Radiation and Environmental Surveys

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OPINION

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ASSESSMENT:

2013 Research Report:

Research on Aires Defender's influence on the variability of heart rhythm

Project manager: S. Datova

Prepared for the submitters:

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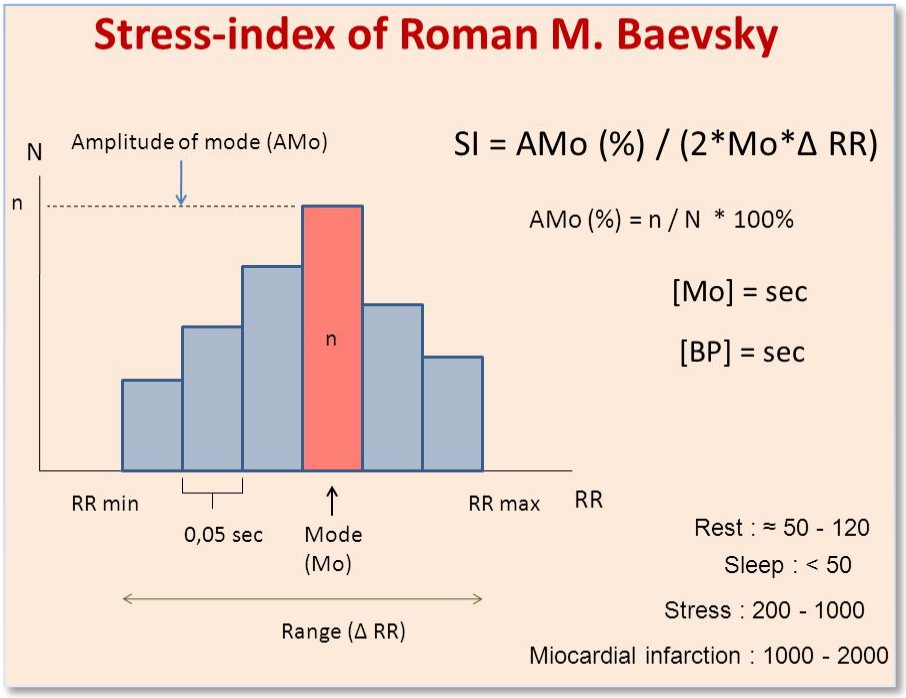
The purpose of the 2013 Research Report, **Research on Aires Defender's influence on the variability of heart rhythm** prepared by the team led by **S. Datova**, is to verify the effectiveness of using the ***Aires Defender*** to enhance the body's ability to adapt.

The research method applied is ***Heart Rate Variability*** *(HRV)* protocol, an analysis system successfully developed for Space Medicine and applied worldwide for monitoring and clinical research.

This non-invasive analysis involves monitoring of heart rhythm and specifically fluctuations of heart contractions relative to a norm.[1] This is a norm in based on the widely-recognized research by **Roman M. Bayevsky**.



In the original space medicine research [2](using telemetric *Holter* monitoring) base, ECG, EEG, pneuomography, arterial oscillography, sphygmography, phonocardiography, kineticardiography, actography, thermometry, skin galvamnic reactions, electroocculography, rate of gas production in bacteria development were cross-related. The weighting parameters developed thereof include: the efficient control of hearing, sight, skin galvanics, memory, response time, emotional stability, communicability,mental aspects of central and autonomic nervous system, physical state of limbs, stamina, *et cetera*. This was partcilarly helpful in assessing adaptation to long-term weightlessness.

In other words, such protocol (in this research's case applying the ***Omega M*** systems of software and hardware, provide non-invasively data, in-vivo, concerning the body's regulation functions: heart activity, autonomous innervations of the medulla, pituitary & hypothalamus performance, and finally, central functions associated with adaptability to external environment influences.

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[1] The norm is based on the mathematical analysis research developed by Roman. M. Bayevsky with regards to heart rate changes under stress as well as assessment of the adaptive capabilities of the body and its risk of developing diseases. Such research has led to a mechanical "seismocardiograph", a seismogram and associated protocols for medical informatics diagnosis of cardiovascular dynamics. It generates rates for emotional stress rates, adaptive regulation performance reflecting neuro-endocrine activation.

