

# *Panta rhei*

Everything flows, everything oscillates in the body

Demonstrating the effects of sound massage through measurements of heart rate variability

by Dr. Maren Pohl-Hauptmann, MD

Photo: Archive Peter Hess® Institute

The sound of the singing bowl invites us to be still, to feel, to listen, and to concentrate on ourselves. Practitioners of Peter Hess® sound massage thus experience daily how clients achieve soothing relaxation and feel rejuvenated often after only the first sound massage. There are several means of capturing this subjective experience in an objective manner. Measuring heart rate variability (HRV) is one such option.

## **Chronobiology & Heart Rate Variability (HRV)**

Chronobiology is a relatively recent scientific discipline that focuses on temporal structures of the organism, biological rhythms. Despite all our modern achievements and lifestyles, our body functions in the same rhythm it did centuries ago when we roamed the earth as "hunters and gatherers". There are outside primeval rhythms that have been with us since time immemorial and affect our life and thereby our body. These include the seasons of the year, phases of the moon, and rhythm of day and night. These cycles convey changes in temperature, light conditions, and ambient sounds. Normally, our body completes a full cycle of performance and recovery within a 24-hour period. In addition to outside influences there are also inner biological rhythms. These include breathing, blood pressure, tissue perfusion, and the release of hormones. All these occur at regular time intervals. Emotions also have an effect on our life rhythm that should not be underestimated.

Upon inspiration, the negative pressure in our chest results in suction and thereby to an increased flow of blood to the heart. The heart, in turn, must react with increased heart rate to transport the increased blood volume. Upon exhalation, this process is reversed, so that the heart now beats more slowly. In a healthy individual, the heart continually adapts to outer and inner signals with finely tuned changes – variations – in heart rate. Our heart rate increases upon

physical exertion and, under normal circumstances, slows down upon relaxation. The heart's capability to change the interval between heartbeats from one to the next and therefore readily adapt to changing requirements is called heart rate variability (HRV). It is a measure of adaptability of the body and can provide information regarding the general health, vitality, and regulation and recovery capability of an individual. The more adaptable the heart rate to continual physical and psychological conditions, the healthier the human being. If the heart rate is monotone, or fixed, this may be a warning sign of a potential myocardial infarct. The Chinese physician Wang Shuhe had already recognized this as early as 300 AD, as evidenced in his writings "Mai Ching/The Knowledge of Pulse Diagnosis". He coined the Chinese saying:

*"If the heart is beating like a woodpecker, death is knocking at the door."*

## **The autonomic nervous system – our unconscious control system**

Our heart rate is controlled by our autonomic nervous system (ANS). In the daily coordination of life processes, there are two players working in tandem: one is the **sympathetic nervous system**, also referred to as the "stress system". This controls all processes in which we are active. In the event of danger, activation of the sympathetic nervous system results in elevation of blood pressure, pulse, and blood sugar. Pupils become dilated so that as many stimuli as possible can be observed. The sympathetic nervous system also ensures that blood moves from the GI tract to our muscles

so that a possible fight or flight response for survival can be initiated. To prevent dangerous hemorrhaging through potential injuries, coagulation capability of the blood is increased. Once the stressful situation has past and danger is no longer imminent, the second player, the **parasympathetic nervous system** – also called the "rest and digest system" – takes over. It regulates digestion, recovery, relaxation, regeneration, and repair processes (e.g., healing of micro wounds). The most important part of the parasympathetic nervous system is the vagus nerve, a cranial nerve that extends along the esophagus into the abdominal cavity and thereby supplies all inner organs.

In recovery phases, the body oscillates particularly strongly, whereby heart rate is dominated by breathing patterns. In active phases, heart rate is predominantly influenced by blood pressure rhythms which are controlled by both the sympathetic and parasympathetic nervous systems. Coherence is achieved when rhythms of breathing, blood pressure, pulse, tissue perfusion, etc. are harmonically coordinated to one another.

### Continual stress without stress resolution

Today's stress is very different from the stress of our ancestors. Instead of short-term situations of danger that are addressed and resolved with a "fight or flight" response, we in our civilization often experience long-term hyperstimulation of the sympathetic nervous system, however, without ever having to run away, climb a tree, or fight for our survival. Additionally, we often do not have enough time for regeneration and rest. Especially children who have a full recreational activity schedule often lack the boredom that acts as a valuable driver of creativity and regeneration.

