

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 Harvey, 1628

Yabluchanskiy M.
(Iabluchanskyi Mykola)

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

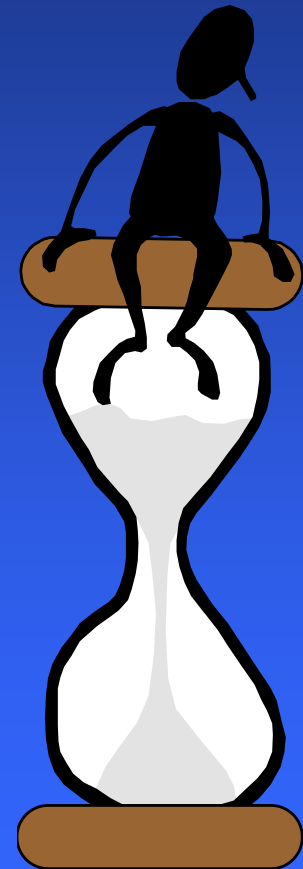
E.P Selvan

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?

R.Rosenman. Integr Physiol Behav Sci. 1993;28(1)

- Smoking, high level of cholesterol or inactive lifestyle form a small part of the causes that bring on a heart diseases.



S.Thomas et al. Am J Crit Care.
1997;6(2)

- 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.



H.Eysenck. Br J Med Psychol. 1988;61(Pt1)

- 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.



T.Allison et al. Am J Epidemiol. 1997;70(8)

- According to Mayo Clinic data the provoking key factor among cardiac catastrophes such as stenocardia attack and cardiac death rate is psychological stress.



B.Penninx et al. Am J
Epidemiol.1997;146(6)

- 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.



L.Kubzanovsky et al.
Circulation.1997;95(4)

- 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.



M.Mittleman et al. Circulation. 1995;92(7)

- **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.**

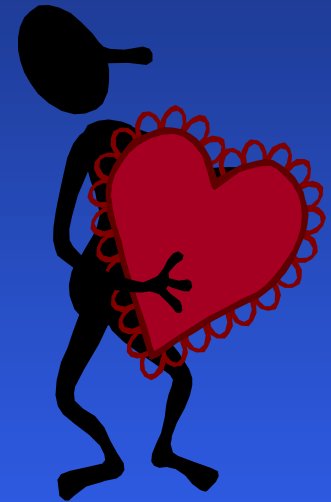
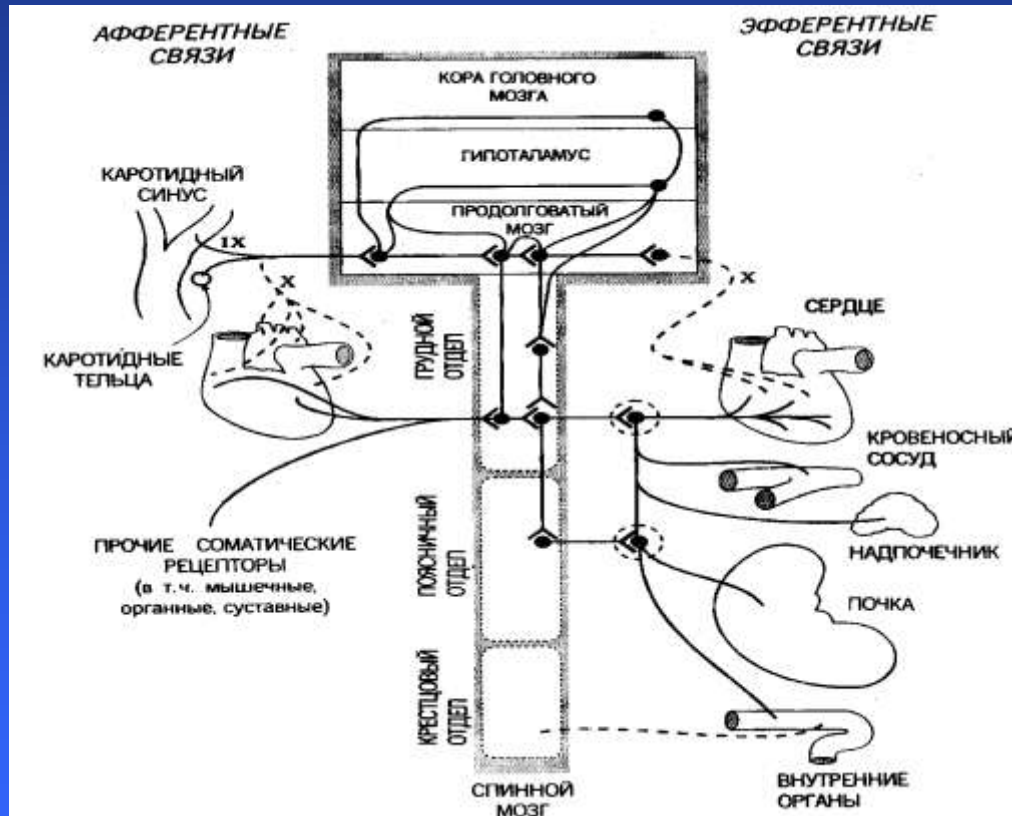


-What can we see?

- In CHD the key role is performed by heart *intelligibility*!

Why so?

Cardiac innervation



Innervation is a flowers

- 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

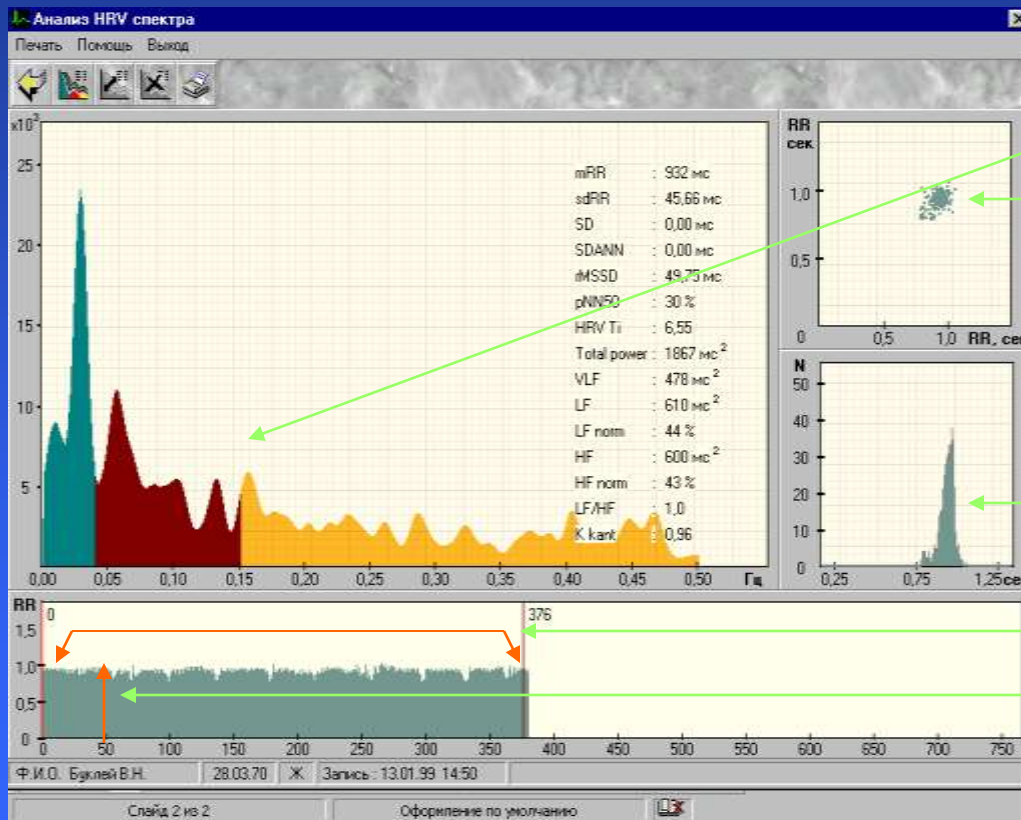
- *Heart Rate Variability Technology*

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) spectrum analysis – it is very simple