[2] R. M. Baevskii *Analysis of Heart Rate Variability in Space Medicine***.** Human Physiology 2002, Volume 28, Issue 2, pp 202–13

Using algorithms, the *HRV* protocol can quantitatively estimate functions of the autonomous nervous system, and perceive influence from numerous stressors, including environmental, such those associated with electromagnetic fields, some of which are described in the **National Research Council of Canada**'s reports, prepared with **Queen's University** (1971-1973).

A chart from one of these Canadian government reports is shown. It indicates numerous relevant effects such as bio-chemical resonance, diffusion coefficients on biomembranes, and flow rates of biosolutions, including those of lymphatic system.

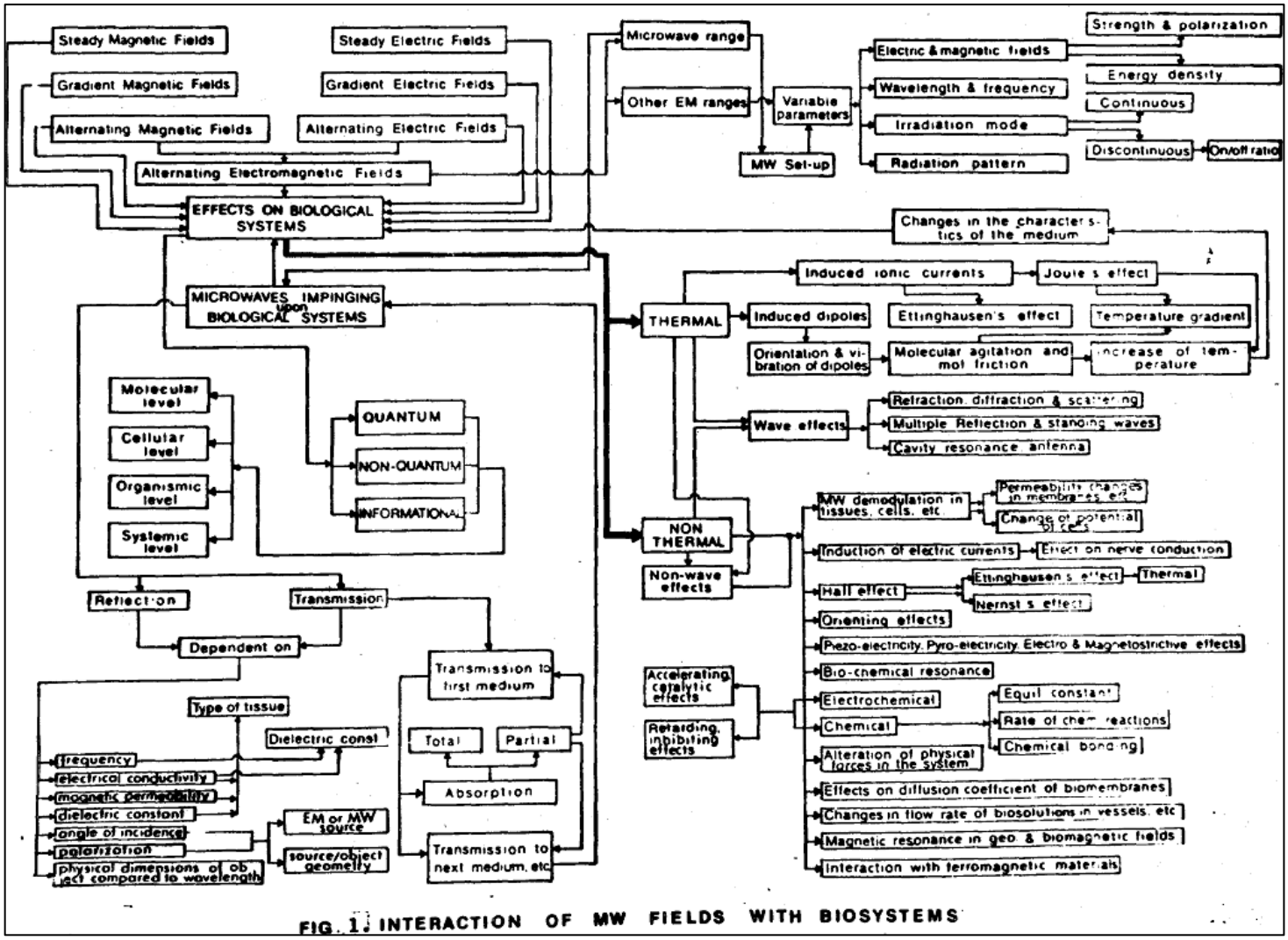
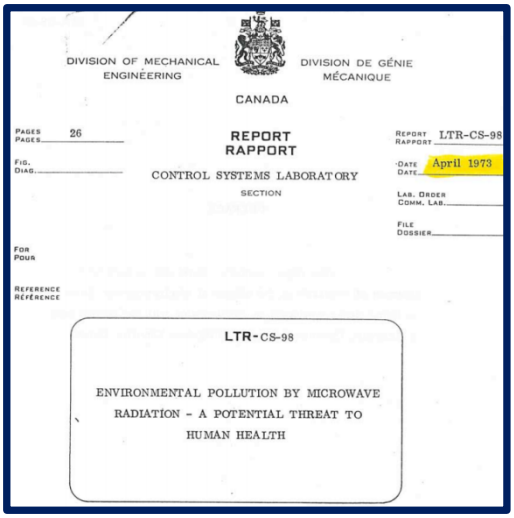