### HRV measurements and health

In the last few years, measurement devices in conjunction with sophisticated software programs for recording raw ECG data have been developed to facilitate and better illustrate the evaluation of HRV. The most diverse biofeedback systems can also be helpful in visualizing bodily functions and learning how to influence and control them through

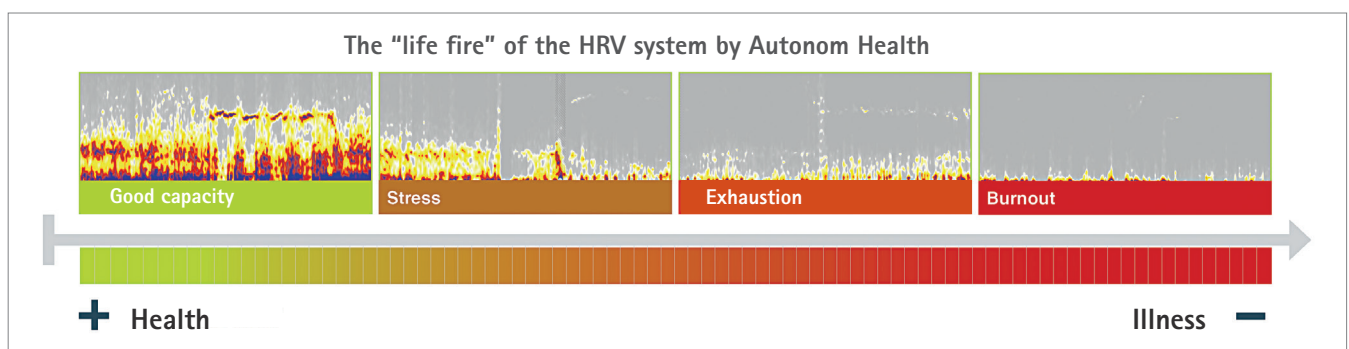
feedback. These methods are applied in stress medicine and psychophysiology, among other disciplines. In my medical practice, using such biofeedback methods is enriching and they can be effectively applied in coaching patients in the development of a healthy lifestyle. Additionally, HRV measuring also can be used to demonstrate the effect of sound massage and other sound and relaxation therapy.

### Is regeneration only possible with activation of the parasympathetic nervous system?

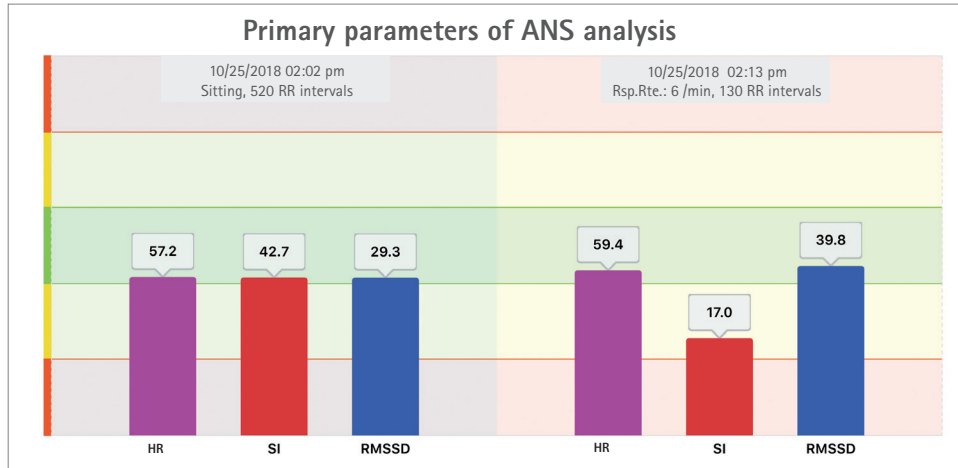
Kevin de Tracy, President of the Feinstein Institute for Medical Research/New York researched the messenger substance of the parasympathetic nervous system, acetylcholine, and showed that it can reduce inflammatory processes. Many diseases are associated with inflammatory processes. In reference to the heart, scientists believe that inflammation of coronary arteries, among other factors, promotes coronary artery disease and can even lead to myocardial infarction. This leads to the following question: is true healing possible only during activation of the parasympathetic nervous system? In any event, it is a prerequisite for recovery and regeneration and is therefore of central importance for balance between stress and relaxation and thereby preservation of our health.