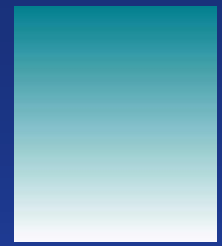
Spectrum dimension
RR-intervalgram



RR-skatergram

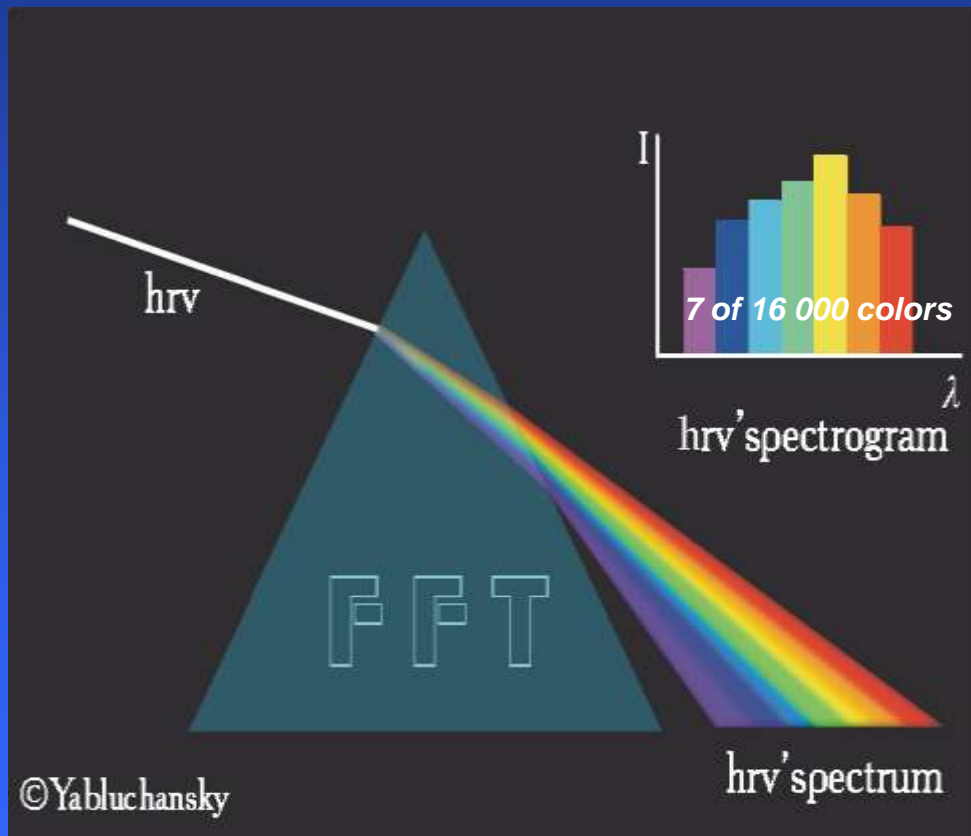
Length distribution
RR-intervals

RR-intervalgram
RR-interval



Technology of heart rate variability (HRV) spectrum analysis

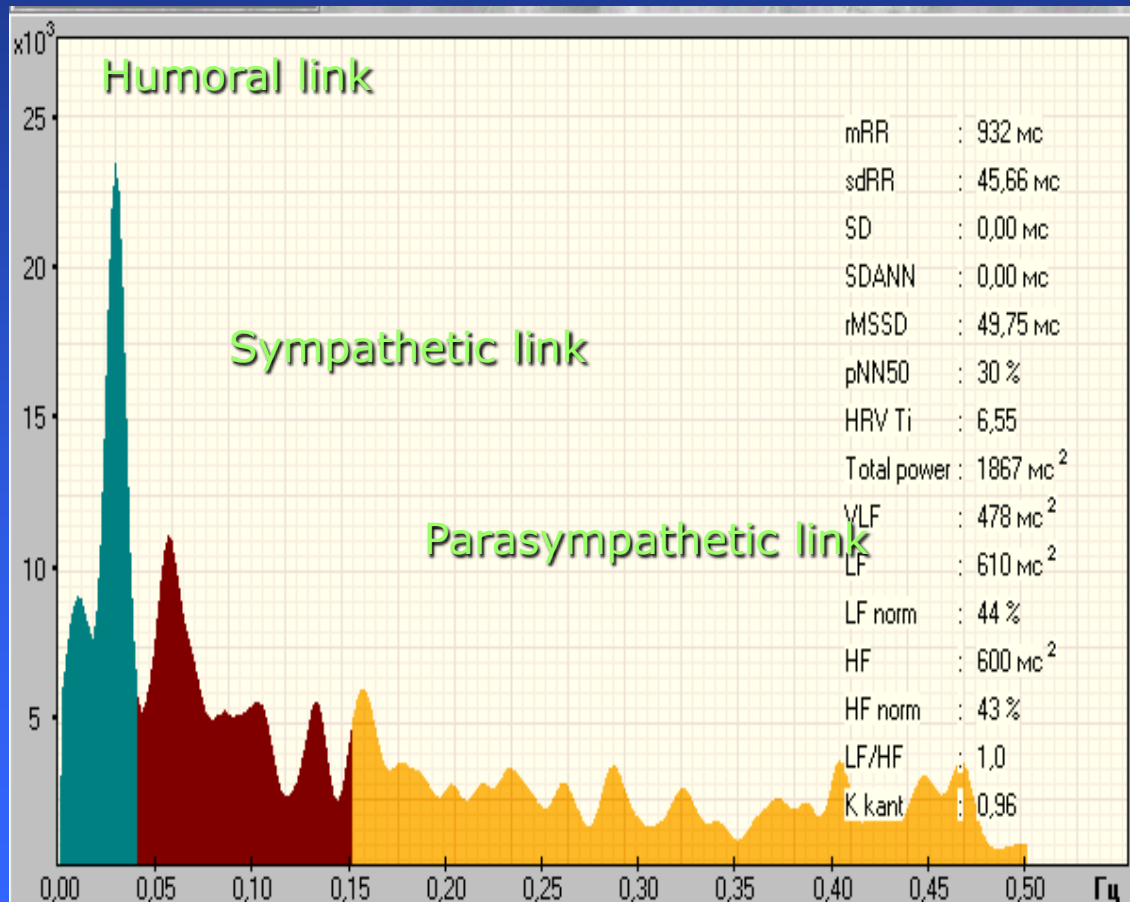
– it is very simple



