

## STRESS DIAGNOSIS OF ACOUSTIC AND VIBRATION STRESSORS WITH A SPECIAL VOICE FREQUENCY ANALYSIS - VFA PRESENTATION OF A RHYTHMIC-FUNCTIONAL DIAGNOSTIC METHOD

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### Background:

Asuquo, U.E., et al.:

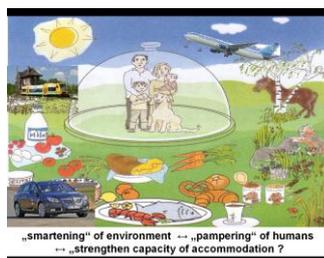
„It is not known whether the direct  
physiological effects of noise play a role in  
the pathogenesis of diseases.“

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### pictur: 1

Results of cross-sectional and longitudinal studies concerning the effects of environmental – especially acoustic and/or vibration - stressors to human organism show the response of a population as a whole. This means, that a statistically significant percentage of responders is affected in a similar way.



### Picture: 2

In consequence society and industry try to form the environment “smart” and/or to “pamper” human in order to protect the population from the disturbing effects of stressors.

But what about the probands, who do not fit to the main population?

The question points to the problem of a person's individual capacity of accommodation and development. Stress response depends on the individual's constitution, conditioning and condition.

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human organism is an open,  
complex system

open, complex system need another  
kind of diagnostic systems

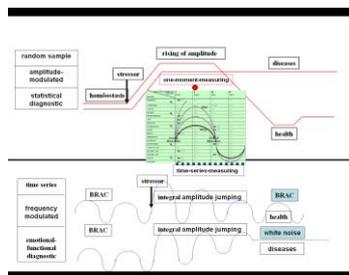
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**picture: 3**

In addition to the “smartening” of environment and technique special kinds of measurement methods have to evaluate the emotional and functional behaviour of human organism with the aim of strengthen the individual's capacity of adaptation to his environment and to optimize his resources.

The industry's demand for diagnosis of the stress effects of noises, sound and vibration within human-machine-interaction so far has not been matched sufficiently by an adequate development of medical equipment and methods.

What is needed is a reproducible diagnostic method to evaluate the essential and individual emotional-functional stress systems in organism considering the influences of the individual's constitution, condition and conditionings.

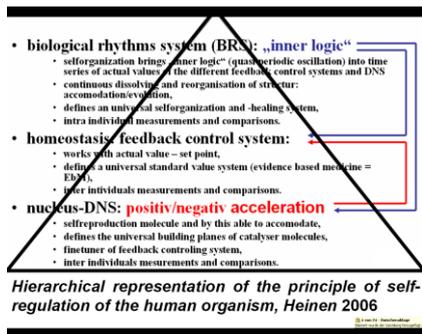


**picture: 4**

Methods, which supply only 1 or 2 values of the moment are of no significance for the diagnosis of regular / non-regular stress response.

If one value is beyond the evidence based standard value one only can say, that the system once and actually reacted extraordinary.

As there is a continuous communication between human organism and its environment, the time series analysis of biosignals proves to be an optimal basis for the assessment and description of stress reactions.



picture: 5

From Chronobiology there is known, that every organic system has its own specific rhythmicity, which dictates its specific – logic - way of stress response.

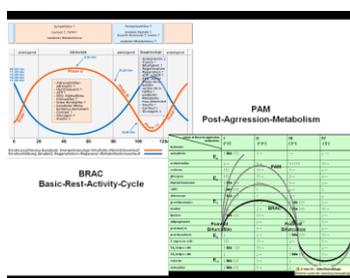
- Adaptation to the present
- Conclusions about the past
- Prognosis for the future
- Evolution / accommodation
- self-regulation-/self-recovery

picture: 6

Rhythm is a universal principle. Its intrinsic logic allows

- Adaptation to the present
- Conclusions about the past
- Prognosis for the future
- Evolution / accommodation
- self-regulation-/self-recovery

2 examples, which demonstrate the principle of rhythm:



picture: 7

1. BRAC (see in figure left side): basic- rest-activity-cycle

This rhythm is a 2-hour-lasting rhythm of increase and decrease of activity during day and night triggered by sunlight..

