

# mental austria report

2025/11

focus

# Happy Hormones

*health*

**happiness hormones  
for regeneration and  
resilience.**

*interview*

**“Being able to live,  
love, achieve and  
laugh again.”**



Dr. Ursula Grohs, Psychologist



Univ.-Prof. Dr. Dagmar Kratky  
biochemist

*portrait*

**Four “superstars”  
in the Balance 4  
Complex. For efficient  
and sustainable help  
and prevention.**

*report*

**Nutrient complex in the test:  
impressive results.  
75% confirm significant  
improvement.**

# focus Happy Hormones

## Revolutionary synergy. 4 happiness hormones for physical regeneration and emotional resilience. The nutrient complex „Balance 4“

To understand the extraordinary function of the balance 4 complex, it is necessary to look at the underlying physiology of the body, in particular the role of the autonomic nervous system. This consists of two main components - the sympathetic nervous system (or stress mode) and the parasympathetic nervous system (or regeneration mode) - which play a fundamental role in regulating physiological processes and responding to environmental factors. These factors range from natural stressors to chronic stress.



The interplay between these two systems is crucial to maintaining healthy homeostasis (body balance), particularly in terms of the body's ability to balance between stress response and recovery.

### **Interaction of the sympathetic and parasympathetic nervous system.**

The interplay between the sympathetic and parasympathetic nervous systems forms the basis for the functioning of the Balance 4 Complex. The autonomic nervous system consists of the sympathetic nervous system (or stress mode), which controls the “fight or flight” response, and the parasympathetic nervous system (or regeneration mode), which is responsible for the renewal and recovery of the body. These systems have developed over the course of evolution to prepare the body for immediate physical threats and to return it to a state of rest after the threat has passed. The sympathetic nervous system triggers a series of physiological changes that prepare the body for acute stress, while the parasympathetic nervous system ensures that the body returns to a restful state after the threat has passed. This interplay enables the organism to react to external threats as well as to regularly undergo internal regeneration phases.

### **The activation of the sympathetic nervous system or stress mode: the health consequences.**

The activation of the sympathetic nervous system or stress mode triggers a cascade of physiological reactions that are vital for survival in the short term. However, if the body remains permanently in sympathetic mode, for example due to chronic stress, anxiety, burnout, sleep problems, failures, severe stress or traumatic experiences, significant

long-term health problems can arise. Chronic overactivation of the sympathetic nervous system has serious effects on the hormone balance and body chemistry. The consequences include:

- a constant increase in cortisol, which results in cortisol resistance and can lead to exhaustion of the adrenal cortex and fatigue
- a constant increase in insulin secretion, which results in insulin resistance and can lead to obesity and diabetes
- Fluctuations in blood pressure, cardiovascular diseases
- Stress-related inflammatory reactions, which can lead to pain in the spine and joints as well as somatoform pain disorders
- Stress-related inflammation, which can impair the immune system and lead to allergies and autoimmune reactions
- Anxiety disorders and depression
- Irritability, high sensitivity
- Mental overload
- difficulty concentrating
- restlessness
- body aches
- Digestive disorders or irritable bowel syndrome
- sleep problems

These health problems can be caused by constant stress that keeps the body in alarm mode and does not allow it to go into regeneration mode.

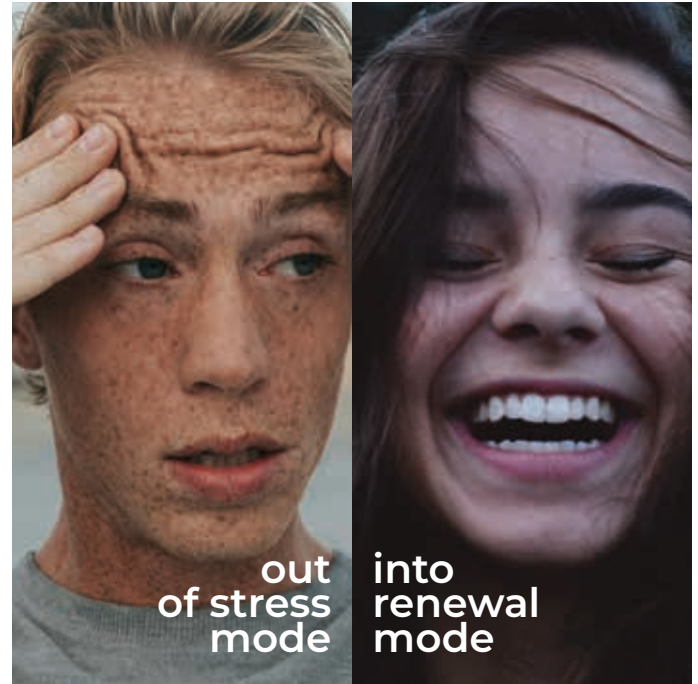
**Therefore crucial:  
Rapid switch to the parasympathetic or  
renewal mode.**

Rapid switch to the parasympathetic or renewal mode.

In the event of severe stress, it is crucial to quickly return to the regenerative parasympathetic mode. This requires a balanced biochemical and hormonal situation in the body. This balance can be restored and the vagus nerve positively influenced through the targeted intake of selected active substances and trace elements.

The vagus nerve plays a central role in switching from the sympathetic nervous system (stress mode) to the parasympathetic nervous system (regeneration mode). Its activation slows down the heartbeat, lowers blood pressure and stimulates digestive processes. These changes promote effective regeneration and stabilize inner security. At the same time, the cortisol level is lowered, which activates the body's self-healing processes. In addition, biological

signals such as exercise in nature (forest, meadow, river, lake, sea), meditation and social ties help to support this process. This physical regeneration is an essential prerequisite for inner security, well-being and therefore long-term health.



**The key to holistic health and inner security.  
Unique, holistic promotion of the  
Balance 4 Complex.**

Based on decades of research and therapeutic experience, a unique principle for the holistic promotion of the four most important happiness hormones has been developed by renowned scientists at Fourme GmbH. Prof. Dr. Dagmar Kratky, expert in molecular biology and biochemistry, Prof. Dr. Christoph Kratky, structural biologist and professor emeritus of physical chemistry, and Dr. Ursula Grohs, clinical psychologist with over 40 years of experience, combine the latest findings from neuropsychology, biochemistry and structural biology.

The scientists recognized that the body's four happiness hormones serotonin, dopamine, oxytocin and noradrenaline play a central role in stabilizing internal processes, activating the vagus nerve and switching to the parasympathetic nervous system. The support of these four happiness hormones is the key to mental health and forms the basis for inner security and effective stress management.

# fake the brain

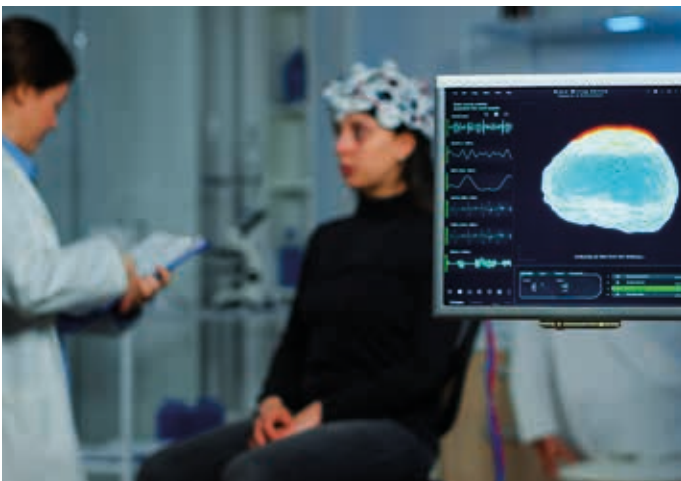


Dr. Ursula Grohs, a clinical psychologist with over 40 years of experience, explains that in order to activate the parasympathetic nervous system, a balanced biochemical situation must be created in the body. This requires the targeted supply of active substances and trace elements that support the transition to the parasympathetic mode and thus enable both physical recovery and psychological stabilization. The gentle flooding with active substances promotes the four happiness hormones serotonin, dopamine, oxytocin and noradrenaline, which play a central role in activating the vagus nerve - a decisive factor in the regulation of the parasympathetic nervous system.

ergy is a decisive basis for inner security, effective stress management and the initiation of self-healing processes in the body.

## Actively control mental and physical regeneration

This targeted mechanism makes it possible to actively influence the brain and put it in a state that corresponds to the body's natural reaction to stress and recovery. Instead of passively suffering from the effects of chronic stress and strain, the flooding of happiness hormones can set a conscious process in motion that "fools" the brain - convincing it that the body is already in a state of safety and satiety. Dr. Grohs refers to this mechanism as "Fake the Brain" - an innovative method of actively controlling mental and physical regeneration. This enables the brain to promote the activation of the vagus nerve and actively put the body into regeneration mode.



The scientist emphasizes that this approach differs fundamentally from many existing solutions that only promote individual happiness hormones in isolation. The simultaneous activation of these four hormones in a targeted syn-





## “Being able to live, love, achieve and laugh again.”

Interview with Dr. Ursula Grohs, psychologist, and Dr. Dagmar Kratky, biochemist.  
Developers of the Balance 4 Complex.

**mental austria:** An interview with two experts whose decades of experience and expertise have been instrumental in the development of the Balance 4 Complex.

**Dr. Ursula Grohs**, Managing Director of Institut Dr. Grohs and Fourme GmbH, Clinical Psychologist, Health Psychologist and Individual Psychological Analyst, and **Dr. Dagmar Kratky**, Professor of Biochemistry at the Medical University of Graz and Deputy Head of the Department of Molecular Biology and Biochemistry. Together they will give us an insight into the holistic perspective of the Balance 4 Complex and explain how this innovative approach supports both psychological and biochemical processes in the body to promote physical and mental health.

