**Adrenalin and Cortisol:  Better than their Reputation**

Now we take a closer look to the role of adrenalin (or: Epinephrine). The well-known stress hormone is produced in the adrenal medulla by order of the hypothalamus. About ten minutes after the adrenalin release, cortisol gets produced in the adrenal cortex to protect the body from an enduring high activation by adrenalin. It also cares for increased and longer lasting vigilance on a lower level as adrenalin. The energy reserves emptied by adrenalin get filled up by metabolizing fat, proteins and minerals. Additionally, cortisol increases the performance of the immune system by alerting the immune cells, mainly the leucocytes, and sending them to where they are needed. There is a feedback system, which reduces cortisol release at a certain level of cortisol. Thus the stress reaction is switched off.

Completing the stress reaction in time is the ideal case appropriate for a balanced way of living. It allows us going through challenging situations and integrating them. For this task we need cortisol. Shortage as well as surplus has psychological results (behavioral distortions, depression, sleep disorders). Strong alterations in the cortisol systems occur after traumatization (post-traumatic stress disorder).

The healthy and beneficial stress reaction, which is an emergency solution, can run up physical performance quickly and accurately and suppress it gradually in time. When the stress gets too strong, too intense and too long or when the appropriate time for regeneration is missing, the adrenalin-cortisol-system can get out of balance and produce detrimental consequences.

**Breathing and Stress Reaction**

There is an obvious connection between breathing and stress reaction:

Releasing adrenalin (e.g. triggered by a threatening stimulus) speeds up the breathing. Speeding up and deepening the breathing, as we do in certain breathing exercises, causes the release of adrenalin.

So when we do intense breathing exercises, the body activates the stress reaction without outer or inner reason. Researchers call this “chemical stress”:  The unusual erratic changes in the pH-levels of the blood during intense breathing seem to trigger the alarm reaction on a hormonal level without a subjective feeling of stress or anxiety. Some participants of the Wim Hof group could lift their pH-levels to 7.75 (the tolerance range of the blood-pH is between 7.3 and 7.7) causing a dramatic fall of the CO2-level. We know from science as well as from practicing of breathwork that one of the symptoms of blood alkalosis (=high level of pH) is the “hyperexcitability” of the nervous system. Caused by the reduction of Ca2+ (calcium ions) in the blood, blood vessels contract and a potential for increased electric conductivity occurs. This phenomenon is usually seen as negative as it is frequently connected with anxious and hyper nervous feelings and panic attacks, connected with a loss of control. Yet the Wim-Hof-experiments have shown that it is possible to consciously influence the nervous system and that the electric conductivity of the nerves can be increased or decreased and deliberately moderated with breathing exercises.

This opens new opportunities for self-directing one’s own health. There is an obvious important difference: When we engage consciously in a stress experience e.g. by deepening and accelerating the breathing, the nervous system reacts differently as it realizes that there is no real danger, but a challenge the organism faces on a conscious and an unconscious level. We create an overwhelming situation, which might remind us of previous experiences, but within a situation of relieve granted by our conscious choice and by a stable and securing environment. So we are not overpowered and out of control as in the previous experience, which is triggered. This lays the ground for later integrating the trauma.