FIG. 1: INTERACTION OF MW FIELDS WITH BIOSYSTEMS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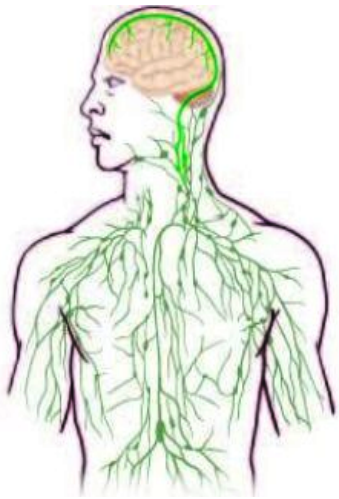
ENVIRONMENTAL POLLUTION BY MICROWAVE RADIATION - A POTENTIAL THREAT TO HUMAN HEALTH

In recent years the Lymphatic System has been noted to relate to the central nervous system. Prof. **Jonathan Kipnis**, **University of Virginia** Neuroscience & Center for **Brain Immunology and Glia** *(BIG)* states, "It changes entirely the way we perceive the neuro-immune interaction. We always perceived it before as something esoteric that can't be studied. But now we can ask mechanistic questions."



This observation supports *HRV* protocol's rationale. The rapport is indicated in the graph to the right. It may explain immune effects associated with *ElectroHyperSensitivity* (EHS), which is a viable and probable target modality for the Aires technology.

It also indicates that the newly discovered lymphatic vessels are likely involved in neurological diseases with an immune component, for example autism, Alzheimer's disease, and multiple scleroses, and will therefore increase the understanding of these diseases and their treatment.

As supportive evidence of the validity of the *HRV* rationale, two examples are indicated, the first from Prof. **Bruce Pomeranz**, **University of Toronto**, Physiology, with associates at **Beth Israel Hospital**, **Harvard Medical School**, **MIT**, and other Boston institutions. From: *Assessment of autonomic function in humans by heart rate spectral analysis.* Am. J. Physiol., 1985, vol. 248, p. 151. It shows how a simple difference between standing and supine positions can alter heart rate variability.