### Making health visible

The various HRV measuring systems have found ways to illustrate measured data. Now, even a lay person can get an impression of the health status of an individual at a glance. In the HRV system by the company Autonom Health, spectral analysis (p. 2), from left to right, shows the course from good health, depicted with blazing so-called "life fire", to burnout, where everything is running at minimum capacity. This measuring system primarily uses 24-hour measuring to show an impression of activity, sport, mental vitality, regeneration, and sleep. Exact logging of activities is required to group and evaluate data precisely.

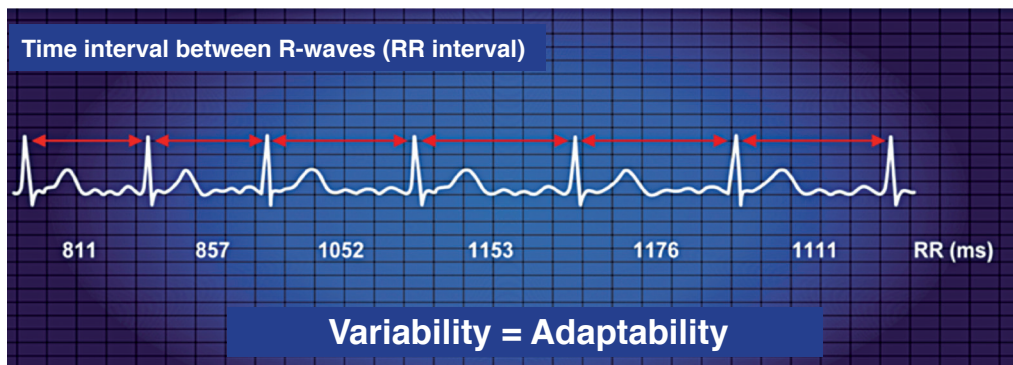


The following image shows an ANS analysis by the company Commit, an example of a typical short-term HRV measuring system.

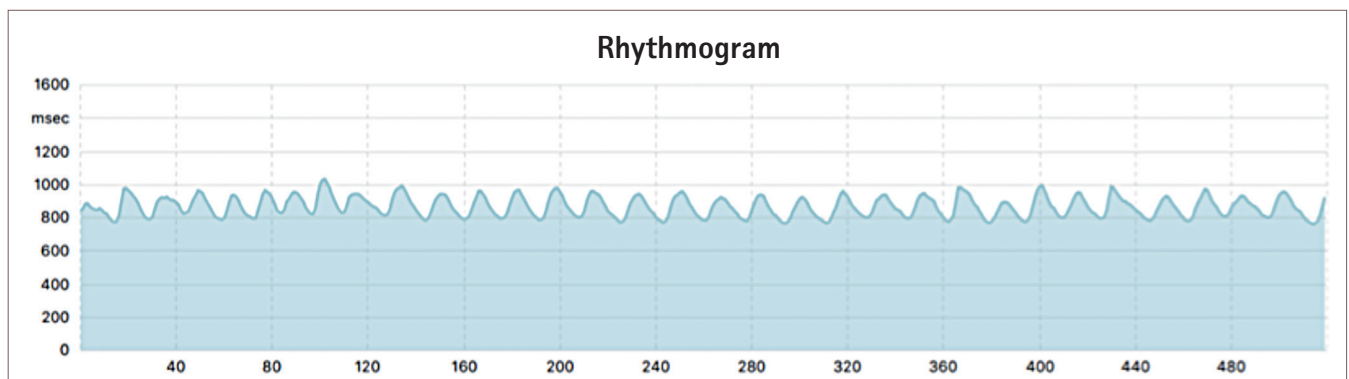


Short-term HRV measurements are informative snapshots of the autonomic nervous system (ANS). Subsequent testing at a respiratory rate of 6 breaths per minute shows whether the body, as shown in the image here, can still regulate itself well. With very good starting conditions (all bars in green range) the stress index (red bar) decreases from 42.7 to 17 and the RMSSD (blue bar), as measurement of the parasympathetic nervous system, increases from 29.3 to 39.8.