- 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) spectrum analysis

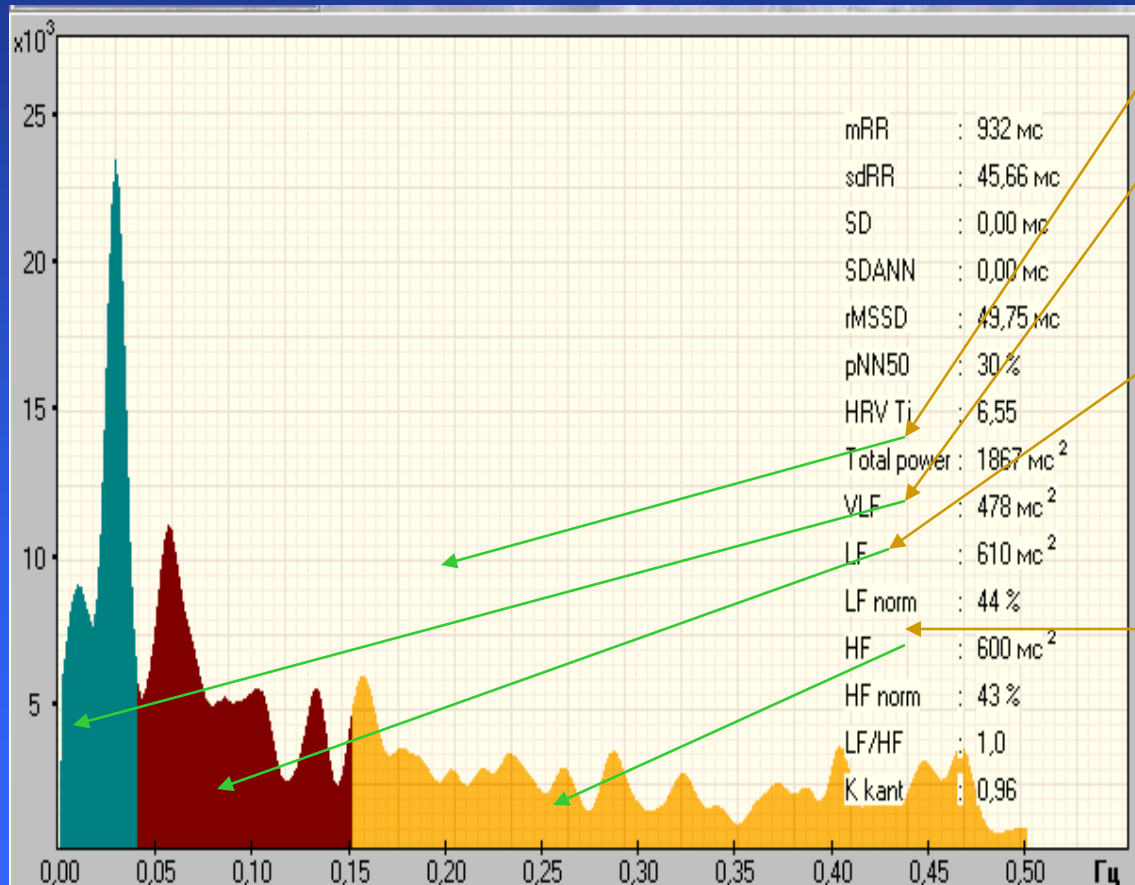
– it is very simple



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) spectrum analysis

– it is very simple

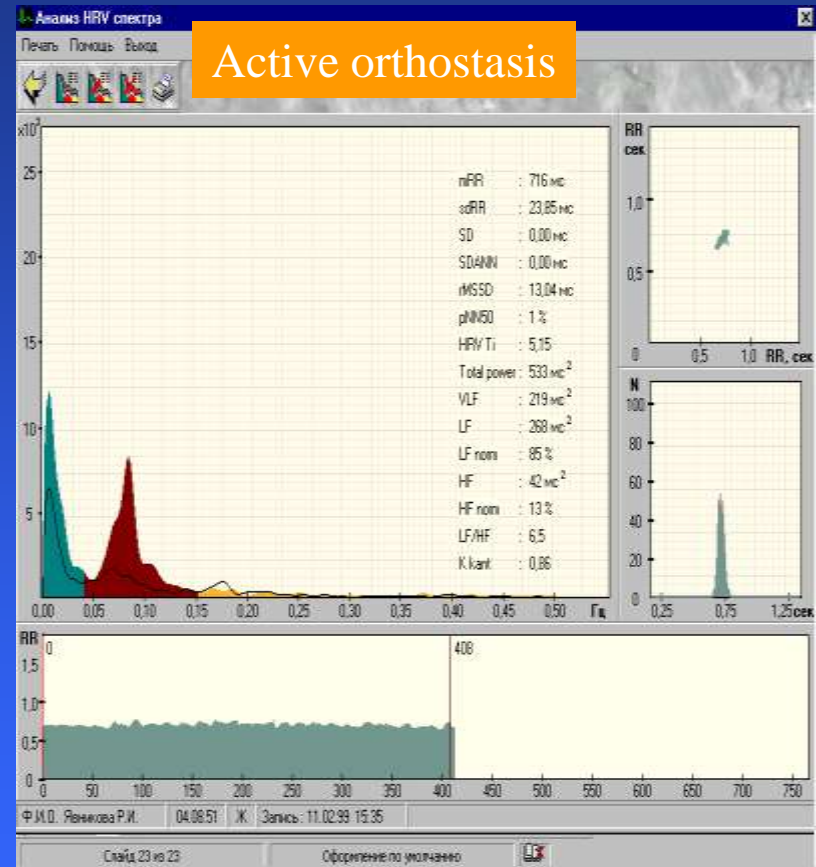
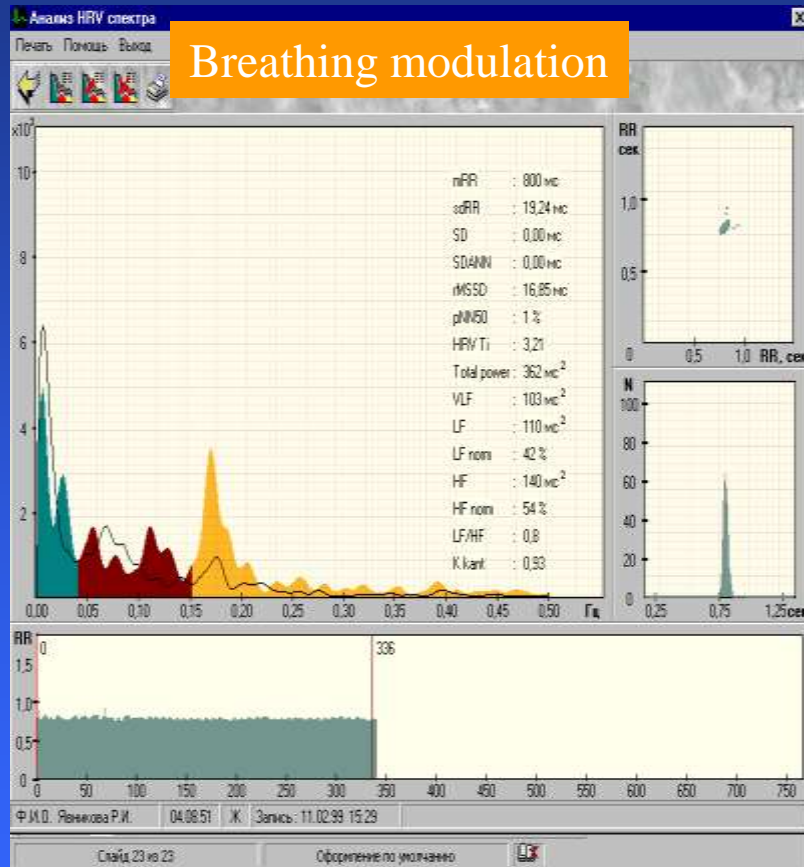