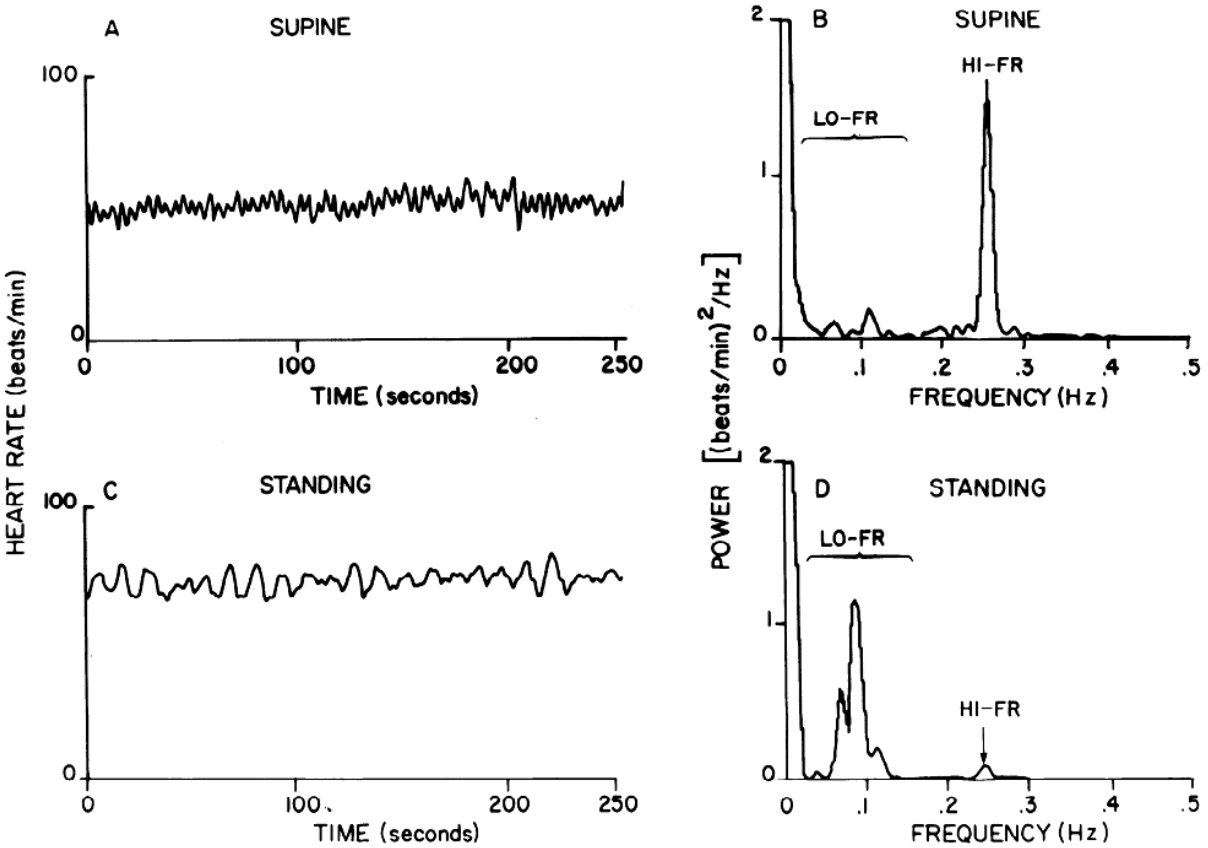


FIG. 1. Heart rate response to changes in posture. *A*: instantaneous heart rate in supine position. Note prominent high-frequency oscillations (respiratory sinus arrhythmia). *B*: power spectrum of *A*. Note small low-frequency (LO-FR) peak and prominent high-frequency (HI-FR) peak. *C*: instantaneous heart rate in standing position. Note prominent LO-FR oscillations. *D*: power spectrum of *C*. Note prominent LO-FR peak and small HI-FR peak.

Another elementary example originates with the **American Heart Association**, in conjunction with a large research group from **Università degli Studi of Milan**, the **Italian National Research Council** and the **Politecnico di Milano**, Italy, which is indicated below, which stresses the level of information coherence of HVR and its non-invasive monitoring characteristic, regardless of stress levels.