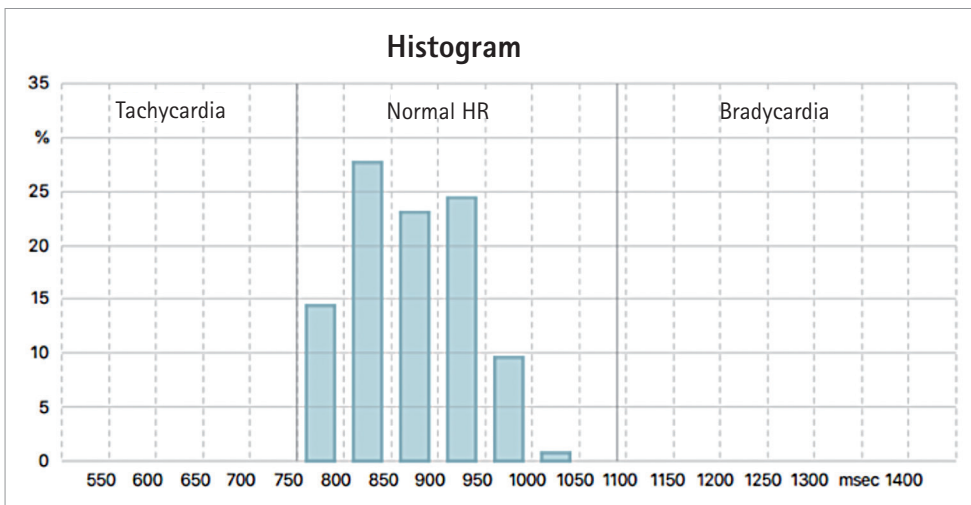
### How are these images generated?



The distance between R waves in the ECG is measured in milliseconds and entered into a diagram. The curve in the image below represents a connection with every measured value, whereby the R-R intervals are quasi set on their end and strung together.



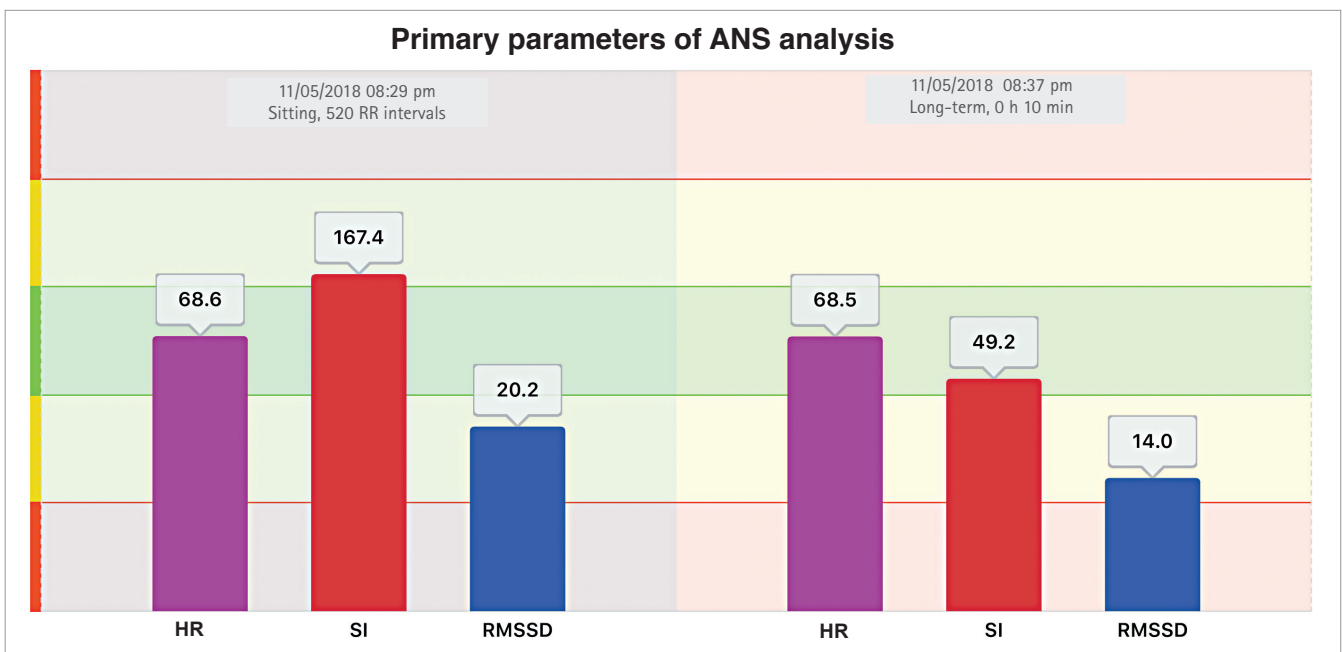
Since large differences in R-R intervals can be almost exclusively attributed to the parasympathetic nervous system, which "kicks in" much faster than the sympathetic nervous systems, the so-called RMSSD value (root mean square of successive differences) between two normal beats in the ECG can be viewed a marker for our "rest and digest system". The stress index (SI) shows the activation grade of the sympathetic nervous system and can be calculated from the total area of the so-called histogram.



