

Does stress make you tired?



“Cellular power plants” – mitochondria

The progress made in Mitochondrial Medicine (4) over the last few years is breath-taking. Our detailed knowledge about how mitochondria impact human health and longevity has been rapidly growing, so has the number of mitochondria-based clinical trials. Recent advances on mitochondrial dysfunction in etiology and pathogenesis of human diseases and aging:

		<ol style="list-style-type: none">1. Mitochondria and Aging2. Mitochondria and Microbiota: the intriguing relationship3. Mitochondria and Redox Regulation4. Mitochondria and Viral Infection5. Mitochondria and Metabolic Syndrome6. Mitochondria and Neurodegenerative Diseases7. Mitochondria and Cancer .
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Stress undermines the production of cellular energy balance in mikrobiom!

Stress has a significant impact on our health. The researchers found that both physical and mental stress undermines our health, so it is very important both management. It occurs in all ages. Stress is a reaction of the whole body (not just psyche) and may cause changes in all organs and cells. Every response to stress, a series of biochemical changes at different levels are triggered in our body as a result of excretion of stress hormones (adrenaline, noradrenaline, cortisol from the adrenal gland). ¹

Types of stress

Almost everyone knows about stress. It is not necessarily a negative as a positive gives us motivation, encourages us to action and has made possible the survival of human in nature for millennia. Stress triggers multiple responses that help the body overcome the crisis or stressful problem.

There are two types of stress: short-term or occasional stress and long-term or chronic stress. Non-intensive short-term stress has encouraging impact to human body: encourages the formation of new memory (experience), creative thinking, dynamics, motivation to work. This is positive stress.

Positive stress is not harmful but the negative one can lead to disease. An intense chronic stress is especially harmful to health.^{[1](#), [2](#), [3](#)}

Prolonged or repeated and / or intense stress, briefly negative stress, without adequate rest and renovation of the organism leads to fatigue and exhaustion.

Chronic stress is characterized by a constantly elevated level of excreted cortisol, which is responsible for: 1, 2

- metabolic changes and diseases (diabetes, increased blood fats, obesity);
- reduced immune response ability (an impairment of immune system);
- psychological symptoms (can be seen as tension, irritability, problems with memory and concentration, lack of will, disorganization, sleeping difficulty, difficulty in relationships and interpersonal communication, a feeling of helplessness, anxiety, depression ...). ⁵

Due to the stress we have to worry about the proper, healthy and regular eating all food ingredients from proteins to minerals. The secret to maintaining a healthy life lies in the fact that we understand and know how from nature to get all those substances which inhibit unwanted oxidation. The body is constantly waging war against the harmful free radicals and antioxidants, which neutralize harmful action first. We therefore recommend eating a lot of fruits and vegetables of all kinds.

By-product of stress are free radicals, which can not be avoided, as they arise in each combustion oxygen. Free radicals are molecules that have lost one electron, which makes them very reactive and feverishly looking for an electron to restore balance. Or they have excess electrons, which must be urgently submitted. Most affected is the nearest surroundings: fat in the cell membrane, the genetic material of cell, DNA and mitochondria. If the free radicals binds to a protein in the cell nucleus, they disable it.

If the free radicals attack the mitochondria, they cause cell mutation; cell begins to behave differently, contrary to its function.

In addition, due to increased “production” and consumption of energy in the body during stress potassium excreted rapidly from the body. Potassium is essential for the proper functioning of the heart and nerve cells. Almost always, with potassium deficiency, there is a shortage of magnesium in the body, causing further problems.

When the balance between the action of antioxidants and the formation of free radicals is destroyed, oxidative stress develops. This may be due to a reduced intake of antioxidants by food or an increased production of reactive oxygen and nitrogen substances due to various types of stress. In healthy organism, the formation of free radicals is in some kind of balance with the effects of antioxidants. Antioxidants can be substances of endogenous origin, which means they are normally present in the body in the form of various enzymes, glutathione or, for example, coenzyme Q. On the other hand, the antioxidant is, as already mentioned, intake with food, for example, in the form of phenolic compounds, carotenoids or vitamin C and E. The most important antioxidants include vitamin C, coenzyme Q10, vitamin E, beta-carotene, flavonoids, lycopene and minerals: selenium, zinc, copper, magnesium.

STRESS FIRST AFFECTS CELL POWER PLANT

Stress first causes damage at the mitochondrial level, after the other cells are damaged. This can lead to damage to the mitochondrial heritable material (mtDNA), but mitochondrial disorders may also occur.

Mitochondria – “cellular power plants”

Mitochondria are our cellular plants. Without them cells can not get the energy they need to perform all their tasks. Reduced functionality of cellular power plants therefore also cause problems in the functioning of cells, in the extreme case it even leads to their death. The energy that cells need is in the form of a molecule adenosine triphosphate molecule, ATP in short, produced in the body by combustion of

sugar and fat. This process can only take place in mitochondria, which act as an energy source inside the cell. Our mitochondria are therefore responsible for producing, storing and supplying energy for cells to function properly. Each cell in our body has an average of 1,500 mitochondria.

Cells, carrying complex tasks in the body also have a great need for energy, contain many so-called cellular power plants. Such are for example cardiac, bone, brain and liver cells, as well as intestinal mucosal cells. Thus, liver cells contain two thousand mitochondria, many thousands of cardiac cells, while skin cells contain only a few hundred. Problems in the functioning of mitochondria are often seen outwardly as muscle weakness, fatigue, heart and brain problems, nervousness and well-being.

