Heart Intelligibility and CHD: new approaches to patient diagnostics and care

Any psychic anxiety, evident in pain and pleasure, hope and pleasure, hope and fear, forms the basis of excitation spreading its influence to the heart.

William Harway, 1628

Yabluchanskiy M.
# How we still understand CHD

**Standard definition**

A general reason for various types of CHD is cardiac muscle abnormality in consequence of disparity between oxygen delivery of myocardium and its necessity.

**Standard understanding of etymology**

Problems of cardiac coronary arteries
- atherosclerosis
- spasm
- thrombosis
- inflammation
- congenital anomaly
- others

*E.P Selvan*

*CHD in Harrisosn’s internal diseases principles*
Are CHD problems only limited by the coronary circulation disturbance consequences caused by a heart needs conflict in a real oxygen delivery to it?
Smoking, high level of cholesterol or inactive lifestyle form a small part of the causes that bring on a heart diseases.
The research of stenocardia attacks shows that an emotional state of patients and relationship between patients are so important as CHD itself and prognosis for it.
30 years’ research showed that an emotional stress played a more important part in an oncological mortality and in a cardiac death than smoking;

Among people who cannot keep a stress under control a death rate is 40% higher than among those who have managed to cope with it.
According to Mayo Clinic data, the provoking key factor among cardiac catastrophes such as stenocardia attack and cardiac death rate is psychological stress.
Multicentral research of more than 2,829 patients aged 55-85 showed that the people who can resist strokes of fate suffer from cardiac diseases 60% less in comparison with those who fail to face life difficulties.
20 years experience of conducting 1,700 elderly patients showed that an anxiety about social conditions, health or even finance significantly increases a risk of bringing on cardiac diseases.
• Staff members of Harvard School of Medicine examine 1,623 patients suffering from stenocardia and discovered that a risk of attack at an emotional stress state is two times higher than at a calm state.
- What can we see?

- In CHD the key role is performed by heart intelligibility!
Why so?
Cardiac innervation
Innervation is an upper level of the more ancient humoral regulation.

There is a single united neurohumoral regulation (NHR).

- NHR will entirely echo
  - And what about the heart?
  - In intelligibility! It cannot reflect if it’s “overloaded” with adelphan.
The key to the intelligibility of the heart
- *Heart Rate Variability Technology*

HRV Technology is an instrument:
- Evaluation of health resource and quality
- Defining the probability of qualitative and timely recovering
- Acute condition of chronic disease prevention exacerbation
- Application of medicaments, doses, schemes of use
- Control, optimizing and prognosing of treatment results
- Indicating the catastrophic health disorders search of effective methods of their prevention
- Planning and control of physical activity in everyday life and in sports
- Professional selection
- Evaluation and increasing the life quality
Technology of heart rate variability (HRV) power spectrum analysis – it is very simple
Technology of heart rate variability (HRV) power spectrum analysis – it is very simple

- Cardiac rate like white light is consist of elementary rhythms
- HRV is a quality measurement of cardiac rate
- HRV spectrum analysis is a cardiac rate dimension into the elementary rhythm spectrum
- Spectrum analysis technology is a fast Furie and other methods transformation; it is like a prism that resolves white light into elementary lights
- HRV spectrum – «rainbow»
- «Rainbow» characteristics in spectrogram «Rainbow» quality – cardiac rate quality
- Cardiac rate quality is a quality of heart rate systems management
Technology of heart rate variability (HRV) power spectrum analysis – it is very simple

According to the experimental results, HRV spectrum is divided into three parts of different colors, in which humoral, sympathetic, and parasympathetic regulations are "concentrated"
Technology of heart rate variability (HRV) power spectrum analysis – it is very simple
HRV – “echo” regulation processes: breathing regulation reaction and active orthostasis

Breathing modulation increases high frequency (parasympathetic) power and active orthostasis – low frequency (sympathetic) link of HRV spectrum
HRV – “echo” of regulation processes: breathing regulation in basal conditions, acute pharmacological tests with theofedrin and anaprilin have the HRV - equivalents

theofedrin

anaprilin

Before breathing modulation

Breathing modulation
Neurohumoral regulation of CHD patients

- Low power of NHR
- High power of NHR
- Predominance of humoral and sympathetic regulations
- Degeneracy of parasympathetic regulation
- Excessive growth of parasympathetic regulation
- Displacement of sympathetic – vagal balance to the sympathetic link of vegetative regulation
- Disorders of NHR systems reaction to the physiological stress
Patient A., 72