The histogram shows what percentage of R-R intervals evidence a certain value in milliseconds.

### Sound therapy and demonstrating its effects

Through HRV measurements that I conducted on patients, friends, and myself, I was able to gather and document various effects of sound massages, sound journeys, or active sound exercises. The system by Autonom Health uses two stick-on ECG electrodes that are connected to an analysis device in the form of a USB stick via a cable. The analysis device by the company Commit consists of a transmitter that is attached to a chest belt with two ECG sensors. Raw data is sent to a tablet via Bluetooth. The result: an insightful representation of the autonomic nervous system.

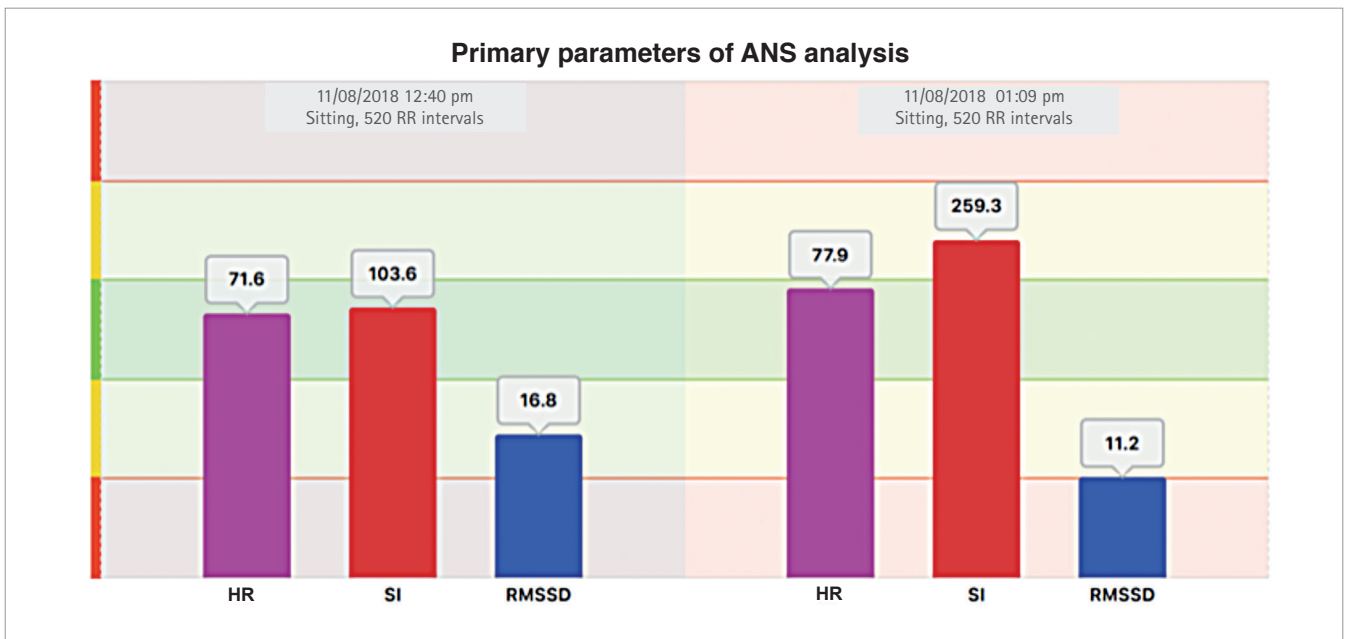


Provided above is an example of a sound meditation in which the patient indicated that although she is able to relax, she has not been able to breathe deeply for some time due to a sensation of pressure in her stomach. It is clearly visible that the stress index is significantly reduced from 167.4 to 49.2. However, instead of rising, the RMSSD value of 20.2 drops to 14.0. Through measurements on myself, I have observed similar effects