal situation and to discover such rhythms, fluctuations and their possible irregularities several analyses are required. This is an obvious advantage of the saliva test. Patients can easily take the saliva sample during their daily routine. Even taking samples at different times of the day is no longer a problem. Blood withdrawal on the other hand requires at least one consultation in the practice and one venous puncture for each sample. This is time, manpower and material consuming. For the saliva test the patients get several tubes and fill them – according to prior instructions - at different times of the day. This can be done at home just as easily as at work or even on business trips and - if desired - without being noticed. The sample can be taken everywhere and stored - no appointment, no waiting times, no effort. The hormones are stable at room temperature for several days. Simple mail shipment is possible. If necessary the patients can mail the samples themselves - biovis will gladly provide additional information material or test sets for samples and shipment.



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