Square under a spectrum curve – total power regulation
 Square under “humoral” section of a spectrum curve – power of humoral regulation,

Square under “sympathetic” section of a spectrum curve – power of sympathetic regulation,

Square under “parasympathetic” section of a spectrum curve – power of parasympathetic regulation

HRV – “echo” regulation processes: breathing regulation reaction and active orthostasis

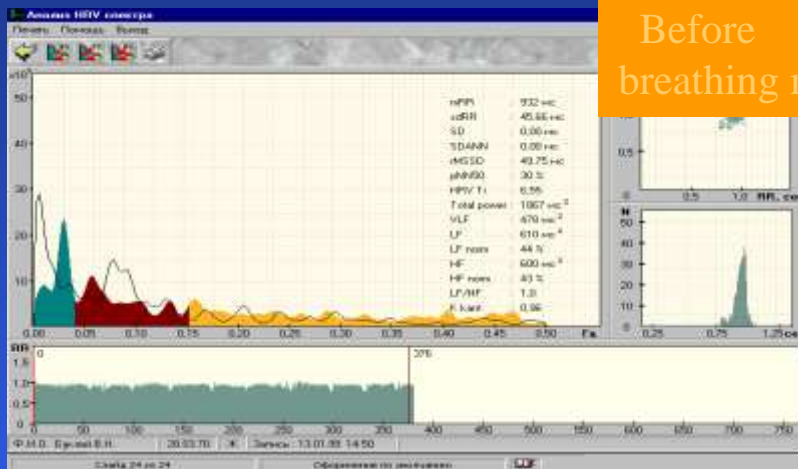


Breathing modulation increases high frequency (parasympathetic) power and active orthostasis – low frequency (sympathetic) link of HRV spectrum

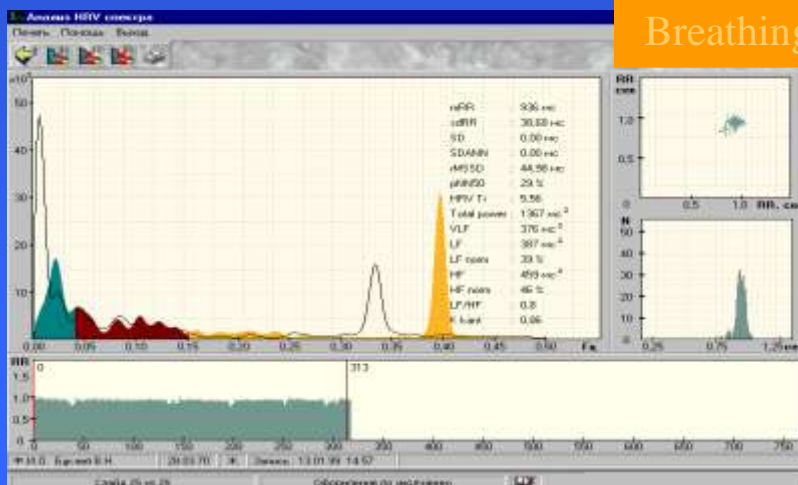
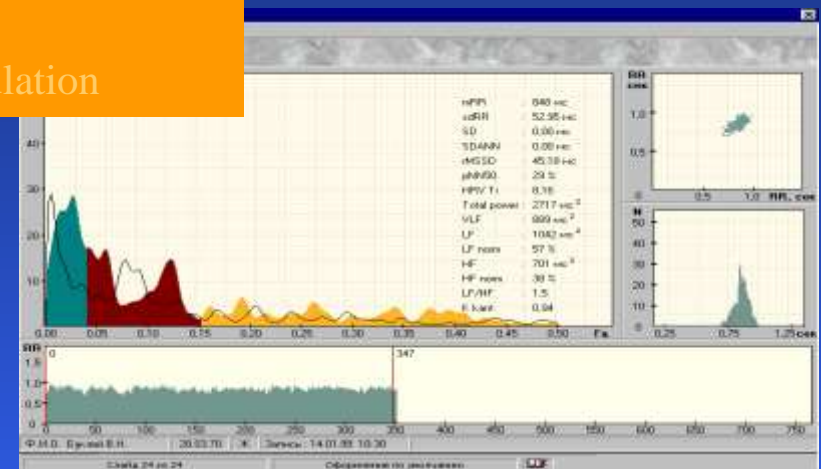
HRV – “echo” of regulation processes: breathing regulation in basal conditions, acute pharmacological tests with theofedrin and anaprilin have the HRV - equivalents