### **mental austria**

What inspired you to develop the Balance 4 Complex and how are the psychological and biochemical perspectives connected?

#### **Dr. Grohs:**

“In more than 40 years of therapeutic support, I have repeatedly seen the importance of inner security and the ability to cope with stress. Psychological resilience is crucial for well-being and physical health. The Balance 4 Complex goes one step further by not only addressing psychologi-

cal aspects, but also the biochemical processes of the body. Only by combining both areas - psychology and biochemistry - can we create a holistic approach to health promotion.”

**“By combining psychology and biochemistry, we can create a holistic approach to health promotion.”**

#### **Dr. Kratky:**

“The biochemical processes in the body directly influence our inner security. Happiness hormones such as serotonin, dopamine, oxytocin and noradrenaline play a central role in how our body reacts to stress and how it can recover. By promoting these hormones simultaneously, we ensure that the biochemical foundations for resilience and emotional stability are created. Balanced biochemical processes make psychological work much easier and stabilize inner security in the long term.”

### **mental austria**

How does the Balance 4 Complex promote the four central happiness hormones, what happens biochemically when these hormones are activated simultaneously?

**Dr. Kratky:**

“The Balance 4 Complex contains specific nutrients that support the production and balance of the four happiness hormones - serotonin, dopamine, oxytocin and noradrenaline. The simultaneous activation of these hormones creates a biological balance that promotes both mental and physical health. Serotonin promotes happiness, dopamine supports motivation, oxytocin strengthens bonding and noradrenaline inspires and helps to improve focus and concentration. These hormones interact with each other and ensure a harmonious balance in the body.”

**“The simultaneous activation of the body’s 4 happiness hormones creates a biological balance that promotes both mental and physical health.”**

**Dr. Grohs:**

“Psychologically, it is the synergy of these four hormones that helps people maintain their inner security, even in stressful or distressing situations. Promoting these hormones at the same time is so important because they reinforce each other’s effects and together provide a solid foundation for resilience.”



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In your opinion, what are the biggest challenges people face when it comes to coping with stress and emotional regeneration? And how can the Balance 4 Complex specifically help?

**Dr. Grohs:**

“The biggest challenge is often the lack of ability to get out of permanent stress mode. Chronic stress causes people to remain in a constant state of alert, which has a negative impact on their physical and mental health.



The Balance 4 Complex helps to break this cycle by simultaneously boosting the four happiness hormones and initiating the transition into recovery mode. This transition is crucial to not only relieve symptoms in the short term, but to stabilize physical and mental health in the long term.”

**“Break the cycle and get out of the stressful stress mode into the recovering renewal mode.”**

**Dr. Kratky:**

“In biochemical terms, the promotion of the four happiness hormones also means a change in the hormone balance. The complex helps to regulate stress hormones such as cortisol and to calm the nervous system. This biochemical change ensures that the body switches to parasympathetic mode, which is responsible for regeneration and healing.”



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The Balance 4 Complex stands for a unique combination of active ingredients for the promotion of happiness hormones and against stress in general. Can you tell us more about the special ingredients, such as L-tryptophan, L-tyrosine, Rhodiola rosea and Ashwagandha, and why they are particularly important for the complex?



Rhodiola rosea also known as "rose root".

**Dr. Kratky:**

“L-tryptophan is a building block for serotonin production, which ensures a balanced mood and relaxation, L-tyrosine is a building block for dopamine production and therefore ensures a good drive. Rhodiola Rosea is an adaptogenic plant that helps the body to adapt to increased physical and emotional stress situations. It not only has a calming effect, but also promotes mental clarity and stamina. Ashwagandha is also an adaptogenic plant that can help regulate cortisol production and strengthen resilience to stress. These four ingredients work synergistically to optimize the biochemical processes in the body and boost the release of the four happiness hormones.”

**“Uniquely combined in the Complex Happy Hormones: Natural superstars against stress. L-tryptophan, L-tyrosine and Rhodiola Rosea.”**

**Dr. Grohs:**

“From a psychological perspective, it is the combination of these amino acids with adaptogenic plants that enables the body to cope better with mental stress. Rhodiola Rosea and Ashwagandha help to promote mental stability, while L-tryptophan provides relaxation and promotes a positive mood and L-tyrosine provides drive. This combination has proven to be particularly effective in strengthening inner security in the long term.”

**mental austria**

How does the Balance 4 Complex approach differ from other solutions on the market that only promote individual happiness hormones?

**Dr. Grohs:**

“The big advantage of the Balance 4 Complex is its holistic approach. Instead of just promoting a single hormone, we focus on the synergy of the four central happiness hormones. This simultaneous promotion is the basis for stable and sustainable mental and physical health. The complex not only offers a rapid improvement in mood, but also helps to create the biochemical conditions for long-term inner security.”

**“Holistic concepts for stable and sustainable mental and physical health”**

**Dr. Kratky:**

“The biochemical advantage of the Balance 4 Complex lies in the simultaneous activation of the four hormones. Many other products only focus on promoting a single hormone, which usually does not have the same lasting effect on emotional balance and regeneration. Our holistic approach ensures that the body is stabilized on many levels.”



**mental austria**

What is the long-term goal of Fourme GmbH with regard to the development of products to promote health?

**Dr. Grohs:**

“Our long-term goal is to provide people with a holistic approach to health promotion that focuses on both mental and physical health. The Balance 4 Complex is a step in this direction, but we continue to develop innovative products that address the individual needs of people at different stages of their lives. An important part of our future program is the satellite products, which are geared towards specific needs. These include products for adolescents that meet the needs and hormonal challenges of the young body, as well as solutions for people with obesity, anorexia, inflammatory reactions or fatigue. The Balance 4 Complex forms the basis on which these products are built. With a targeted promotion of the happiness hormones, we can not only support mental well-being, but also effectively address metabolism, inner security and weight control.”

**„In the next step, we will develop specific solutions for obesity and anorexia, stress-related depression and anxiety disorders, fatigue and other stresses based on the Balance 4 Complex, which we call satellite products.”**

**Dr. Kratky:**

„The development of such satellite products is an extension of our holistic approach. By promoting the four central happiness hormones, we can not only promote inner security and resilience to severe stress, but also positively influence the metabolism. Hormonal imbalances play a central role in obesity and anorexia, for example. By simultaneously activating the happiness hormones and supporting the biochemical processes in the body, we offer a unique opportunity to tackle these challenges. People suffering from fatigue can also benefit from the regeneration and stabilization of the hormonal system.”

**Dr. Grohs:**

“Our vision at Fourme GmbH is to help people lead healthy, fulfilling lives by supporting both their mental and physical health. We have made it our mission to develop innovative solutions that address the needs of the individual - with a holistic approach based on the promotion of happiness hormones. Our products should not only help in the moment, but also pave the way to a better quality of life in the long term.

**„We want people to regain the joy of life, pursue their goals with ease and experience their zest for life - so that they can live, love, achieve and laugh again.”**



**The core scientific team of Fourme Formulas.**

The scientific core team of Fourme Formulas unites top-class experts who, through their interdisciplinary expertise and many years of research experience, contribute significantly to the development of innovative solutions in the field of mental and physical health.



**Dr. Ursula Grohs**, Managing Director of the Dr. Grohs Institute and Fourme GmbH. As a clinical psychologist, health psychologist and individual psychological analyst, she developed the world’s most successful PDM® smoking cessation program, which meets the highest recommendation A of the World Health Organization. Her focus is on the development of psychodynamic models for meditative training and autosuggestion.



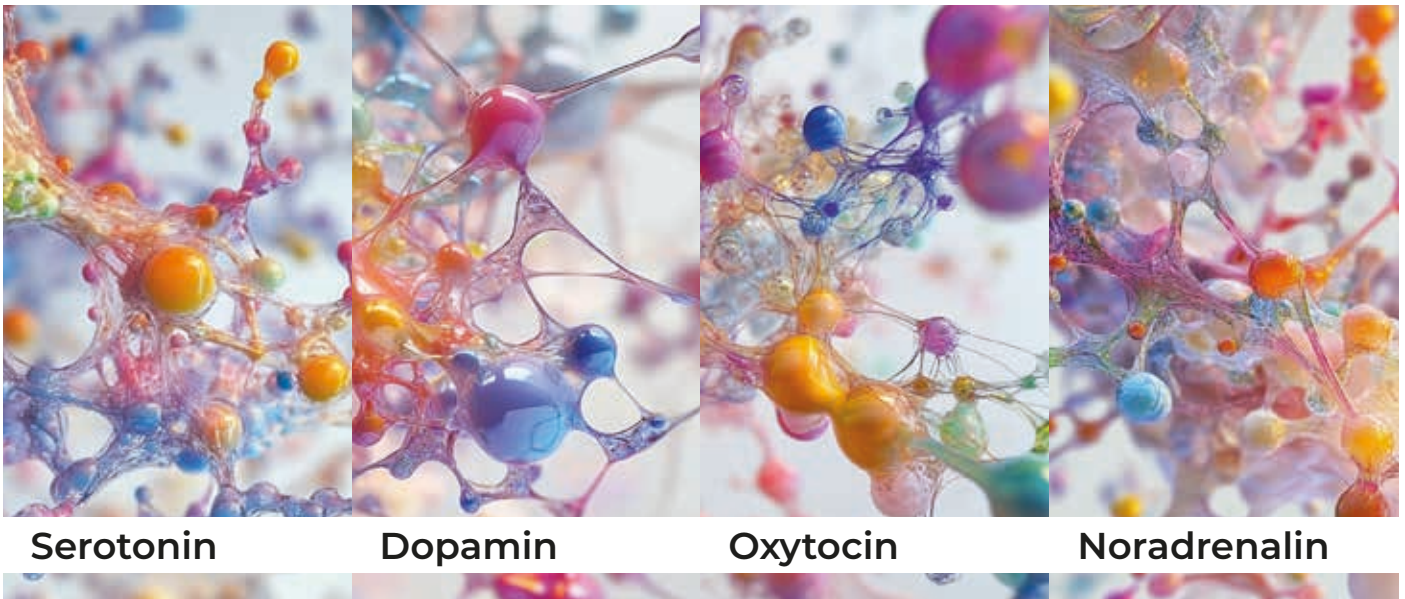
**Dr. Dagmar Kratky**, Professor of Biochemistry at the Medical University of Graz and Deputy Head of the Department of Molecular Biology and Biochemistry. With an impressive academic career and numerous research projects, she is a leading expert in the field of biochemistry and molecular biology.