Cross-spectral analysis of systolic arterial pressure and R–R interval variabilities indicated that a high degree of coherence existed between the fluctuations of these two variables both in recumbency and during tilt. In correspondence to the HF component, arterial pressure and R–R interval changes occurred in phase, whereas each LF pressure change preceded R–R interval oscillation by about two beats.

Although this cross-spectral analysis provides no direct insight into the mechanisms linking heart period and arterial pressure oscillations, with their possible neural and non-neural components,[12,47] it supports the conclusion that similar information on oscillatory rhythms can be obtained from both invasive and noninvasive studies, not only at rest, but also during augmented sympathetic activity.

Circulation Research
Journal of the American Heart Association

American Heart Association

Power spectral analysis of heart rate and arterial pressure variabilities as a marker of sympatho-vagal interaction in man and conscious dog.
M Pagani, F Lombardi, S Guzzetti, O Rimoldi, R Furlan, P Pizzinelli, G Sandrone, G Malfatto, S Dell'Orto and E Piccaluga

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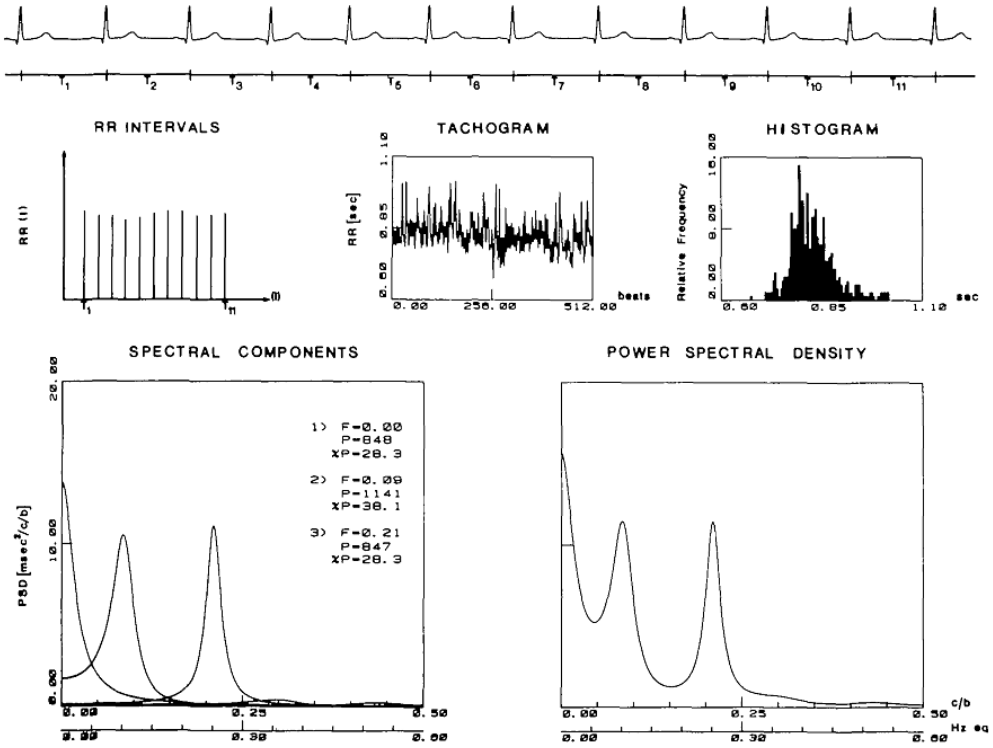

FIGURE 1. *Schematic outline of the computer analysis of R–R variability. From the surface ECG (top trace), the series of R–R intervals is calculated as a function of the beat number. This gives rise to the tachogram and, from it, simple statistics are first computed, such as mean, variance, and the relative frequency distribution, i.e., the histogram. Following this, spectral analysis is performed: Individual spectral components are automatically determined, together with their center frequency and associated power, i.e., area. Finally, the autospectrum is computed and plotted. Inset of left lower panel: F = frequency in cycles/beat; P = power in msec²; %P = fractional power. In this, as well as in the other R–R interval variability autospectra, the power spectral density (PSD) units should be multiplied by 10³.*

This *HRV* computing-based method for assessing psycho-physical-physiological functional states has been applied to determine level of decision-making performance of air-traffic controllers, aviation safety and security personnel.[3]

[3] 2018 Joint study of **Kyiv Polytechnic Institute**, Kyiv School of Economic and National Aviation University, Kyiv, reported in: Recent developments in data science and intelligence analysis of information (in print, Springer).