theofedrin

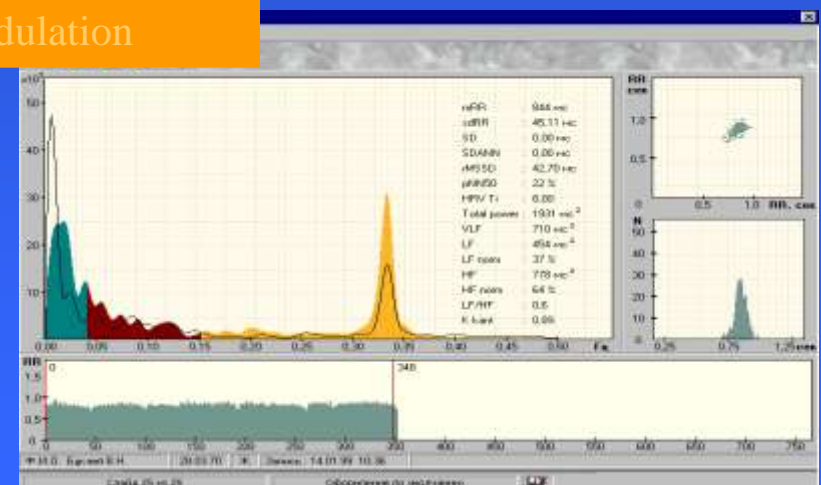
anaprilin



Before breathing modulation



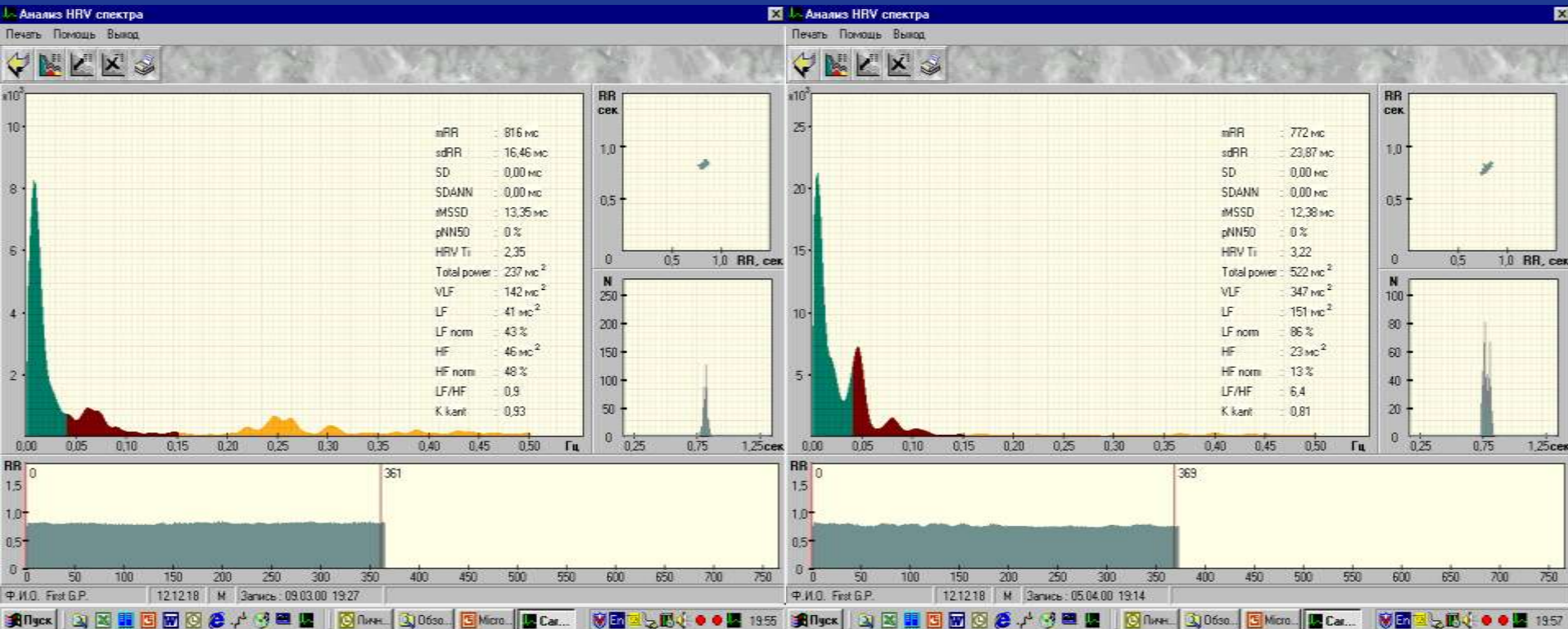
Breathing modulation



Neurohumoral regulation of CHD patients

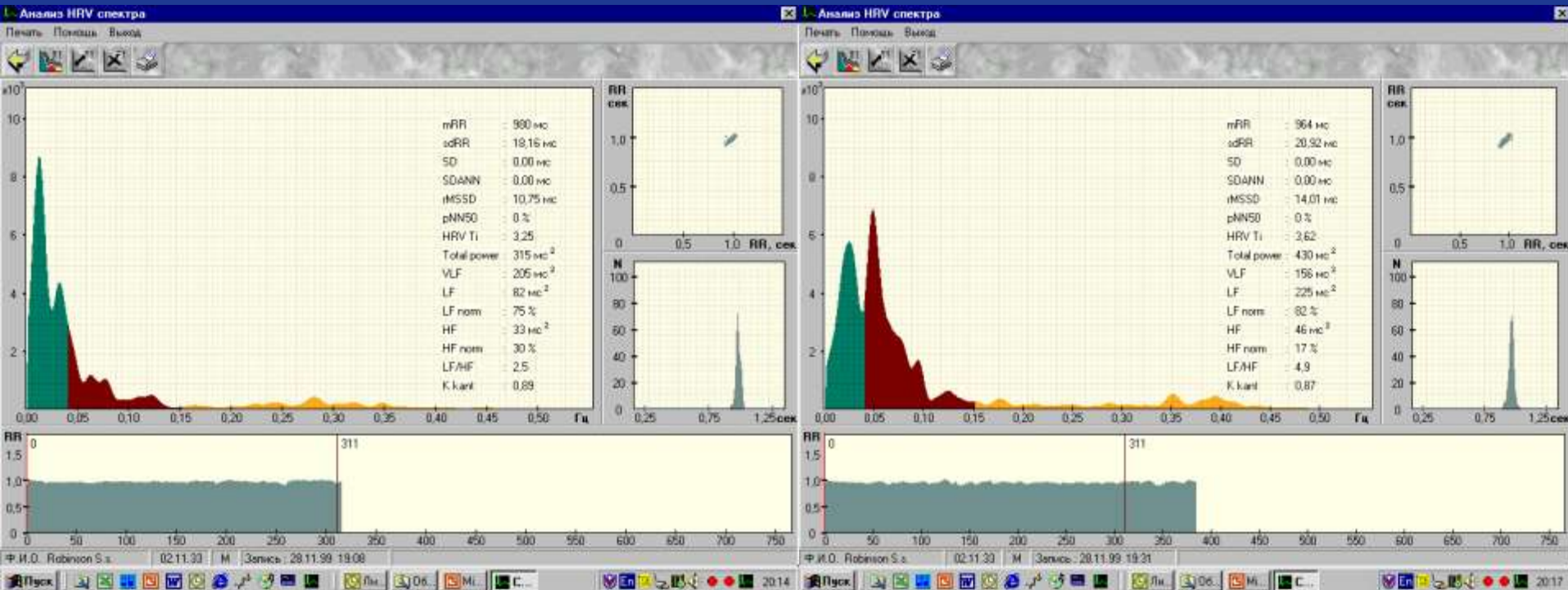
- **Low power of NHR**
- **High power of NHR**
- **Predominance of humoral and sympathetic regulations**
- **Degeneracy of parasympathetic regulation**
- **Excessive growth of parasympathetic regulation**
- **Displacement of sympathetic – vagal balance to the sympathetic link of vegetative regulation**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