when I, as sound massage provider, breathed very softly as not to disturb my patients. In hindsight, I realized that there was an association with my tense holding of breath during resonance of the singing bowl and subjective exhaustion upon completion of the sound massage. If I continue to breathe

deeply and quietly, then I feel relaxed yet strong following a sound therapy session. For us sound massage practitioners, it is important to consciously keep incorporating deep breathing into sound therapies such as sound meditation und sound games. When giving a sound massage, it is important to create as **safe space** in which the client can “exhale” in the true sense of the word. If the singing bowls are secured from slipping and falling, the client dares to breathe deeply and can often let go and relax much better.

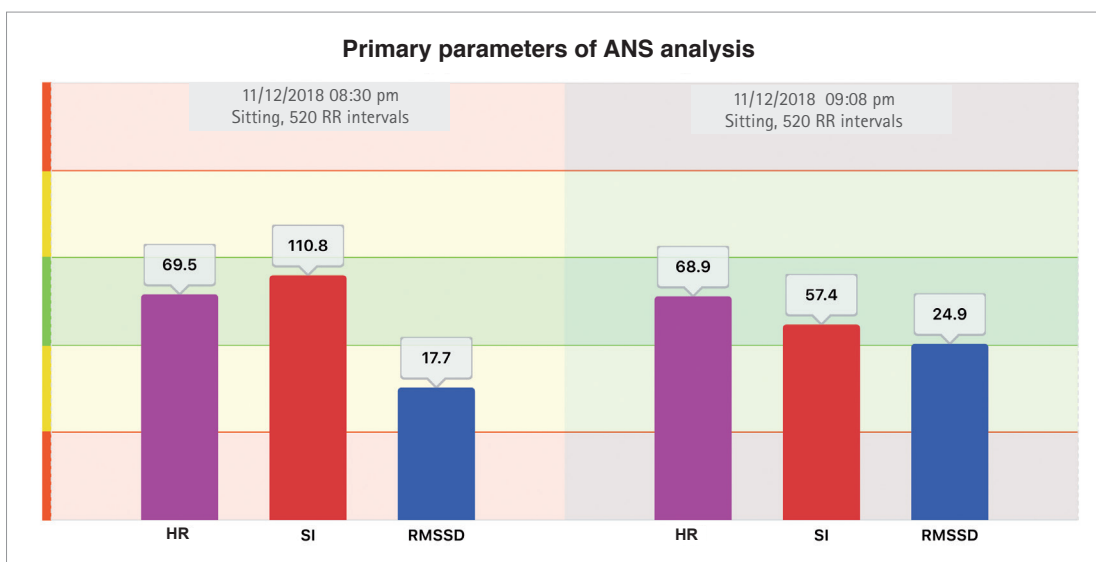
### The soft sounds are the ones that are healing ...

When the sounds are too many and too loud, many participants react with symptoms of hyperstimulation. They feel stressed, simply unwell, sometimes they even develop a headache and other autonomic symptoms. The image below shows the result of 20 minutes for very loud gongs.