**em. Prof. Dr. Christoph Kratky**, Professor Emeritus of Physical Chemistry at the University of Graz, is a renowned structural biologist. He specializes in chemistry, structural biology, physical chemistry and biophysics and develops innovative solutions to promote mental and physical health.



**Susanne Grohs-Schlager** is an authorized signatory of Institut Dr. Grohs and Fourme GmbH as well as a clinical psychologist and health psychologist. She specializes in the treatment of children and adolescents, stress reactions and personality disorders, thus contributing to the holistic treatment of those affected.



## The 4 happiness hormones and their effects on the body and mind.

The four key happiness hormones - serotonin, dopamine, oxytocin and noradrenaline - are fundamental regulators of physical and mental health. Their simultaneous promotion provides a synergy that is deeply rooted in the body's biochemical processes and supports a healthy alternation between stress modes and renewal phases. This combination has far-reaching positive effects on inner security, stress management and physical regeneration.

### **Serotonin - the “happiness hormone”**

Serotonin is known as the actual “happiness hormone” as it plays a central role in regulating mood, sleep and appetite. It has calming properties that stabilize the nervous system and promote relaxation. In stressful situations, serotonin curbs the overactivity of the sympathetic nervous system and guides the body into the recovery mode of the parasympathetic nervous system. This transition is crucial for mental balance, as serotonin stabilizes emotional fluctuations, reduces anxiety and improves sleep quality. An imbalance in serotonin levels is associated with depression and anxiety disorders and has a negative effect on inner security.

### **Dopamine - the reward hormone**

Dopamine is the central hormone of the reward system and is closely linked to motivation, satisfaction and pleasure. It is released during positive experiences and rewards and

promotes performance and the pursuit of goals. However, dopamine also has calming properties that put the body into recovery mode. It helps to stabilize focus, increase cognitive abilities and promote relaxation. In addition, dopamine contributes to emotional stability and increased motivation, thus acting as an important stress regulator. A low dopamine level is associated with listlessness and a lack of motivation.

### **Oxytocin - the trust hormone**

Oxytocin, often referred to as the “bonding hormone”, plays a key role in promoting social bonding and interpersonal relationships. It is released during positive social interactions and increases empathy, trust and emotional well-being. Oxytocin also contributes to the reduction of anxiety, which promotes the activation of the parasympathetic nervous system and supports the body's recovery. This hormonal effect makes oxytocin an important player in stress management and contributes to emotional stability. High oxytocin levels strengthen interpersonal relationships and have a positive influence on mental health.

### **Noradrenaline - stress regulator**

Noradrenaline is commonly associated with stress as it is responsible for the fight or flight response. It arouses enthusiasm, improves concentration, focus and reaction time and helps to increase alertness in stressful situations.

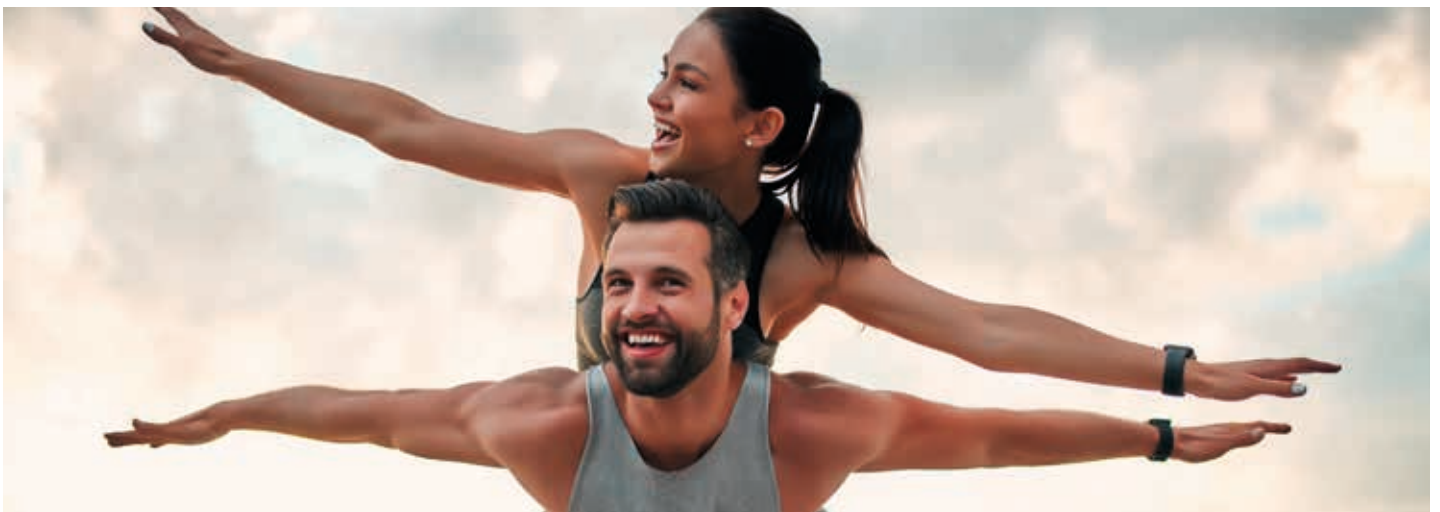
Although noradrenaline plays an important role in the stress response, it also plays an important role in stress regulation and mental recovery. In the right dosage, it promotes the restoration of mental balance and helps the body to get back into regeneration mode after stressful events. By stimulating the vagus nerve, it supports the conversion of the sympathetic nervous system into the parasympathetic nervous system, enabling the body to initiate the regeneration process.

### **Biochemical flooding and regeneration**

The simultaneous and targeted promotion of these four happiness hormones leads to a “biochemical flooding” in which the body is supplied with the necessary nutrients and active substances required for the production and balancing of these hormones. This flooding stabilizes in-

ner security, promotes stress management and supports physical regeneration. The regular supply of the right nutrients frees the body from the effects of chronic stress and puts it into a regeneration mode that activates the body’s self-healing powers. This forms the basis for long-term inner security and the sustainable promotion of a healthy psychophysical state.

The synergy of these four happiness hormones ensures that the body efficiently and quickly switches from stress mode (sympathetic nervous system) to regeneration mode (parasympathetic nervous system), thus promoting the body’s self-healing processes. This holistic approach provides in-depth support for physical and mental health and is therefore the key to effective stress management and long-term well-being.



## **Balance 4 Complex. The synergy of happiness hormones for optimal health.**

Balance 4 Complex is a unique formula that focuses on the simultaneous promotion of the four key happiness hormones - serotonin, dopamine, oxytocin and noradrenaline. This flooding of the body with active ingredients stabilizes the balance of hormones and neurotransmitters, promotes inner security and improves the ability to cope with stress. The supply of targeted nutrients supports the body’s self-healing powers by promoting the transition from sympathetic mode (stress mode) to parasympathetic mode (renewal mode). This biochemical flooding puts the body into a regenerative state that promotes both mental and physical regeneration.

### **The clusters of the Balance 4 Complex.**

Although Balance 4 Complex focuses on promoting the four key happiness hormones, the synergy between the individual ingredients is crucial to the product’s unique influence. This synergy can be seen in the interactions between the ingredients, which work together to optimize both stress reduction and the promotion of the renewal process. The Balance 4 Complex is divided into 4 main clusters.

## 1. Cluster of Amino Acids and Neurotransmitters

Amino acids are the building blocks of neurotransmitters and play a key role in the regulation of mood and emotional balance.

### L-Tryptophan:

L-tryptophan is an essential amino acid that the body needs to synthesize serotonin. Serotonin has a stabilizing effect on mood and sleep. L-tryptophan supports the transition from stress mode to renewal mode.

### L-Tyrosine:

This amino acid is a precursor to dopamine, another important happiness hormone responsible for drive and reward. Dopamine not only helps to boost performance, but also has beneficial properties.

## 2. Cluster of Vitamins

Vitamins play an essential role in maintaining a healthy hormonal balance and in promoting physical and mental health.

### Vitamin B complex:

The B vitamins, including B6, B9 (folic acid) and B12, are essential for the synthesis of neurotransmitters that interact with happiness hormones. They promote the health of the nervous system, improve mood and boost energy levels.

### Vitamin D3:

Vitamin D3 is crucial for the regulation of serotonin and supports overall well-being, especially during the cold season when sunlight exposure is reduced.

## 3. Cluster of Trace Elements

Minerals and trace elements are crucial for the stabilization of bodily processes that are necessary for well-being.

### Magnesium:

Magnesium has a calming effect on the nervous system and supports the function of the parasympathetic nervous system. It plays a central role in the regulation of stress and helps to put the body into renewal mode.

### Zinc:

Zinc is important for the immune system and supports mental health. It helps to regulate the release of cortisol and is an essential building block in neurotransmitter production.