It is noted that the Datova research how it is remarkably rich in indicators, processed through weighed formulations and algorithms to enhance collective diagnosis decision-making through a "virtual" conciliation. This complexity is key for evaluating stress, particularly such as from cumulative electromagnetic affectation.[4]

Mode (Mo) – predominant range of values (0.7 - 0.9)

Mode amplitude (AMo) - RR (consecutive contraction interval) rate = % Mo (30 - 50%) re: rhythm rigidity.

Variability range *(VR)* – Max- Min cardiac signal differential re: parasympathetic indication (0.15 - 0.45).

Index of Regulation System* Stress *(IRSS) = AMo/2*^X*Mo – heart rhythm regulation coherence fluctuating between 10-100 c.u. re: reactivity to sympathetic nervous system's increased tonus.

Index of Autonomic Equilibrium (***IAE***) = AMo/^X – ANS sympathetic & parasympathetic ratio (35 – 145 c.u.).

Autonomic Rhythm Indicator ARI = 1/Mo*^AX - balance of autonomic regulation circuit (0.25 – 0.6).

Regulation Processes Adequacy Indicator RPAI = AMo/Mo - consistency between parasympathetic ANS area activity and sinoatrial node's leading functional level (15 - 50 c.u.)

High-Frequency Spectral Component Power (***HF*** - 0.15 - 0.40 Hz) ANS-generated fluctuations, influenced by nature of breathing etc.

Low-Frequency Spectral Component Power (***LF*** - 0.04-0.15 Hz) - complex physiological indicator; intensity possibly affected by changes in both parasympathetic and sympathetic nervous systems.

Very Low-Frequency Spectral Component Power (***VLF*** - 0.003 - 0.04 Hz) – meaning unclear: intensity associated with regulation system distress, metabolism and ANS sympathetic super-segment regulation.

Power ratio LF/HF - ratio of sympathetic and parasympathetic influences. When sympathetic area tonus rises, indicator increases significantly. With sympathetic imbalance, the opposite occurs. Reciprocal changes in LF and HF power are frequent. ***LF*** power may rise significantly in healthy persons under mental stress and a moderate physical load. ***LF*** power and ***LF/HF*** indicator probably reflect ANS sympathetic area activity.

Full Spectrum (TP) (less than 0.40 Hz) - integrated indicator of influence of both sympathetic and parasympathetic areas of the autonomic nervous system (ANS). Increased sympathetic influence decreases overall spectral power; sympathetic imbalance activation leads to the opposite effect.

We note that the methodology has been judiciously applied to reduce influence from artifacts and "noise" associated with possible electromagnetic emissions at site of monitoring, while permitting life-like but comfortable conditions. The number of volunteers, their staging and data-logging periodicity are considered to be conducive to indicator and analysis development for this research's purpose: to determine the body's ability to adapt, with or without the ***Aires Defender***. The heart rhythm variability (HRV) methodology's characteristic susceptibility to responsiveness to numerous external and internal influences poses challenges that have been carefully dealt with in this research exercise, to the degree that further research should be able to reproduce parallel results. These have been described by the discussion

[4] The father of the study of stress, Canadian Hans Seyle (In: ***In vivo: the case for supramolecular biology***. 1967) states,"only a small number of illness are monocausal … The majority of illnesses are predominantly pluricausal – they do not have a single specific cause: they are the result of the action of pathogenic compounds." This thesis is noted by Hungarian, J. Sos, et al, in: ***The pathogenisis of illnesses of civilization***, 1976: "… every illness caused by civilsation is polyaetiological" displaying general pathological symptoms."

on the research results. For example several subjects gave HRV evidence of long-term stress of their bodies' regulation systems.