Before and after treatment of enapapril maleat (enap (KRKA), 2.5 mg/day), low spectrum power two times increasing, disappearance of paraxisms
An hour later after 2.5 mg of enapril maleat spectrum power increased in 1.5 times with changes of a very low frequent to a low frequent domain.
Left, right windows – circles of high and low frequency fractals, rhythmgram, skatergram, a curve of cardiac circle length distribution – dual modal distribution, regeneration of a sinus note function after a pill of belloid
Spectrum resolution of rhythmgram from low and high frequent fractals, in both cases degeneration of vegetative regulation link, regeneration of a sinus note function after a pill of belloid.
Patient E, 63, Acute myocardial infarction, *can’t believe my eyes*

### Общая характеристика ритма

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<thead>
<tr>
<th>Показатель</th>
<th>Значение</th>
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<tbody>
<tr>
<td>Количество анализируемых событий</td>
<td>102566</td>
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<tr>
<td>Средняя ЧСС</td>
<td>71 уд/мин</td>
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<tr>
<td>Ночь</td>
<td>68 уд/мин</td>
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<tr>
<td>Макс. ЧСС</td>
<td>125 уд/мин в 13:08:57</td>
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<td>Миним. ЧСС</td>
<td>50 уд/мин в 22:40:37</td>
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<td>92 уд/мин в 10:11</td>
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<td>Миним. часовая ЧСС</td>
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### Нарушения ритма

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<tr>
<th>Нарушение</th>
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<tr>
<td>Тахикардия</td>
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<tr>
<td>Брадикардия</td>
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<td>Паузы</td>
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<tr>
<td>Макс. пауза</td>
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### Аналиті ST1 сегмента

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<th>Уровень</th>
<th>Длительность</th>
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<td>12.18 сек.</td>
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<tr>
<td>ST эп. макс. элевация</td>
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<td>8.21 сек.</td>
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### Вариеабельность ритма

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<tr>
<td>RMSSD</td>
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<tr>
<td>RMSSD</td>
<td>89 мс</td>
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<tr>
<td>RMSSD</td>
<td>58 мс</td>
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<tr>
<td>pNN50</td>
<td>3 %</td>
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<tr>
<td>HRV T1</td>
<td>33.2 %</td>
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### Спектральное параметры

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<tr>
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<tr>
<td>ULF</td>
<td>1210.9 мс2</td>
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<tr>
<td>VLF</td>
<td>2654.8 мс2</td>
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<tr>
<td>LF</td>
<td>465.3 мс2</td>
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<td>61.1 %</td>
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<tr>
<td>HF</td>
<td>298.6 мс2</td>
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<td>HF Norm %</td>
<td>38.9 %</td>
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<tr>
<td>LF/HF</td>
<td>1.6</td>
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Halter monitoring: *false impression about dipper HR, «false» HRV rates*
Patient F, 63, Acute myocardial infarction, something happened to illegibility

<table>
<thead>
<tr>
<th>Дата записи</th>
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<tbody>
<tr>
<td>Количество анализируемых сокращений</td>
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<td>Общая длительность артефактов</td>
<td>00:0:05</td>
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<td>Количество событий пациента</td>
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<table>
<thead>
<tr>
<th>Дата</th>
<th>Средняя ЧСС</th>
<th>Средняя Дыхание</th>
<th>Холтеровская ЧСС</th>
<th>71 уд/мин</th>
</tr>
</thead>
<tbody>
<tr>
<td>Днем</td>
<td></td>
<td>Дыхание</td>
<td></td>
<td>68 уд/мин</td>
</tr>
</tbody>
</table>

- Макс. ЧСС: 105 уд/мин в 23:40:37
- Миним. ЧСС: 50 уд/мин в 22:40:37
- Макс. часовая ЧСС: 92 уд/мин в 10:21
- Миним. часовая ЧСС: 43 уд/мин в 22:23

Halter monitoring: non-dipper HR
Patient G, 63, Acute myocardial infarction

Halter monitoring: Distribution and skatergram RR-intervals – on the background of basic rhythm monotopic extrasystole with a higher frequency at day time, HRV defies a spectrum analysis in a standard minute.
Patient H, 63, Acute myocardial infarction

Halter monitoring: quasicinussoidal rhythmgram – demonstration of significant disorders of humoral regulation, extrasystoles in periods of “long” RR-intervals.
Patient I, 63, Acute myocardial infarction

Halter monitoring: quasicinussoidal rhythmgram - demonstration of significant disorders of humoral regulation, episode of frequent extrasystoles in periods of “long” RR-intervals.
Patient J, 63, Acute myocardial infarction

Halter monitoring: Pendulum-like rhythm – “degeneration” of regulation
The Zutphen Study
(1088 patients examined)

Conclusion:

Low heart rate variability is associated with a high death rate among elderly age people as well as among mean age people.