## 4. Cluster of Adaptogens

Adaptogens are plant substances that help the body to adapt to stressful situations and restore physiological balance. In Balance 4 Complex, Rhodiola Rosea (rose root) and ashwagandha play a key role in this cluster.

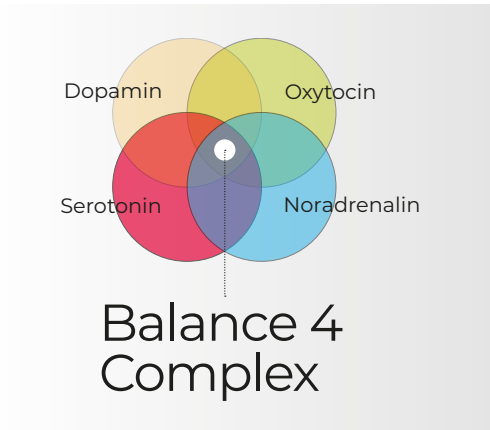
### Rhodiola Rosea:

This adaptogenic plant has traditionally been used to reduce stress and increase physical and mental performance. In 2023, Rhodiola Rosea was officially named Medicinal Plant of the Year, underlining the recognition of its stress-reducing and performance-enhancing properties. Especially in times of chronic stress, Rhodiola Rosea helps to improve the body's ability to adapt and promotes regeneration.

### Ashwagandha:

Another adaptogenic remedy known to strengthen the body's resistance to stress. It helps to reduce stress levels and can lead to better stress management. Ashwagandha can support overall well-being and promote mental clarity.





## The synergy of the happiness hormones

The simultaneous promotion of the four happiness hormones - serotonin, dopamine, oxytocin and noradrenaline - forms the synergy that is crucial for a balanced biochemical environment in the body. These hormones work in close interaction with each other and thus promote lasting inner security. The Balance 4 Complex utilizes this synergy by combining amino acids, vitamins, adaptogenic plant substances and trace elements. This special composition

creates an environment that optimally prepares the body for regeneration and recovery. The hormonal balance achieved by this nutrient complex lowers cortisol levels and activates the body's self-healing powers. The targeted intake of these active ingredients not only promotes physical regeneration, but also strengthens inner security, leading to a healthier and less stressful life.





Portrait.

# Exceptional ingredients combined for synergy.

Rhodiola Rosea, L-Tryptophan,  
L-Tyrosine & Ashwagandha.

The Balance 4 Complex relies on a unique combination of natural nutrients that create synergies and thus the effective promotion of the four happiness hormones - serotonin, dopamine, oxytocin and noradrenaline. With regard to the unique synergistic effect of Balance 4 Complex, 4 ingredients can be particularly emphasized:

- **Rhodiola Rosea (rose root)**
- **L-Tryptophan**
- **L-Tyrosine**
- **Ashwagandha (KSM-66®)**

### Why these four ingredients?

These four ingredients offer a unique approach to boosting the 4 happiness hormones. L-tryptophan directly influences serotonin levels, L-tyrosine directly influences dopamine levels. Together they ensure a stable inner security. Rhodiola Rosea is not only an adaptogenic plant, but also plays a central role in the combination of stress management and performance enhancement. Ashwagandha supports recovery and relaxation. Together they offer a potent blend which, in its synergy, represents a unique solution for the holistic promotion of the 4 happiness hormones.



## Against stress management for increased performance. Super-adaptogen **Rhodiola Rosea**.

Rhodiola Rosea, also known as rose root, is a remarkable adaptogenic plant\* that has become increasingly important in recent years, particularly for its stress-reducing and performance-enhancing properties. This plant grows mainly in the arctic and alpine regions, with a particular concentration in the Austrian Alps as well as in the mountainous regions of Asia, Europe and North America. Ho-

wever, the use of Rhodiola Rosea in naturopathy is not new. It was already used in the traditional medicine of Nordic and Russian cultures to treat fatigue, stress and as a general remedy. Of particular note is its use in the former Soviet Union, where it has been used specifically since the 1960s to help cosmonauts cope with the extreme stress conditions of space.

\*Adaptogens describe plants that have the properties to normalize bodily functions in stressful situations and to increase the body's resistance to stress in a non-specific way. They can help the organism to adapt to physical and mental demands and stress, i.e. to adjust.

### Active ingredients and herbal derivation

Rhodiola Rosea contains a variety of bioactive ingredients, including rosavin, salidroside and tyrosol, which are primarily responsible for its adaptogenic effects. These compounds work together to support the immune system, modulate the body's stress response and enhance mental and physical performance. In particular, rosavin and salidroside are the two compounds thought to be responsible for the neuroprotective and stress-reducing effects. These nutrients help to dampen the body's response to stress and increase energy production at a cellular level.

### Use in naturopathy

Rhodiola Rosea has been used for centuries in various traditional healing systems to combat exhaustion, stress and depressive moods. In Russian and Scandinavian medicine in particular, the plant has a long history as a means of improving physical and mental vitality. Recently, it has gained increasing attention worldwide and was even named "Medicinal Plant of the Year" in 2023, underlining the recognition of its health benefits and importance to modern naturopathy.

### Effects and benefits in connection with the Balance 4 Complex.

The adaptogenic effect of Rhodiola Rosea makes it an ideal ingredient in the Balance 4 Complex, as it helps to naturally arm the body against the strains of stress. Its ability to regulate the stress hormone cortisol plays a crucial role in promoting the transition from stress mode (sympathetic nervous system) to renewal mode (parasympathetic nervous system). In combination with other active ingredients such as L-tryptophan and L-tyrosine, Rhodiola Rosea promotes the balance of the four happiness hormones - Oxytocin, Serotonin, Dopamine and Noradrenaline - and thus contributes to the comprehensive promotion of psychophysical health.

In addition, Rhodiola Rosea boosts mental performance and focuses the brain, which is particularly helpful in stressful situations. Its effect on the central nervous system not only helps to improve mental clarity, but also promotes recovery, leading to increased resilience to stress. In combination with the other adaptogenic ingredients of the Balance 4 Complex, the body's ability to process stress is further optimized, while regeneration is triggered at the cellular level.

### Further applications and research

Research on Rhodiola Rosea is still ongoing, and more and more results are demonstrating its positive effects on mental health and general well-being. Recent research projects have shown that Rhodiola Rosea is not only helpful in combating stress and anxiety, but can also improve sleep quality and boost mental performance when physically exhausted. This shows that Rhodiola Rosea goes far beyond its traditional use as a stress reliever and offers a variety of other therapeutic potentials.

## The building block for happiness & well-being.



### L-Tryptophan.

L-tryptophan is an essential amino acid that plays a central role in the body in the production of serotonin, one of the most important neurotransmitters for emotional balance. As a precursor to serotonin, L-tryptophan plays a key role in stabilizing mood, reducing stress and promoting general well-being. The body cannot produce L-tryptophan itself, which is why it must be supplied via the diet or food supplements. In Balance 4 Complex, L-tryptophan is used specifically to promote the production of serotonin and thus support a stable emotional balance.

#### Influence of L-tryptophan on the body and psyche.

L-tryptophan is crucial for the synthesis of serotonin, a neurotransmitter that is not only responsible for regulating mood, but also influences essential physiological functions:

#### Mood regulation:

L-tryptophan promotes the production of serotonin, which contributes to a stable mood. Serotonin has a calming effect on the nervous system and helps to reduce anxiety and depression.

#### Sleep improvement:

As serotonin is also the precursor of the sleep hormone melatonin, L-tryptophan plays an important role in regulating sleep. A balanced intake promotes better and more restful sleep.

#### Stress management:

L-tryptophan helps to regulate cortisol levels and calm the sympathetic nervous system. This enables the body to cope better with stressful situations and minimize the effects of chronic stress.

#### Appetite regulation:

Adequate nutrition leads to the release of serotonin, which causes satiety. A balanced supply of L-tryptophan encourages a healthy diet.

### **L-tryptophan in naturopathy and scientific findings.**

For decades, L-tryptophan has been a proven remedy in naturopathy for the treatment of mood swings, sleep disorders and stress. Clinical studies have shown that L-tryptophan is just as effective as many pharmaceutical antidepressants in the treatment of depression and anxiety - but with fewer side effects. Of particular note is the use of L-tryptophan in the treatment of seasonal affective disorder (SAD), a form of depression that occurs particularly in winter and is associated with low serotonin levels.

### **Synergy in the Balance 4 Complex.**

L-tryptophan perfectly complements other ingredients in the Balance 4 Complex to synergistically promote the four central happiness hormones serotonin, dopamine, oxytocin and noradrenaline. Especially in combination with the ingredients of the adaptogenic plants *Rhodiola Rosea* and *Ashwagandha*, the body's ability to cope with stress and regenerate is further enhanced. This combination not only promotes inner security, but also contributes to the long-term stabilization of psychophysical well-being.

## The activator for motivation & drive.



## **L-Tyrosin**

L-Tyrosine is a non-essential but highly relevant amino acid for the body, which plays a key role in the synthesis of several neurotransmitters - including dopamine, noradrenaline and adrenaline. These messenger substances are central to motivation, attention, alertness and the reaction to stressful situations. The need for tyrosine can increase, especially under high physical or mental stress. In Balance 4 Complex, L-tyrosine is used specifically to support the dopaminergic system and thus promote drive, motivation and mental performance.

### **Influence of L-tyrosine on the body and psyche.**

L-tyrosine makes a decisive contribution to the production of several happiness and stress hormones and is particularly effective in situations of increased mental or emotional stress:

#### **Motivation boosting:**

As a direct precursor of dopamine, L-tyrosine supports the neurotransmitter responsible for drive, feelings of reward and motivation. A stable dopamine level promotes the ability to pursue goals, concentrate and feel pleasure.