Patient A., 72



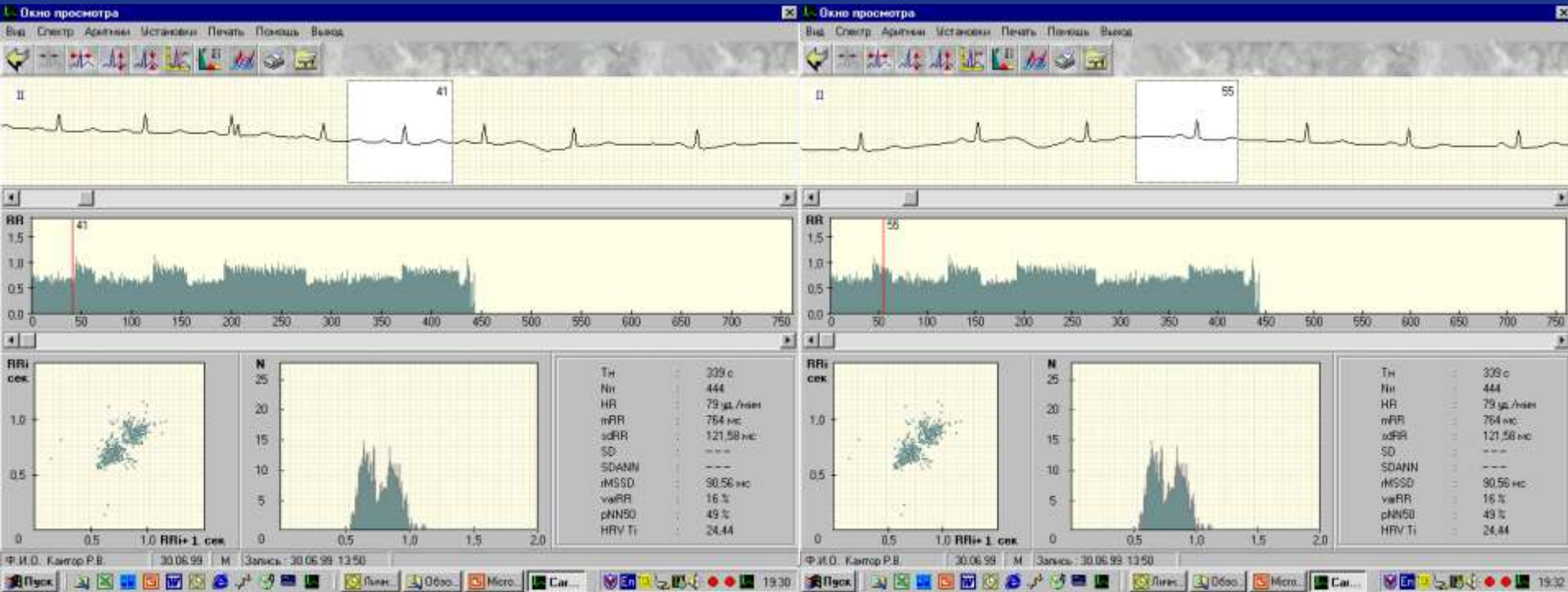
Before and after treatment of enalapril maleate (enap (KRKA), 2,5 mg/day), low spectrum power two times increasing, disappearance of paroxysms

Patient B, 68



An hour later after 2,5 mg of enalapril maleate spectrum power increased in 1,5 times with changes of a very low frequent to a low frequent domen

Patient C,67



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

Patient E, 63, Acute myocardial infarction, can't believe my eyes

Система Холтеровского мониторинга CardioSens

Отчет Заключение Настройки Помощь

Выход Содержание Назад Вперед Фрагменты Заключение Печать Настройки Помощь

Общая характеристика ритма

| | |
|-------------------------------------|-----------------------|
| Количество анализируемых сокращений | 102566 |
| Средняя ЧСС | |
| Днем | 71 уд/мин |
| Ночью | 68 уд/мин |
| Макс. ЧСС | 125 уд/мин в 13:08:57 |
| Миним. ЧСС | 50 уд/мин в 22:40:37 |
| Макс. часовая ЧСС | 92 уд/мин в 10..11 |
| Миним. часовая ЧСС | 63 уд/мин в 22..23 |

Нарушения ритма

| | |
|-------------|----------------------|
| Тахикардий | Не обнаружено |
| Брадикардий | Не обнаружено |
| Паузы | 5 |
| Макс. пауза | 2.4 сек., в 19:00:28 |

Анализ ST1 сегмента

| | |
|----------------------|----------------------|
| ST эпизоды | |
| канал 1 | Не обнаружено |
| канал 2 | 1, длит. 30 сек |
| канал 3 | 1, длит. 30 сек |
| макс. ST - депрессия | 1к. -40 мкВ, в 12:18 |
| макс. ST - элевация | 2к. 284 мкВ, в 00:21 |
| ST эп. макс. длины | Не обнаружено |
| ST эп. макс ЧСС | Не обнаружено |

Вентрикулярная экстрасистолия

| | |
|-------------------|-------------------|
| Всего VE | 4344 (4.24%) |
| Бигемений | 29, длит. 52 сек. |
| Couplets | 13 |
| VE-RUNS | Не обнаружено |
| Наиболее длинный | Не обнаружено |
| VE-RUNS макс. ЧСС | Не обнаружено |
| VE-RUNS Миним ЧСС | Не обнаружено |

Суправентрикулярная экстрасистолия

| | |
|-----------------|---------------|
| Всего SVE | 10 (0.01%) |
| SVE Couplets | Не обнаружено |
| SVT эпизодов | Не обнаружено |
| SVT макс. длины | Не обнаружено |
| SVT с макс. ЧСС | Не обнаружено |

Вариабельность ритма

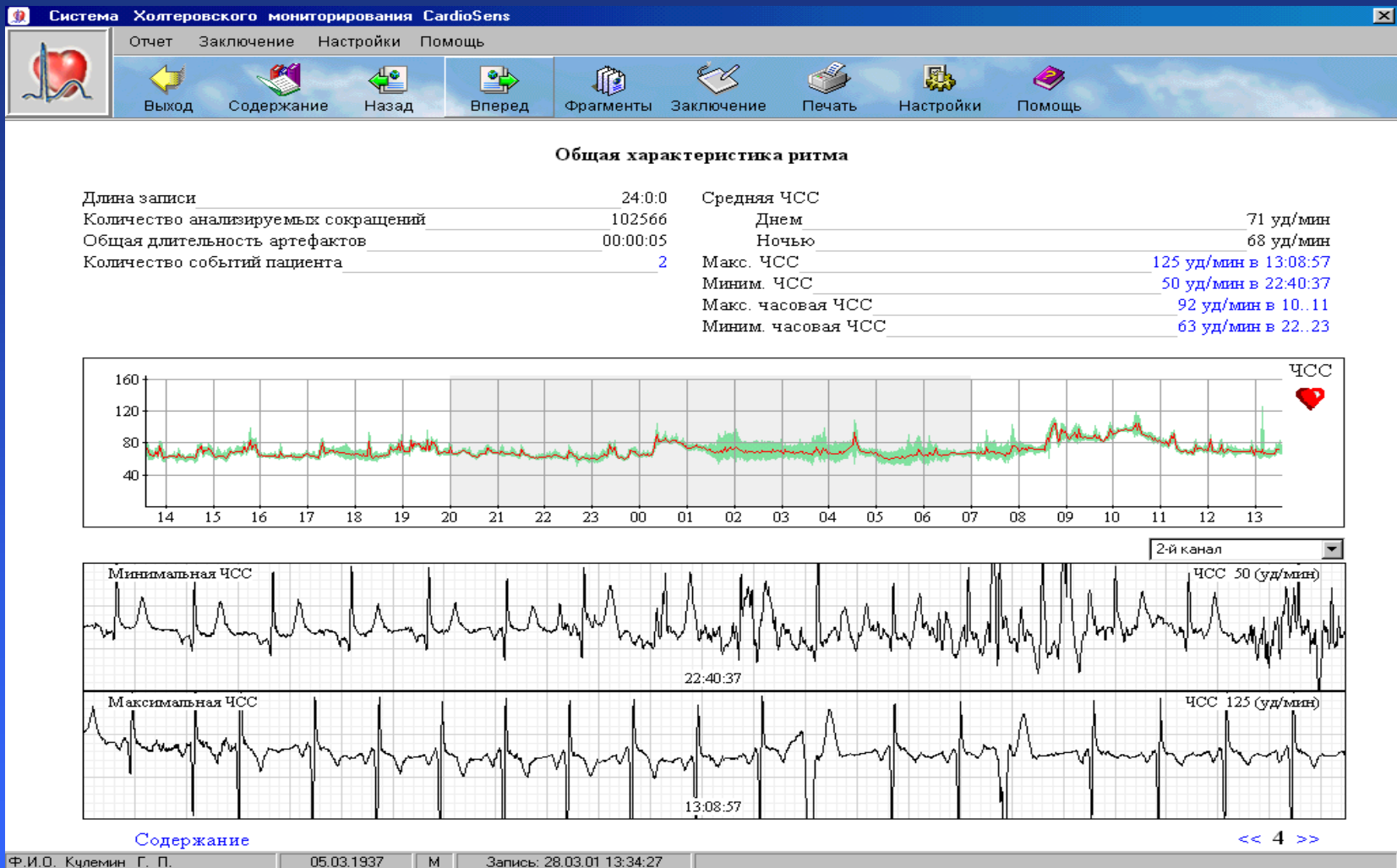
| Временные параметры | | Спектральные параметры | |
|---------------------|--------|------------------------|------------|
| mRR | 860 мс | Total | 4627.8 мс2 |
| SDNN | 118 мс | ULF | 1210.9 мс2 |
| SDNNi | 59 мс | VLF | 2654.8 мс2 |
| SDANN | 89 мс | LF | 465.3 мс2 |
| rMSSD | 58 мс | LF Norm % | 61.1 % |
| pNN50 | 3 % | HF | 296.8 мс2 |
| HRV TI | 33.2 | HF Norm % | 38.9 % |
| | | LF/HF | 1.6 |