Low heart rate variability indicates a low level of health in general including immune functions.

What does The Zutphen Study mean, or how to read between the lines The Zutphen Study

Of course, not only “low heart rate variability is associated with a high death rate among elderly age people as well as among mean age people”, but low non-perfect regulation, when besides there are some problems with heart intelligibility.
HRV index and survival probability

Depressed HRV – high rate of sudden death, depressed left ejection fraction (LVEF) – high rate of non-sudden death

Old and forgotten things from the West

- Pavlov’s nervism as a philosophy of health and disease
- Clinical supplement of Pavlov’s nervism in the cortico-visceral theory of somatic diseases
ESC: Hypertension, heart failure and infarction: Evidence for ACE-inhibitor-based treatment?

**Heredity**
- Associated Risk Factors

**Environment**
- Associated Risk Factors

**BP, IHD**

**Remodelling**

**Atherosclerosis**

**Arteriosclerosis**

**CV events**
- CV death

**Subclinical CV disease**
- (LVH; micro?; coronary reserve; atherosclerosis of carotid artery)

**No place for regulation!**
**It is out of day!**

European Society of Cardiology
There is a place for regulation! Is it just enough?

Remodelling Process

Hypertension (months-years-decades)
Myocardial infarction (days-weeks-years)

Ischaemia

Increase in load (relative/absolute)

Increase in wall stress (global/regional)

Neurohormonal activation (altered transcription of genome)

Altered phenotype (hypertrophy/fibrosis/dilation)
Consequences of heart illegibility in CHD diagnostic

**Accents**

- Patient’s health state in general
- Psycho-social portrait of a patient
- Development and balance of neurohumoral regulation
- Cogniguity of neurohumoral regulation
- The role of medical and psycho-social factors in CHD indication and prognosis
- *Quality of patient’s life*
Consequences of *heart illegibility* for CHD patients conducting

- Integrative medical and psycho-social approach
- Cognitive behavior therapy
- Neurohumoral regulation optimizing
- Traditional therapy
Neurohumoral modulation in clinic
-heart illegibility dictates!

- Only now we start to understand the role of disorders and the necessity of NHR modulation
- Effects of many medicaments through NHR
  - B-blockades
  - Inhibitors ACI
  - Spironolacton diuretics
  - Digoxin (*digoxin for all!*)
- And some new medicines (selective antagonist aldosteron receptors – eplerenon, NEP(neutral endopeptidase)-ACE-I – omapatrilat, endotelin antagonists – selective and non-selective (bosentan), metalproteas inhibitors, and others.
- And besides immune and inflammation modulation, molecular-genetic therapy...

*Are we ready?*
I. Mode of action of ACE inhibitors: block conversion of $A_I$ (an inactive substance) to $A_{II}$ (a vasoconstrictor). This action (1) decreases the generation of $A_{II}$, and also by blocking the activity of kininase II, (2) decreases the breakdown of bradykinin: this vasodilator substance increases; blood pressure is lowered. II. Mode of action of angiotensin II (AT-1) receptor blocker: blocks effects of $A_{II}$; aldosterone secretion is not increased and vasoconstriction is prevented; *no effect on bradykinin system.*
Possible levels of RAAS blockades
B-blockators, ACE inhibitors, spironolactonic diuretics, digoxin increase NHR power and modulate sympathetic-vagal balance.

Anaprilin influence on TP, LH1/HF in an acute pharmacological dose of healthy volunteers.
Not all preparations have such an influence.

Here you are - cerucal.
ATLAS
Assessment of Treatment with Lisinopril And Survival

All-cause Mortality

Dose – nothing, preparation – all!

% Survival

High dose

Low dose

p=0.128

Months

0 6 12 18 24 30 36 42 48
Consequences of *heart illegibility* in CHD patients conducting

- Integrative medical and psycho-social approach
- Cognitive behavior therapy
- Neurohumoral regulation optimizing
- Traditional therapy (*if now we can call anything traditional therapy as it is*)
Medicaments therapy approaches

- Combination of preparations is preferable
- Add something new, but don’t increase a dose
- Dose titration
- No peripheral vasodilators
- NHR preparations are preferable
Our patient is a social(!) – biological Human Being, where the biological part serves for the social one, and biological can be ideal only within Nature, as they cannot exist separately. A regulation inseparability occurs good or bad depending on how lucky and successful you are. Or on your doctor’s prescription. A bad regulation – what will the heart say? And what will we say to the heart? CHD is like a mine field! How can one cross it with a bad heart intelligibility?