#### **Stress resistance:**

L-tyrosine is involved in the production of noradrenaline and adrenaline - two neurotransmitters that prepare the body for stress. Under stress, tyrosine helps to maintain cognitive abilities and reduce the feeling of being overwhelmed.

#### **Cognitive performance:**

In demanding situations such as lack of sleep, pressure to perform or emotional stress, L-tyrosine can improve mental clarity, concentration and reaction speed. Studies show improved cognitive performance in stressful situations after L-tyrosine administration.

#### **Mood balancing:**

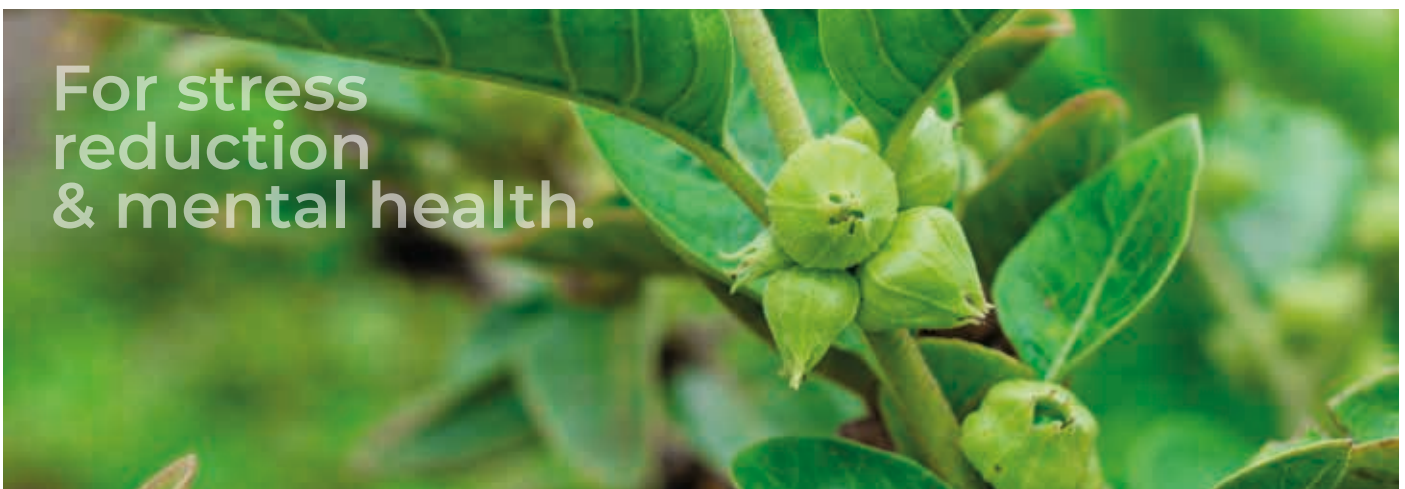
By regulating dopamine and norepinephrine levels, L-Tyrosine supports emotional balance and protects against states of exhaustion that can accompany chronic stress.

**L-tyrosine in naturopathy and scientific findings.**

L-tyrosine is used in orthomolecular medicine and functional psychiatry to support states of exhaustion, attention deficits and stress-related mood swings. Scientific studies show that L-tyrosine can increase performance in stressful or cognitively demanding situations and promote rapid recovery of mental functions - without the undesirable side effects of synthetic stimulants.

**Synergy in the Balance 4 Complex.**

In Balance 4 Complex, L-tyrosine acts as a targeted supporter of the dopaminergic and noradrenergic systems - in close coordination with other ingredients such as L-tryptophan, Rhodiola Rosea and adaptogenic plant extracts. This combination enables a balanced activation of both the parasympathetic and sympathetic nervous systems - and thus creates a stable foundation for mental balance, performance and inner security.



**The winter cherry.  
Ashwagandha.**

Ashwagandha (*Withania somnifera*), also known as ‚Indian ginseng‘ or ‚winter cherry‘, is another remarkable adaptogenic plant that has been used in traditional Indian medicine (Ayurveda) for centuries. It is particularly known for its calming and stress-relieving properties, which make it a valuable ingredient in Balance 4 Complex. Ashwagandha grows mainly in India, North Africa and the Middle East and has become increasingly popular in Western health circles due to its many healing properties.

**Active ingredients.**

Ashwagandha contains a variety of bioactive compounds, including withanolides, alkaloids and saponins, which are responsible for its adaptogenic effects. Withanolides in particular, classified as steroidal lactones, have a significant role in regulating the body’s stress response. These compounds act directly on the endocrine system and help to lower cortisol levels in the body. Ashwagandha also has antioxidant properties that protect the body from the damaging effects of free radicals.

**Use in naturopathy**

In Ayurvedic medicine, ashwagandha is traditionally used as a tonic that strengthens the body and mind. It is used to treat stress, anxiety, sleep disorders and general exhaustion. Ashwagandha is also considered a “rasayana”, an Ayurvedic term that describes a substance that promotes physical and mental well-being and prolongs life.

Ashwagandha is also known as an adaptogen, as it supports the body’s ability to adapt to stressful situations and increases overall resilience to physical and mental stress. These properties make ashwagandha an essential ingredient for promoting stress management and regeneration of the body.

**Benefits associated with the Balance 4 Complex.**

Ashwagandha plays a key role in Balance 4 Complex as it directly helps to support the transition from the sympathetic nervous system (stress mode) to the parasympathetic nervous system (renewal mode) through its stress-reducing and calming properties. The nutrient helps to lower cortisol levels and calm the nervous system, which improves the body’s ability to relax and recover.

In addition, ashwagandha supports the production of serotonin and dopamine, two of the four happiness hormones promoted in Balance 4 Complex. These hormones are crucial for regulating mood, improving quality of life and promoting mental and physical health. Ashwagandha therefore supports overall inner security and resilience and helps to promote the body's self-healing processes.

### Other possible applications

Interest in ashwagandha has increased enormously in recent years, and more and more research projects are de-

monstrating the numerous health benefits of this plant. Recent studies show that ashwagandha is not only helpful in reducing stress and anxiety, but also improves cognitive function, increases sleep quality and even supports physical performance in stress-related fatigue.

Research has also shown that ashwagandha has a positive effect on the immune system and helps to reduce inflammation in the body. This anti-inflammatory influence is particularly important for promoting physical regeneration and maintaining a healthy biological balance.

## To summarize: Four key active ingredients for happiness, balance and inner strength\*

In Balance 4 Complex, a targeted combination of micronutrients such as vitamin B complex, magnesium, zinc, selenium, folic acid and vitamin C work together with four highly effective active ingredients that play a central role in emotional balance and the promotion of the four happiness hormones:

**Rhodiola Rosea, L-Tryptophan, L-Tyrosine and Ashwagandha.**

### Rhodiola Rosea

is a powerful adaptogen that promotes stress resistance and relieves emotional exhaustion. In combination with other active ingredients, it helps to stabilize the balance of happiness hormones and strengthen inner resilience.

### L-tryptophan

is the natural precursor of serotonin, the hormone for mood, calmness and sleep. It supports emotional stability, has a calming effect and promotes restful sleep - an essential factor for mental recovery.

### L-tyrosine

provides the building blocks for dopamine and noradrenaline, which are important for motivation, focus and drive. It helps to maintain mental performance and cope better with stress, especially under high levels of stress.

### Ashwagandha

has a balancing effect on the stress system, regulates cortisol levels and helps the body to switch into recovery mode more quickly. It strengthens resilience and contributes to inner calm and physical regeneration.

## Optimum results thanks to 2 coordinated formulas for morning and evening in the Balance 4 Complex.

When developing the Balance 4 Complex, the scientists under the direction of Dr. Ursula Grohs and Dr. Dagmar Kratky paid particular attention to ensuring that the nutrients are adapted to the course of the day in such a way that a rapid and lasting effect is achieved. The body's natural daily routine was also taken into account in order to optimally promote both physical and mental health.

The Balance 4 Complex follows an innovative concept in which the ingredients are taken in two phases - morning and evening. This timed intake ensures that the body is constantly supplied with the necessary nutrients throughout the day. This not only achieves maximum results, but

also takes into account the body's natural rhythms. In the morning, the body is prepared and supported for the day with a targeted supply of nutrients, while the renewal phase is promoted in the evening.