Содержание << 2 >>

Ф.И.О. Кулемин Г. П. 05.03.1937 М Запись: 28.03.01 13:34:27

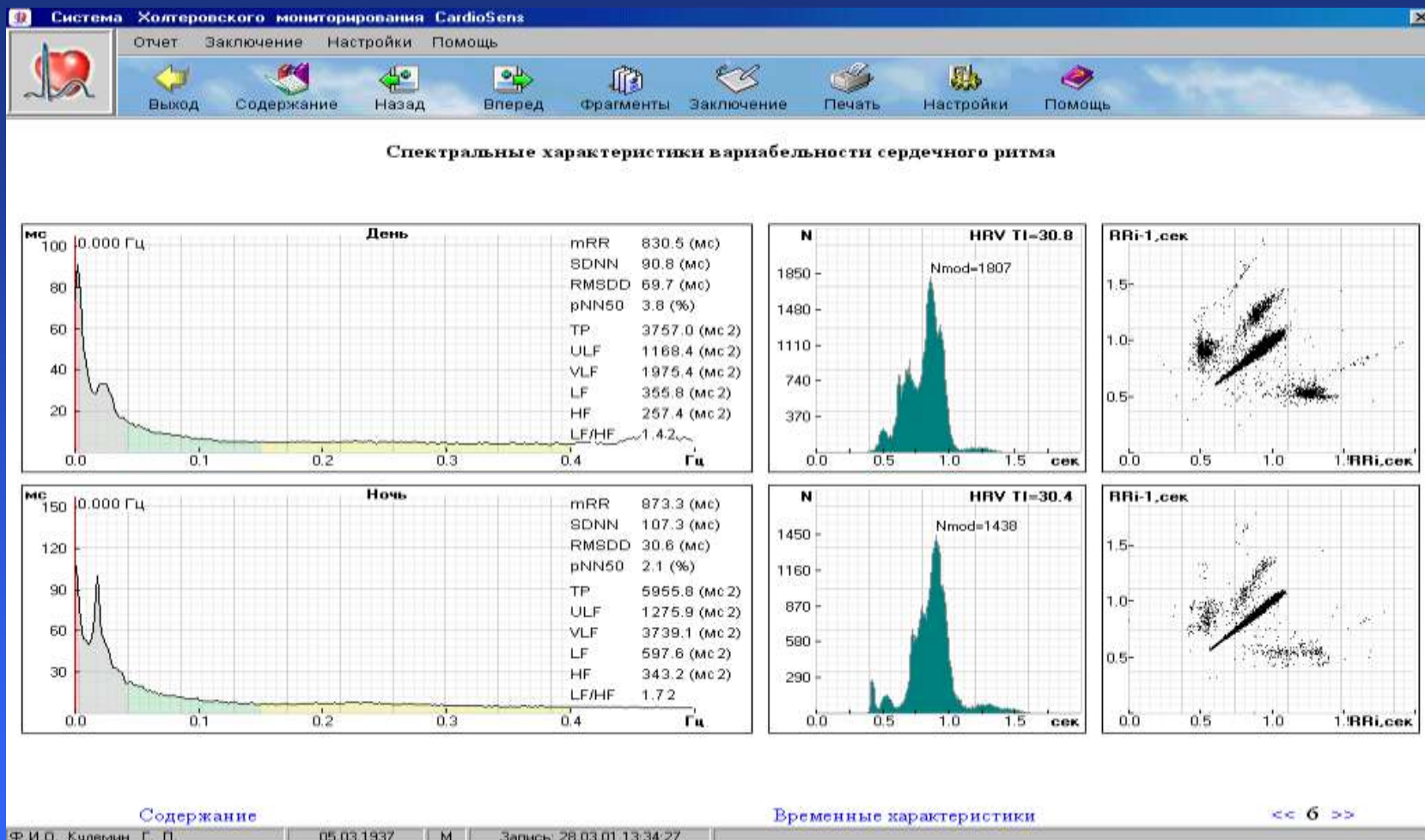
Halter monitoring: false impression about dipper HR, «false» HRV rates