Nevertheless, the results do indicate - on the basis of best-available know-how - that the application of the ***Aires Defender*** upon the celiac plexus[5]:

- Does increase parasympathetic tonus (normal continual muscle tissue tension, or partial contraction, that facilitates response to stimulation) that is interpretable on the basis of clinical observation as stress reduction on the body's regulation system[6].
- Does increase vasomotor centre activity[7] in a way that suggests greater body's harmonization (homeostatic dynamic equilibrium).
- Does increase level of energy and metabolic regulation [8] which may indicate activation of central regulation.

The research shows pronounced effects in large groupings of monitored individuals, some of whom (77.8%) demonstrate increase of sympathetic and parasympathetic tonus, whereas (88.9%) demonstrate stress decrease. Such results suggest inputs towards dynamic equilibrium (homeostasis). The findings are consistent with other HRV parameter indicators identified in the study. In 12 out of 13 subject volunteers, the near-field presence of the ***Aires Defender*** the heart rhythm's coherence (parameter *IRSS*) normalized, apparently to the degree of greatest deviation from "norm", i.e.: the greater the stress experienced by a volunteer, the greater the relief from the device. Thus there is a significant adaptive effect, or "efficiency", suggesting a possible learning enhancement for the body, which could become an interesting area of further scientific investigation. If so, the self-organizing aspect in a dynamic environment could lead to internal problem solving feedback regulation / computational intelligence and allocation.

The Datova study concludes with a quantification of improvements associated with the near-field presence of the ***Aires Defender*** with this graph:

1. Adaptation level of the cardiovascular system - 13.5%
2. Level of autonomic regulation - 11.5%
3. Level of central regulation - 9.7%
4. Indicator of psycho-emotional condition - 8.8%
5. Integral health indicator - 10.9%

How relatively significant are these improvements is not yet totally understood for lack of comparison with variations of the Aires technology, but they are consistents with other **Aires** technology research associated with other biological markers done by other research groups. Additionally, the data and its analysis underscore the addition of an additional parameter (homeostatis adaptability) when conduction research on cumulative effects of electromagnetic field on living systems.

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[5] Also known as "solar plexus" from which nerve fibers radiate located in the abdomen on the chest below the *Xiphoid* (ensiform) cartilaginous projection process.

[6] This is in reference to homeostasis as a *dynamic equilibrium* rather than a constant unchanging state, wherein the endocrine system that coordinates activities between the brains and other body structures plays an important role since hormones regulate the activity of body cells, and because the *release of hormones into the blood is controlled by stimuli.*

[7] Located in the brainstem's *medulla* and lower *pons* responsible for central regulation of cardiac electrical activity, this centre engages in blood pressure and other homeostatic processes such as synthesis of *noradrenalin* / *norepinephrine.*

[8] Involving soluble messengers such as hormones and growth factors that are detected by specific receptors on cell surfaces: examples are glucose metabolism by insulin hormone. Also at play: homeostasis of ionic biochemical process from the pituitary-hypothalamus to the glands which regulate blood, respiration, tissues, etc..

In conclusion, we find this Research Report to credible, instructive, consistent with and complementary to other research conducted with Aires technology.

The nature of the findings is aligned with advances in the leading-edge understanding of cumulative effects in living systems.

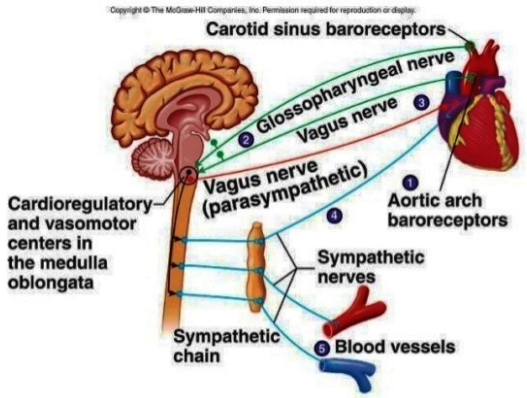
The Research Study also suggests considerable opportunity for **Aires** technology being applied for cases of populations subjected to considerable and extreme stress, such as first-responders, and vigilant professional groups.