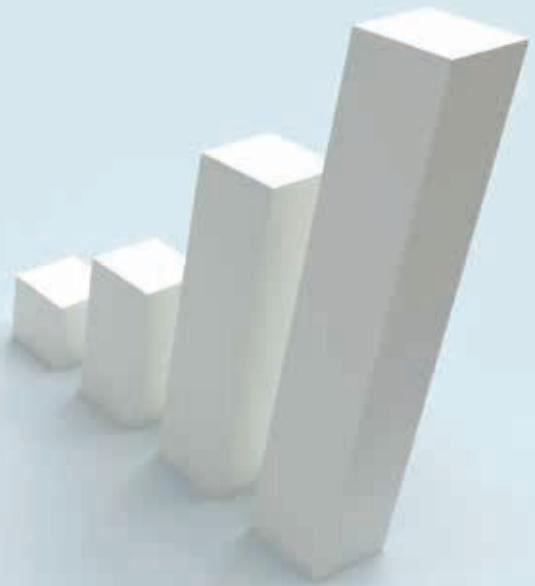
The specific allocation of ingredients ensures a continuous and timely release of nutrients that harmoniously "gently floods" the body and psyche throughout the day. This approach enables constant support for the body's self-healing processes and ensures an even balance between the four central happiness hormones, which optimizes both inner security and physical regeneration.

|  | <p><b>Morning</b></p>     | <table border="1"> <thead> <tr> <th>Ingredients</th> <th>daily dose (= 5 g powder)</th> </tr> </thead> <tbody> <tr><td>L-Tyrosin</td><td>700 mg</td></tr> <tr><td>Inositol</td><td>600 mg</td></tr> <tr><td>Rhodiola Rosea Wurzelextrakt</td><td>150 mg</td></tr> <tr><td>enthält Rosavin</td><td>4,5 mg</td></tr> <tr><td>Vitamin D3</td><td>20 µg</td></tr> <tr><td>Vitamin C</td><td>100 mg</td></tr> <tr><td>Vitamin B1/Thiamin</td><td>0,55 mg</td></tr> <tr><td>Niacin</td><td>13 mg</td></tr> <tr><td>Pantothensäure</td><td>3 mg</td></tr> <tr><td>Vitamin B6/ Pyridoxal</td><td>0,7 mg</td></tr> <tr><td>Folsäure (als 5-MTHF-Glucomin)</td><td>200 µg</td></tr> <tr><td>Vitamin B12/ Methylcobalamin</td><td>2,5 µg</td></tr> <tr><td>Magnesium</td><td>100 mg</td></tr> <tr><td>Zink</td><td>5,3 mg</td></tr> </tbody> </table> | Ingredients | daily dose (= 5 g powder) | L-Tyrosin                | 700 mg | Inositol            | 600 mg | Rhodiola Rosea Wurzelextrakt | 150 mg | enthält Rosavin | 4,5 mg | Vitamin D3 | 20 µg  | Vitamin C             | 100 mg  | Vitamin B1/Thiamin | 0,55 mg | Niacin | 13 mg | Pantothensäure | 3 mg | Vitamin B6/ Pyridoxal | 0,7 mg | Folsäure (als 5-MTHF-Glucomin) | 200 µg | Vitamin B12/ Methylcobalamin | 2,5 µg | Magnesium | 100 mg | Zink | 5,3 mg |
|---|---------------------------|--|-------------|---------------------------|--------------------------|--------|---------------------|--------|------------------------------|--------|-----------------|--------|------------|--------|-----------------------|---------|--------------------|---------|--------|-------|----------------|------|-----------------------|--------|--------------------------------|--------|------------------------------|--------|-----------|--------|------|--------|
| Ingredients   | daily dose (= 5 g powder) |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| L-Tyrosin   | 700 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Inositol  | 600 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Rhodiola Rosea Wurzelextrakt  | 150 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| enthält Rosavin   | 4,5 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Vitamin D3  | 20 µg                     |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Vitamin C   | 100 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Vitamin B1/Thiamin  | 0,55 mg                   |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Niacin  | 13 mg                     |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Pantothensäure  | 3 mg                      |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Vitamin B6/ Pyridoxal   | 0,7 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Folsäure (als 5-MTHF-Glucomin)  | 200 µg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Vitamin B12/ Methylcobalamin  | 2,5 µg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Magnesium   | 100 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Zink  | 5,3 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
|  | <p><b>Evening</b></p>     | <table border="1"> <thead> <tr> <th>Ingredients</th> <th>daily dose (= 5 g powder)</th> </tr> </thead> <tbody> <tr><td>Ashwagandhawurzelextrakt</td><td>500 mg</td></tr> <tr><td>enthält Withanolide</td><td>25 mg</td></tr> <tr><td>L-Tryptophan</td><td>300 mg</td></tr> <tr><td>Vitamin E</td><td>15 mg</td></tr> <tr><td>Vitamin C</td><td>125 mg</td></tr> <tr><td>Vitamin B6/ Pyridoxal</td><td>0,88 mg</td></tr> <tr><td>Magnesium</td><td>250 mg</td></tr> </tbody> </table>   | Ingredients | daily dose (= 5 g powder) | Ashwagandhawurzelextrakt | 500 mg | enthält Withanolide | 25 mg  | L-Tryptophan                 | 300 mg | Vitamin E       | 15 mg  | Vitamin C  | 125 mg | Vitamin B6/ Pyridoxal | 0,88 mg | Magnesium          | 250 mg  |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Ingredients   | daily dose (= 5 g powder) |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Ashwagandhawurzelextrakt  | 500 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| enthält Withanolide   | 25 mg                     |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| L-Tryptophan  | 300 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Vitamin E   | 15 mg                     |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Vitamin C   | 125 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Vitamin B6/ Pyridoxal   | 0,88 mg                   |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |
| Magnesium   | 250 mg                    |  |             |                           |                          |        |                     |        |                              |        |                 |        |            |        |                       |         |                    |         |        |       |                |      |                       |        |                                |        |                              |        |           |        |      |        |

The targeted intake of these highly effective nutrients creates a balanced biochemical situation in the body, which not only promotes the four happiness hormones, but also actively supports the vagus nerve and the entire parasympathetic system. This leads to sustainable stress management and effective mental and physical regenera-

tion. With the Balance 4 Complex, Fourme Formulas offers a revolutionary solution based on the scientific finding that the simultaneous promotion of the four happiness hormones provides the optimum basis for inner security and support for the body's self-healing processes.

## Impressive initial results of a research project.



**75% of all test subjects confirm a significant improvement in their physical and mental well-being.**

The observational study on the Balance 4 Complex was conducted in summer 2024 in Austria with 30 specifically selected participants. The selection was based on various psychological and physical stressors, including chronic everyday stress, depressive moods, sleep disorders, anxiety, fear of loss and stress in connection with Long Covid.

The aim of the 7-week test phase was to evaluate the influence of Balance 4 Complex on physical and mental health. Various parameters such as stress resistance, sleep quality, energy levels and general well-being were recorded and evaluated.

### **Study design and methodology:**

**Participants:** 30 men and women

**Duration:** 7 weeks

**Measurement criteria:** mental resilience, sleep quality, energy levels, metabolic parameters

**Methods:** Perceived Stress Scale (PSS), PANAS sleep protocols, metabolic tests

## The results in detail:

### **Improved stress management (stress & anxiety):**

**76%** can now cope better with current stress/strain

**80%** need fewer rest breaks

**79%** recover more quickly from anxiety

**75%** have less anxiety than at the beginning of the cure

**71%** tolerate stress better again

**77%** have had no more panic attacks in the last few weeks

**72%** confirm that they have recovered more quickly than before and are mentally balanced despite setbacks

**On average, 75.71% confirm significant improvements**

### **Performance & work**

**78%** more focused and more efficient

**75%** confirmed an improvement in concentration and motivation at work

**76%** cope better with everyday life than before the cure

**75%** confirm that challenges in everyday life are accepted more calmly

**On average, 76% confirm significant improvements**

## The results in detail (Continuation)

### **Appetite, metabolism & energy**

**80%** feel hungry again, having previously only eaten for reasons of reason for a long time

**75%** generally feel more resistant and resilient

**78%** are convinced to have a more active metabolism, the body purifies better

**75%** confirm that they have more energy to tackle things

**71%** have more energy for exercise and sport

**On average, 75.8% confirm significant improvements**

### **Sleep & mornings**

**81%** sleep significantly better, fall asleep better, sleep through the night

**79%** feel motivated, well-rested and more productive in the morning

**On average, 80% confirm significant improvements**

### **Mood & Emotion**

**75%** feel more balanced, enjoy life again

**74%** confirm that their general well-being has improved

**77%** feel more motivated and relaxed

**72%** can “defend themselves” verbally effectively again without immediately taking things personally

**71%** find more time for themselves again

**On average, 73.8% confirm significant improvements**

### **Inflammation & allergies**

**71%** confirm that pain caused by inflammation has decreased

**72%** recognize an improvement in allergic reactions

**On average, 71.5% confirm significant improvements here**

### **To summarize.**

The participants were consistently positive about the effects of the Balance 4 Complex. They reported that they were mentally better able to deal with stressful situations, woke up more rested and felt more motivated and energized during the day. They also reported less anxiety and an improved ability to concentrate.

This first research project confirms that the Balance 4 Complex has positive effects on mental resilience, sleep quality and general vitality. The survey showed a significant improvement in the mental and physical well-being of the test subjects of over 75% on average. The Balance 4 Complex offers a promising solution for supporting mental and physical health.



coming soon:

## **Complex ADOLESCENCE\*** **Balance for young people.**

With Complex ADOLESCENCE \*, Fourme Formulas is developing a nutrient complex that will be specially tailored to **young people aged 12 to 18**. Based on the scientifically sound formula of Balance 4 Complex , an innovative product will be available that specifically addresses the needs of adolescents in the sensitive development phase of puberty. The focus will be on supporting hormonal balance, promoting emotional stability and strengthening the stress resistance of adolescents.

\*) Complex ADOLESCENCE (Working title ) will be available to international retailers from spring 2026

## Balance 4 Complex - balance for body and mind

The innovative nutrient complex from Fourme Formulas specifically supports the production of the four central happiness hormones - Serotonin, Dopamine, Oxytocin and Noradrenaline. For more inner peace, emotional stability and better stress management. Naturally. Scientifically proven. Developed in Austria.



# Appendix. Research and development Study material.



## The science behind happiness and balance. Research into happiness hormones, mental stability and neurobiological health

The Fourme Formulas scientific team is developing its own test programs on the effect of central happiness hormones on mental stability, resilience and stress management. At the same time, a broad spectrum of international studies and publications are being evaluated, integrating the latest findings from neuropsychology, psychotherapy and mole-

cular biology. The focus is on the regulation of serotonin, dopamine, oxytocin and noradrenaline and their clinical significance for emotional health, therapeutic interventions and preventive concepts. The following is an overview of relevant research findings and scientific contributions.