How to increase the number of mitochondria?

A group of researchers from the University of South Carolina led by Dr. Davis, with experiments in mice, found that regular running stimulates the development of mitochondria in the brain. Dr. Davis concludes similar actions in humans. Thus, increased energy for the brain helps to act faster and more efficiently and in the short term reduce mental fatigue. Accumulation of large amounts of mitochondria in the brain can also be useful as a protection against aging-related diseases, such as Alzheimer's disease.⁶

One of the most effective ways to maintain healthy mitochondria is to reduce the amount of free radicals. The best way to maintain the number of free radicals in normal amounts is diet rich in antioxidants. If the amount of free radicals increases and remains elevated, free radicals (ref) gradually overcomes mitochondria and damages them.



IMPORTANT TARCH OF STRESS IS OUR MICROBIOM

Recently, scientists have discovered hundreds of new bacterial species. In order to compile a complete inventory of bacteria associated with the human body, a global project titled Human Microbiology(Human Microbiome Project, HMP).

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Some doctors go even so far as to label the numerically and metabolically diverse intestinal flora as an “additional organ”; Argue that when considering human health, the symbiotic relationship between man and his microbes must be understood.

Stress does not only damage cell mitochondria, but also our microbiom. It is probably not necessary to explain that antibiotic treatment, in addition to harmful microbes, is also destroys the good microbes of our intestinal microbiom (lactobacilli, bifidobacteria ...), on which are highly dependent on our health. But the intestinal microbiom not only harm antibiotics, but also preservatives in canned foods.

Pesticide residues such as glyphosate, etc. The use of this pesticide (found in conventional wheat flour) is still very widespread in Europe, as it is supposed to be safe for humans and animals. Unfortunately, those who study the safety of pesticides, did not take into account that our health depends on the health of microbiom (lactobacilli, bifidobacteria ...). According to researchers ⁸ Glyphosate is definitely destroying it, which leads to many current diseases!

Excessive consumption of sugar and white flour and products from them is also harmful to beneficial microbes in the intestine, as they promote the growth of bad microbes (candida) and at the same time inhibit the growth of good microbes. Mental stress also strikes a balance between

beneficial and harmful microbes. Researchers at the University of Ohio have found that exposure to stress causes changes in the structure, variety and number of intestinal microorganisms. Microbial compositions in the gut under the influence of stress become less diverse, increasing the number of bad microbes, such as clostridia, and reducing the number of useful microbes. Psychologist Simon Knowles, from Australia, found that med students in stressful period of exams contain less lactobacilli than in a time when they are not under stress, such as at the beginning of the academic year.

Since gastrointestinal sophisticated neural network transmit messages from the trillions of bacteria in our central nervous system, a neural network in the gut has very strong influence on the central nervous system, as shown by new research. Such findings suggest the possibility of using beneficial or probiotic bacteria to treat mood and anxiety disorder either by administering beneficial microbes or with the development of medicinal products that imitate metabolic functions. The new study also suggests new ways of treating chronic gastrointestinal diseases, which are often accompanied by anxiety and depression, and the occurrence of abnormal microbial in the gut.⁷

DISEASES ARISING IN THE GUT

The theorem originates originates from the Hippocrates: all the disease begins in the gut. If we combine the above facts that stress first strikes the balance of the intestinal microbiom and the production of cell energy of energy-intensive cells (cells of the intestinal mucosa). It quickly becomes clear that diseases originate in the gut still holds. With the destruction of the intestinal flora and the weakening of the intestinal epithelial cells, a vicious circle of problems begins sooner or later. Damaged intestinal microbom and energy-impaired intestinal cells can no longer

perform their tasks optimally.

Among the consequences of this are poor food digestion, inadequate nutrient absorption, reduced immune defenses, ingress of toxins, harmful microbes and unread food through the leaking colon, the damaging spread of candida, and a bunch of other problems stemming from it. Researchers estimate that this situation is to blame for the occurrence of 80 percent of illnesses! In order not to get caught in a vicious circle of stress, it needs to be mastered as soon as possible and as fully as possible. That is why it is always welcome to strengthen the intestinal flora and to support valuable cellular plants. Mitochondrial DNA is ten times more vulnerable than cellular DNA and directly exposed to free radicals. In addition, mitochondria do not have a system repair for their DNA.

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This is also the reason that the mitochondrial DNA is weaker day by day. This process results in a lack in the production of proteins that are required in the production of ATP. Both weakened and damaged mitochondria produce and supply less energy to cells. It is therefore important that our mitochondria are preserved and regenerated by the attenuated ones. Many "modern" diseases have one thing in common: lack of energy. Obvious examples are chronic fatigue , fibromyalgia, and chronic muscular tension, burnout, chronic stress. However, it is also evident in most chronic and severe acute diseases, such as diabetes, cancer, depression, Alzheimer's disease, cardiovascular diseases, etc. Lack of energy in cells.

How do we usually respond to a lack of energy?

By eating more foods – often high in calories: chocolate or other sweets to get as much energy as possible. However, the result is the same: whether there is too little energy (ATP) and / or too much consumption. The lack of energy promotes oxidative and nitrosative stress, it is a disorder of healthy body functions Doctors call this metabolic stress. So it starts – the “disease”!

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