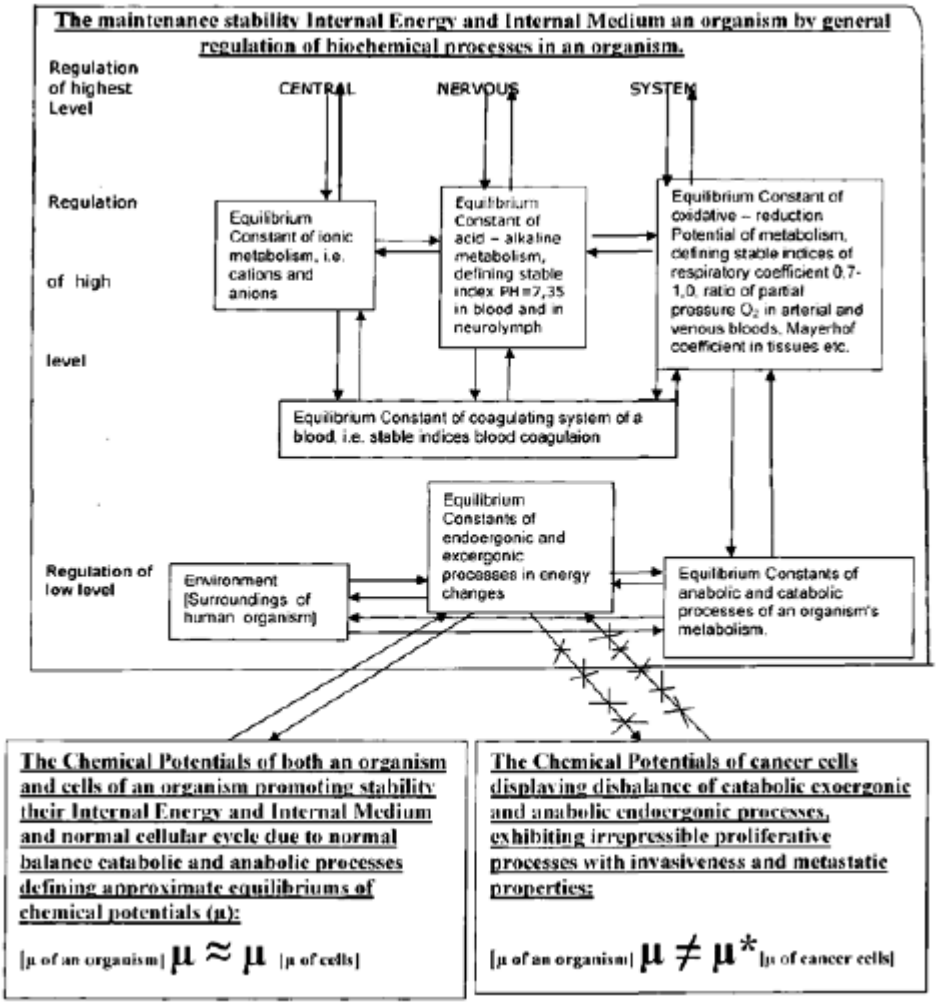
This study's results demonstrate an effectiveness of **Aires** technology in reducing adverse heart rate variability (HRV) affectation such as from wireless technology emission on persons.

Dr. Andrew Michrowski

Appendix

Baroreceptor Reflex Control





The Chemical Potentials of both an organism and cells of an organism promoting stability their Internal Energy and Internal Medium and normal cellular cycle due to normal balance catabolic and anabolic processes defining approximate equilibriums of chemical potentials (μ):

[μ of an organism] $\mu \approx \mu$ [μ of cells]

The Chemical Potentials of cancer cells displaying disbalance of catabolic exoergonic and anabolic endoergonic processes, exhibiting irrepressible proliferative processes with invasiveness and metastatic properties:

[μ of an organism] $\mu \neq \mu^*$ [μ of cancer cells]