The following sections examine the role of each neurotransmitter in mental health and explain their functions as neurotransmitters and hormones. It also examines how diet, the gut-brain axis and exercise influence the production and regulation of neurotransmitters, which ultimately promotes happiness and mental well-being. Finally, the consequences of a neurotransmitter deficiency are also presented.

### **Dopamine:**

Dopamine plays a pivotal role in reward processing, motivation, and pleasure regulation, making it essential for mental health. As Bressan & Crippa (2005) highlight, dopamine is a key neurotransmitter in the brain's reward circuits, facilitating positive reinforcement and motivating behaviours. Dysfunction in these pathways can lead to mental health conditions such as depression, schizophrenia, and addiction, where motivation and reward perception are impaired. Wise (2004) also underscores dopamine's role in reinforcing behaviours that promote survival. Without proper dopamine regulation, individuals may struggle to find pleasure or motivation in daily activities, a common symptom of mood disorders.

Supporting the dopaminergic system through nutrition is vital. Tyrosine, an amino acid found in protein-rich foods like meat, fish, and dairy, is essential for dopamine synthesis (Fernstrom & Fernstrom, 1994; Wang, 2012). A balanced diet rich in antioxidants, vitamins (especially B vitamins), and healthy fats further supports brain function and dopamine activity (Gasmi et al., 2023; Lou, 1994; Kühn et al., 2019; Melamed et al., 1980). The gut-brain connection enhances the effects of nutrition on dopamine. González-Arancibia et al. (2019) explain that gut microbes regulate neurotransmitter production, including dopamine, influencing the brain's reward systems. The „gut-brain dopamine axis,“ as described by de Araujo et al. (2012), shows how dopamine signalling influences feeding behaviour and caloric intake. A fibre-rich and probiotic-rich diet supports a healthy gut microbiome, which has been linked to improved dopamine regulation and mental well-being (Dicks et al., 2022; Gasmi et al., 2022; Glen, 2004; Scott et al., 2013).

### **Noradrenaline:**

Noradrenaline, or norepinephrine, regulates attention, stress response, and mood, making it integral to mental health. This neurotransmitter is central to the body's fight-or-flight response, enhancing alertness and cognitive function during stressful situations (Robbins, 1984; Ubuka 2021). Its role in attention and focus makes it particularly relevant in conditions like ADHD, where disruptions in noradrenaline levels affect symptoms (Del Campo et al., 2011).

Noradrenaline is also critical for managing stress and anxiety. Morilak et al. (2005) explain that its release modulates behavioural responses to stress, helping individuals cope with challenges. It works in brain circuits related to fear and anxiety behaviours, preparing the body for quick reactions (Bremner et al., 1996; Charney, 2003). Dysregulation of noradrenaline, however, can lead to heightened anxiety or panic disorders. Imbalances in noradrenaline are linked to mood disorders such as depression, contributing to lethargy, lack of focus, and emotional instability (Ressler & Nemeroff, 1999).

Chronic stress can lead to excessive noradrenaline production, resulting in anxiety and burnout (Chrousos, 2000). Maintaining a healthy balance in noradrenaline production is vital for managing stress without overwhelming the brain's emotional regulation capacity.

### **Serotonin:**

Serotonin is crucial for regulating mood, sleep, and appetite, all of which are essential for mental health. Silber & Schmitt (2010) emphasize that serotonin synthesis is influenced by the availability of tryptophan, an amino acid linked to mood stabilization. Low serotonin levels are associated with depression and anxiety. Monti (2011) also highlights serotonin's role in regulating the sleep-wake cycle, while Salomon et al. (1994) demonstrate how serotonin function is affected by sleep deprivation, worsening depressive symptoms.

Nutritionally, supporting serotonin production involves ensuring sufficient tryptophan intake from foods like turkey, nuts, and seeds. Carbohydrates consumed with tryptophan-containing foods enhance serotonin synthesis (Silber & Schmitt, 2010). Bravo et al. (2013) showed that tryptophan-enriched cereal improved serotonin levels and mood in elderly populations. Serotonin also aids appetite control by signalling fullness and working with leptin to regulate hunger (Halford & Blundell, 2000; Blundell, 1984).

The gut-brain connection further enhances serotonin production. The gut produces most of the body's serotonin, and a healthy gut microbiota supports this process. A diet rich in fiber and probiotics positively impacts serotonin levels, improving mood and mental health (Dicks et al., 2022; Gasmi et al., 2022; Glen, 2004; Scott et al., 2013). Gut health, therefore, plays a critical role in supporting serotonin's effects on emotional well-being.

### **Oxytocin:**

Oxytocin, often referred to as the „bonding hormone,“ plays a critical role in mental health by regulating social behaviours, emotional bonding, and stress responses. According to Uvnäs-Moberg (1998), oxytocin mediates the benefits of positive social interaction, which can lead to feelings of trust and emotional well-being, making it essential for mental health. Positive interactions and social bonding, facilitated by oxytocin, have been shown to alleviate stress and reduce symptoms of anxiety and depression. Florea et al. (2022) also highlight oxytocin's involvement in modulating other neurotransmitters like serotonin and dopamine, which further impacts mood and emotional stability. This integration with other neurotransmitter systems underscores oxytocin's broad influence on mental well-being, making it a key player in maintaining emotional balance and resilience against stress-related disorders.

Nutrition can influence the oxytocin system, supporting its role in mental health. Skinner et al. (2018) conducted a systematic review that found that certain dietary factors might enhance oxytocin activity. Foods rich in magnesium and vitamin D, for example, have been shown to support oxytocin synthesis and release. Moreover, omega-3 fatty acids, present in foods like fish and flaxseed, are associated with improved oxytocin signalling, promoting positive mood and social behaviours (Skinner et al., 2018). These findings suggest that a well-rounded diet can optimize oxytocin function, contributing to better social interactions and emotional health. Beyond mental health, oxytocin has important metabolic effects, as noted by McCormack et al. (2020), where it is linked to appetite regulation and weight management, further indicating its broader impact on health.

### **Gut-Brain Axis:**

The gut-brain axis is integral to mental health, with nutrition playing a key role in maintaining this communication system. The gut and brain communicate through neurotransmitters, hormones, and the nervous system, meaning the health of one directly affects the other. Sun et al. (2020) explain that gut hormones like ghrelin and leptin not only regulate appetite but also influence brain function and mood. A diet rich in fiber, probiotics, and essential nutrients optimizes gut health, enhancing gut-brain communication and promoting better mental health (Dicks et al., 2022; Gasmi et al., 2022; Glen, 2004; Scott et al., 2013).

The gut microbiota's influence on neurotransmitter production is a key aspect of the gut-brain axis. Liu et al. (2020) highlight that gut bacteria modulate the production of serotonin, dopamine, and noradrenaline, all of which are critical for regulating emotions and stress. Dockray (2014) further emphasizes how gastrointestinal hormones impact brain function by acting on neurotransmitter pathways. This cross-talk ensures that gut health directly influences mental health outcomes by affecting neurotransmitter balance. In summary, the gut-brain axis demonstrates how proper nutrition supports the production of neurotransmitters like serotonin and dopamine, which are essential for maintaining mood balance, emotional well-being, and cognitive function.

### **Nutrition and 'Happiness hormones'**

Nutrition plays a vital role in the production and regulation of key neurotransmitters such as dopamine, serotonin, oxytocin, and noradrenaline, all of which are essential for mental health. Certain foods provide the building blocks needed for neurotransmitter synthesis. For example, tyrosine, an amino acid found in protein-rich foods like chicken, fish, and dairy, serves as a precursor to dopamine, which is crucial for motivation and reward (Cohen & Wurtman, 1979). Likewise, tryptophan, another amino acid found in turkey, nuts, and seeds, is essential for serotonin production, which influences mood and emotional regulation (Gasmi et al., 2022; Silber & Schmitt, 2010). Additionally, omega-3 fatty acids, present in fish and flaxseed, help maintain cell membrane integrity, ensuring efficient neurotransmitter signalling—particularly for serotonin and dopamine (Ximenes-da-Silva & Guedes, 2020). Furthermore, B vitamins, particularly B6, B9, and B12, support enzymatic processes necessary for neurotransmitter synthesis and regulation, playing a role in both serotonin and dopamine pathways (Dhailappan & Samiappan, 2022; Kennedy 2016). On the other hand, poor nutrition can negatively affect neurotransmitter balance. Diets high in processed foods, sugars, and unhealthy fats can disrupt the production of dopamine and serotonin, contributing to mood disorders like depression and anxiety (Gasmi et al., 2022). Deficiencies in essential nutrients such as omega-3 fatty acids, tryptophan, and vitamins can impair brain function and contribute to fatigue, poor concentration, and mental health issues (Cohen & Wurtman, 1979; Ximenes-da-Silva & Guedes, 2020; Dhailappan & Samiappan, 2022; Kennedy 2016). This underscores the importance of a nutrient-dense diet in supporting optimal brain health and neurotransmitter function.

### **The Impact of Exercise**

Exercise has a profound impact on brain health, particularly by influencing neurotransmitters that are essential for mental well-being. Dopamine, serotonin, oxytocin, and noradrenaline, often referred to as the „happiness hormones,“ play key roles in regulating mood, motivation, and emotional stability. Regular physical activity enhances the production and release of these neurotransmitters, contributing to improved mental health. Meeusen & De Meirleir (1995) as well as Lin & Kuo (2013) note that exercise influences brain neurotransmission, and locomotion fosters the interaction of various neurotransmitters such as dopamine, serotonin and noradrenaline, which all critical for motivation and mood. Serotonin, for example, which regulates mood and promotes feelings of calm, is significantly elevated during and after physical activity, as observed by Weicker & Strüder (2001). Oxytocin, associated with social bonding and emotional connection, is released during exercise, especially in group activities, while noradrenaline, which enhances focus and stress management, also increases, helping individuals better handle both physical and mental stress (Dreu 2012; Yüskel et al, 2019).