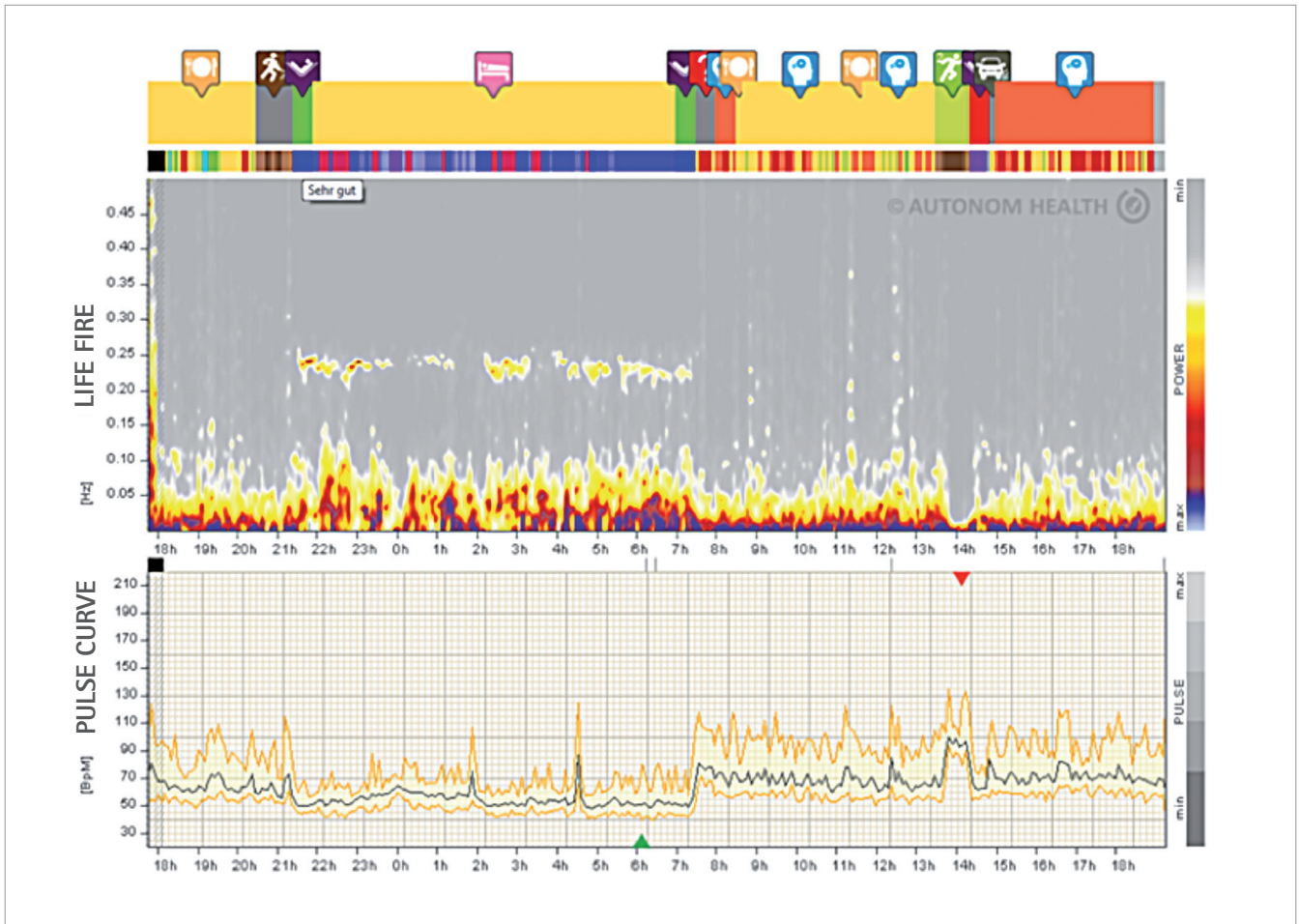
You can distinctly see that the stress index increases significantly while the parasympathetic nervous system (RMSSD) drops. Loud sounds often cause stress in us and our autonomic nervous system shows this immediately in the HRV measurement. This is an effect we can easily imagine when we think of waterfilled singing bowls that turn into “water fountains” upon strong tapping. Remember, we consist of 70% water.

In the following, I would like to present the results of an ANS analysis before and after a back sound massage with the patient in prone position:



There is almost a 50% reduction in the stress index with significant increase in the RMSSD value.

Another image from the 24-hour measuring system shows self-application of sound with a pelvic bowl.



Onset of respiratory arrhythmia, reduction in heart rate, and lighting in the purple range are consistent with characteristics of deep sleep. Here, regeneration can definitely take place.

Gathering HRV data and comparing them make it possible to objectify subjective experiences. We have the first indications, which confirm the positive feedback on relaxation and regeneration by course participants and clients that has been known in practice for decades.

Of course, for scientifically confirmed declarations, more extensive data is required. I look forward to reporting more on this subject in the coming years.



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