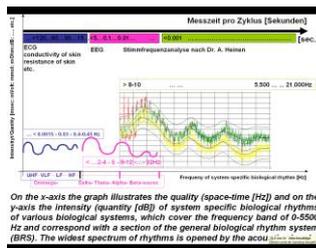
## 2.PAM (see figure **right side**) post-aggression metabolism

This rhythm is a 2-hour-lasting rhythm, too, of increase and decrease of activity triggered by a stressor.

As both figures show, the metabolism is always in:

- phase I: as purely catabolic (chaotic, i.e., resolving);
- phase II: as anabolic-catabolic (structural destructive);
- phase III: as purely anabolic (cosmic, i.e. structuring)
- phase IV: as anabolic-catabolic (structure preserving).

The different between BRAC and PAM is only the quantity / intensity of the metabolism in phase I to phase IV.



### picture: 8

The time series analyses EEG, ECG, etc. are used in general.

The widest spectrum of rhythms of human organism is opened by the acoustic signal, the “voice”.

Time series analysis of the biosignal “voice” and a special developed mode of interpretation produce a voice diagram, which represents the individual’s own rhythm system (BRS).

Based on experimental / practical / clinical research with thousands of voice graphs over the last years, it appeared that special interpretation modes of a new kind of voice-frequency-analysis VFA allow inferences about essential emotional-functional stress parameters (ESP).

Open practice studies with the voice-frequency-analysis VFA in recent years used for the diagnosis of stress reactions and chronic diseases, revealed that the VFA is a measuring method especially for the emotional-functional field of chronic diseases as well as for vibrational environmental stressors <sup>5, 8, 10, 11, 13</sup>.

Based on the individual’s sound of voice the method is independent of age, culture or gender. The handling is easy, safe, mobile and quick, without any sensors or belts to be attached to a proband.



picture: 9

The VFA is based on the models for living open systems with non-linear behaviour and connects the knowledge of Chronobiology, functional medicine, physics, acoustics and stress research. Stress thereby is defined as a communicative process of interfering environmental (technical, natural) rhythms and the biological rhythm system (BRS) of organism<sup>1, 2, 3, 6, 7</sup>.

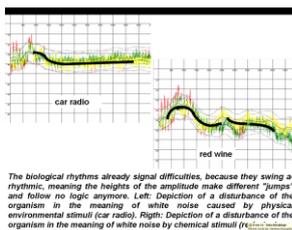
- 'autonomous nervous system',
- 'redox system',
- 'acid-base-equilibrium',
- 'anabolic-katabolic-hormone-equilibrium',
- 'personality profile':
- 'basic/stress behaviour',
- 'conditioning',
- 'experience of time and space – speed and distance',
- 'potentials/resources',
- 'stress status',
- 'problem areas of columna vertebralis'

Picture: 10

It allows to assess the emotional and functional stress parameters ESP:

- 'autonomous nervous system',
- 'redox system',
- 'acid-base-equilibrium',
- 'anabolic-katabolic-hormone-equilibrium',
- 'personality profile':
  - 'basic/stress behaviour',
  - 'conditioning',
  - 'experience of time and space – speed and distance',
  - 'potentials/resources',
  - 'stress status',
- 'problem areas of columna vertebralis'

### Conclusion:



picture: 11

- 1.VFA is a reproducible empathic and emotional-functional diagnostic method, which considers the individuality of the human organism's stress response.
- 2.VFA allows to control individual empathic, emotional and functional reactions of human organism during an application of defined acoustic/vibration stressors.
- 3.VFA is an optimal enhancement to conventional morphological and chemical diagnosis and visual biometric methods and the diagnosis individually.
- 4.VFA supports the process of optimizing the human-machine-interaction by impartial controlling and mobilization of consecutive targeted interventions in order to develop an optimal individual prevention for organism and to enhance health and manpower.

Aim in future must be to support the individual apparatuses of organism in order to make an effective and sufficient accommodation to an environmental stressor – in addition to the efforts of diminishing disturbing sounds and vibrations of environment and technique.

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**Thank You for listening!**