Exercise effectively supports the regulation of these four neurotransmitters, each contributing to mental and emotional well-being. Lin & Kuo (2013) report that physical activity boosts dopamine levels, improving motivation and focus, particularly during challenging tasks. This dopamine surge reinforces a sense of reward and satisfaction, crucial for sustaining physical effort and motivation. Regular exercise also elevates serotonin levels, stabilizing mood and alleviating symptoms of depression and anxiety (Weicker & Strüder, 2001). Oxytocin, while commonly associated with social bonding, is also influenced by physical activity, particularly in social environments, where it promotes trust and emotional cohesion (Dreu 2012; Yüskel et al, 2019). Noradrenaline, closely linked to the body's fight-or-flight response, increases during exercise, enhancing alertness, attention, and the ability to manage stress (Meeusen et al., 2001).

The gut microbiota's influence on neurotransmitter production is a key aspect of the gut-brain axis. Liu et al. (2020) highlight that gut bacteria modulate the production of serotonin, dopamine, and noradrenaline, all of which are critical for regulating emotions and stress. Dockray (2014) further emphasizes how gastrointestinal hormones impact brain function by acting on neurotransmitter pathways. This cross-talk ensures that gut health directly influences mental health outcomes by affecting neurotransmitter balance.

In summary, the gut-brain axis demonstrates how proper nutrition supports the production of neurotransmitters like serotonin and dopamine, which are essential for maintaining mood balance, emotional well-being, and cognitive function.

### **Nutrition and 'Happiness hormones'**

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The health benefits of these neurotransmitters become especially evident in the context of exercise. Dopamine, released during rewarding physical activities, reinforces exercise behaviours and boosts motivation for future workouts (Marques et al., 2021; Tedjasaptutra et al., 2015). The rise in serotonin from aerobic exercises, such as running or cycling, helps alleviate symptoms of depression and anxiety, positioning exercise as a natural antidepressant. Oxytocin fosters a sense of belonging and emotional support, particularly in group activities, enhancing overall emotional well-being. Noradrenaline, which improves focus and stress resilience during high-intensity activities, helps individuals build both physical and psychological resilience (Meeusen et al., 2007; Zhai et al., 2023).

However, excessive exercise or inadequate recovery can disrupt neurotransmitter balance. Meeusen et al. (2007) caution that overtraining may lead to a depletion of key neurotransmitters such as dopamine and serotonin, resulting in fatigue, burnout, and even mood disturbances. When neurotransmitters become imbalanced due to overexertion, symptoms like irritability, depression, and reduced motivation can occur. Additionally, noradrenaline levels, which initially rise with exercise, can become dysregulated under extreme physical stress, leading to anxiety and impaired focus. This highlights the importance of balancing exercise with sufficient recovery to maintain optimal neurotransmitter function and overall mental well-being.

### **Physical and Psychological Consequences of Neurotransmitter Deficiency**

Neurotransmitter deficiencies can have both physical and psychological consequences, manifesting in various organ systems and contributing to a wide range of disorders. Deficiencies in serotonin and dopamine, for example, are associated with cardiovascular diseases, metabolic disorders, and inflammation due to their involvement in regulating blood pressure, heart rate, and immune responses (Szczepanska-Sadowska et al., 2010). Serotonin dysfunction, in particular, can contribute to increased inflammatory responses, which are implicated in both physical conditions, like cardiovascular disease, and neurodegenerative diseases such as Alzheimer's (Lanari et al., 2006; Ledo et al., 2016; Szczepanska-Sadowska et al., 2010). Similarly, noradrenaline deficiencies are linked to neurogenic orthostatic hypotension, a condition marked by impaired blood pressure regulation, and can exacerbate heart-related issues, further complicating physical health (Loavenbruck & Sandroni, 2015).

On the psychological side, low levels of serotonin and dopamine are linked to major depressive disorder and anxiety, resulting in symptoms like persistent low mood, lack of motivation, and cognitive decline (Liu et al., 2018). Serotonin and dopamine imbalances can also exacerbate behavioural and psychological symptoms in neurodegenerative conditions like Alzheimer's, where mood disturbances, aggression, and anxiety become prevalent as the disease progresses (Lanari et al., 2006). During the COVID-19 pandemic, psychiatric conditions like anxiety and depression surged, partly due to stress-induced alterations in neurotransmitter systems, highlighting the role of neurotransmitter balance in mental health stability (Muhlisa, 2023). Additionally, deficiencies in oxytocin, a key regulator of social bonding and emotional behaviour, have been linked to emotional dysregulation and affective disorders, particularly in conditions like hypopituitarism and craniopharyngioma (Bhargava et al., 2019; Gebert et al., 2018). Noradrenaline imbalances are similarly implicated in mood and anxiety disorders, where deficiencies can lead to heightened stress responses and exacerbated depressive symptoms (Brunello et al., 2003).

Deficiencies in glutamate, another critical neurotransmitter, may contribute to neurodegenerative diseases and physical conditions like back pain and joint inflammation, as glutamate is involved in both synaptic plasticity and pain perception (Lau & Tymianski, 2010; Brennenstuhl et al., 2019). Without sufficient neurotransmitter regulation, both the central nervous system and peripheral systems are affected, leading to complex, multi-system conditions ranging from psychological disturbances to inflammatory and degenerative physical diseases.

### **The Impact of Neurotransmitters and Nutrition on Behaviour.**

The relationship between neurotransmitters and nutrition plays a critical role in shaping behaviour. As outlined in previous sections, neurotransmitters such as serotonin, dopamine, and oxytocin are essential for mood regulation, impulse control, and social behaviours. Nutritional deficiencies, particularly in essential vitamins, minerals, and fatty acids, can disrupt neurotransmitter synthesis and function, leading to behavioural issues. For example, a study on young adult prisoners demonstrated that supplementing these nutrients significantly reduced antisocial behaviour (Gesch et al., 2002). Similarly, omega-3 fatty acids, which are crucial for neurotransmitter production, play a key role in maintaining emotional balance and preventing mood dysregulation (Gesch, 2002; 2005).

Imbalances in neurotransmitter levels, particularly serotonin and dopamine, are strongly associated with problem behaviours in adolescents, including aggression and impulsivity (Song et al., 2010). Nutritional support can help mitigate these effects by ensuring proper neurotransmitter functioning. Additionally, dysregulated interactions between neurotransmitters such as dopamine and oxytocin are linked to behavioural disorders, further underscoring the importance of balanced neurotransmitter systems for healthy behavioural outcomes (Baskerville & Douglas, 2010).

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### **From stress to regeneration. Publications on the biochemical activation of the body's regeneration mode.**

Cortisol is the main biological mediator by which stress lowers the brain's serotonin function, causing depression in vulnerable individuals

<https://doi.org/10.1192/bjp.180.2.99>

Supplementation of tryptophan as in Happy Hormones Complex could reduce depression in women with reduced tryptophan levels <https://doi.org/10.1192/bjp.180.2.168>

Serotonin interacts with cortisol and dopamine in a complex way, whereby serotonin can increase dopamine production while inhibiting cortisol production

<https://doi.org/10.3758/CABN.1.4.388>

The administration of tryptophan and vitamin B6 reduces depression in young adults (<https://doi.org/10.3177/jnsv.65.507>) and vitamin D3 is important for the regulation of serotonin

<https://doi.org/10.1016/j.smr.2020.101379>

As insufficient magnesium levels in the brain appear to lower serotonin levels and antidepressants have been shown to increase magnesium levels in the brain, it is thought that magnesium is beneficial for almost all depressed people

<https://doi.org/10.1016/j.mehy.2009.10.051>

### **Rhodiola rosea - evidence and effect at a glance.**

A randomised, double-blind, placebo-controlled, parallel-group study of the standardised extract shr-5 of the roots of *Rhodiola rosea* in the treatment of subjects with stress-related fatigue

<https://pubmed.ncbi.nlm.nih.gov/19016404/>

Rhodiola rosea versus sertraline for major depressive disorder: A randomized placebo-controlled trial

<https://pubmed.ncbi.nlm.nih.gov/25837277/>

Effect of a Combination of Magnesium, B Vitamins, Rhodiola, and Green Tea (L-Theanine) on Chronically Stressed Healthy Individuals-A Randomized, Placebo-Controlled Study

<https://pubmed.ncbi.nlm.nih.gov/35565828/>

Rhodiola rosea for mental and physical fatigue in nursing students: a randomized controlled trial

<https://pubmed.ncbi.nlm.nih.gov/25268730/>

Effects of rhodiola rosea on oxidative stress and negative emotional states in patients with obstructive sleep apnea

<https://pubmed.ncbi.nlm.nih.gov/31623042/>

Effects of Concurrent Training and a Multi-Ingredient Performance Supplement Containing *Rhodiola rosea* and *Cordyceps sinensis* on Body Composition, Performance, and Health in Active Men

<https://pubmed.ncbi.nlm.nih.gov/33078636/>

Effect of commercial *Rhodiola rosea* on CYP enzyme activity in humans

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live  
love  
laugh  
again

**balance 4**  
complex

|                                 |   |                |
|---------------------------------|---|----------------|
| Aglycosylated<br>Biotin Complex | Arginine, L-Asparagine<br>& L-Ornithine | Multi-Vitamins |
|                                 |   |                |