Patient F, 63, Acute myocardial infarction, something happened to illegibility



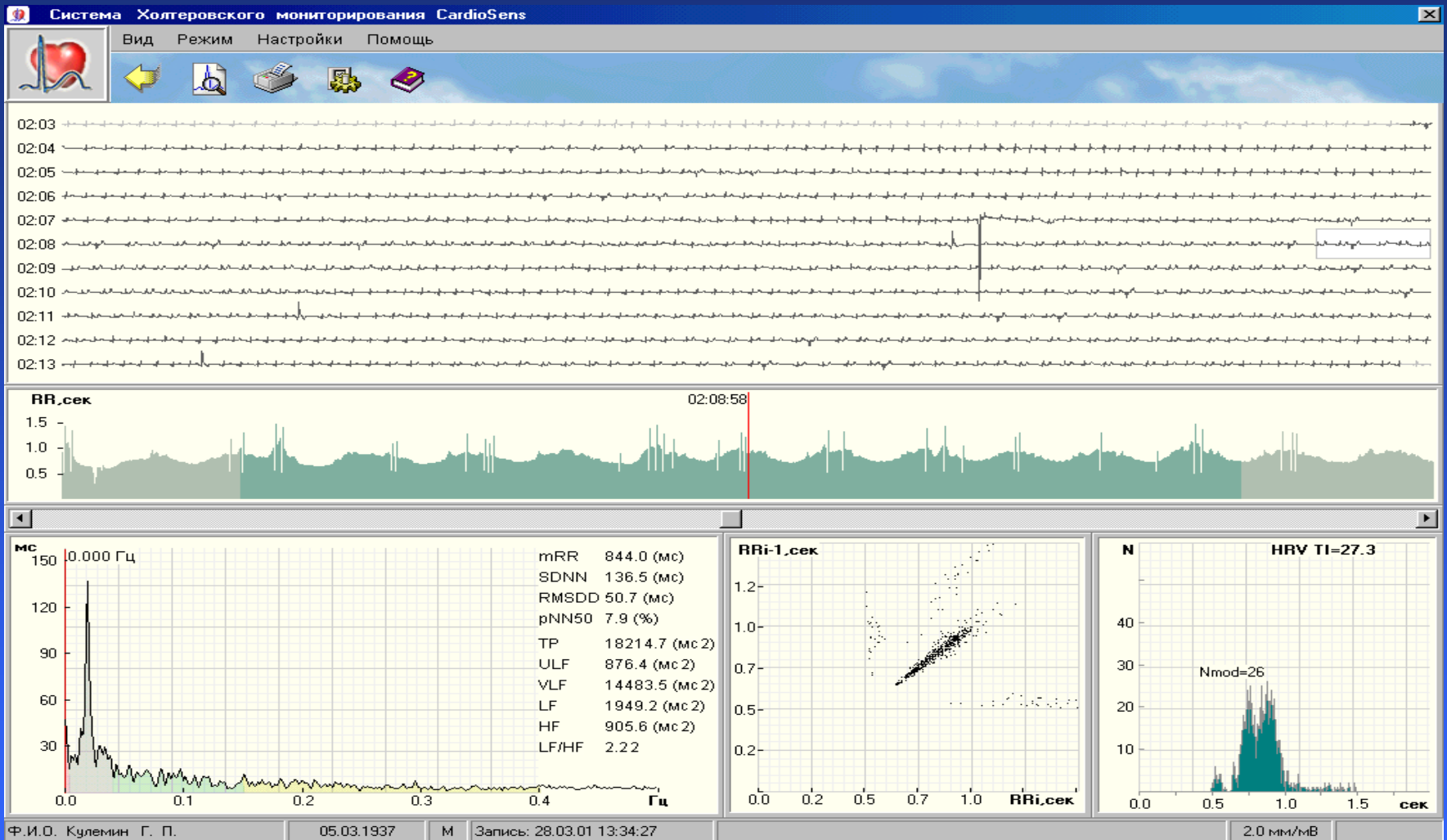
Halter monitoring: non-dipper HR

Patient G, 63, Acute myocardial infarction



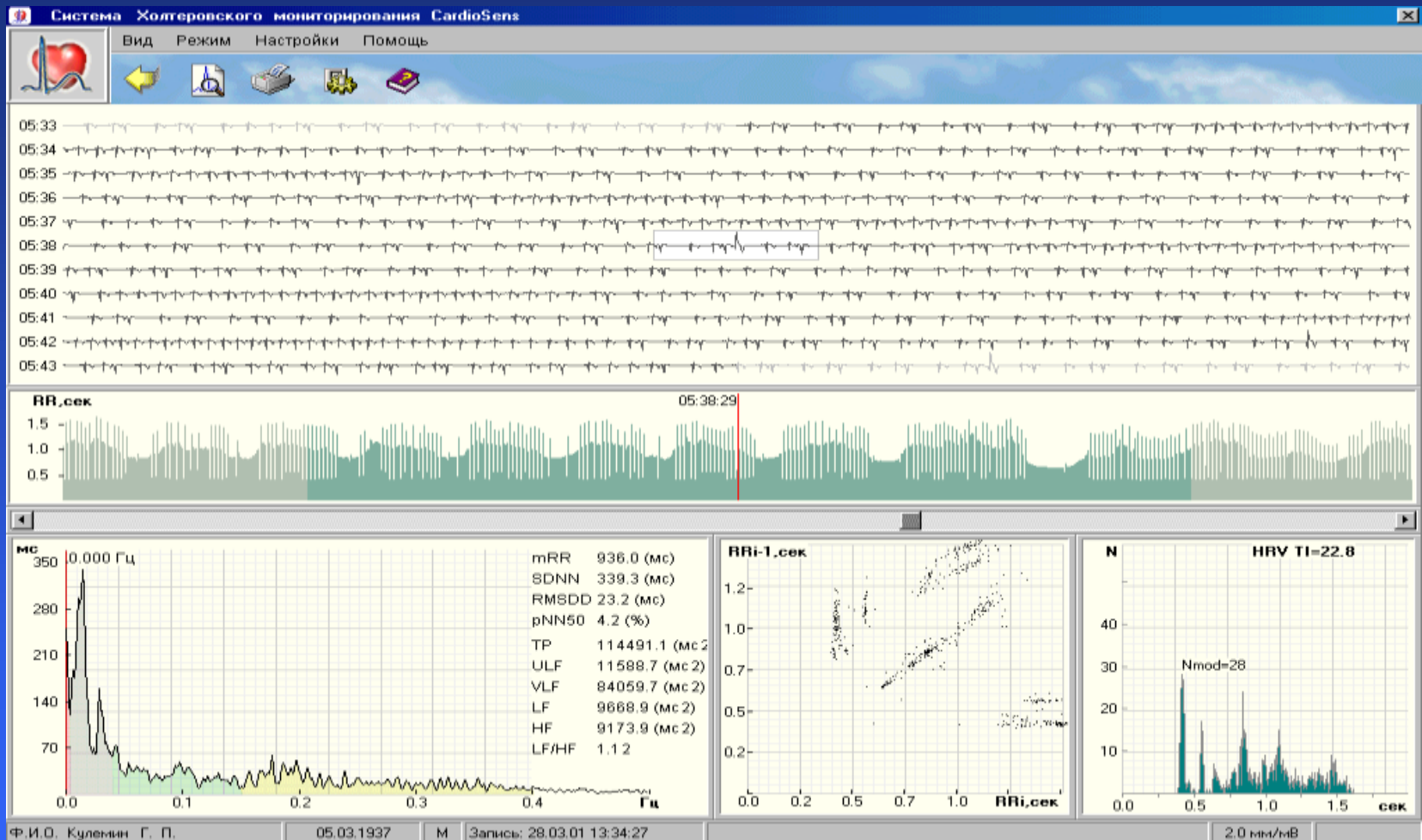
Halter monitoring: Distribution and skatergram RR-intervals – on the background of basic rhythm monotopic extrasystole with a higher frequency at day time, HRV defies a spectrum analysis in a standard minute.

Patient H, 63, Acute myocardial infarction



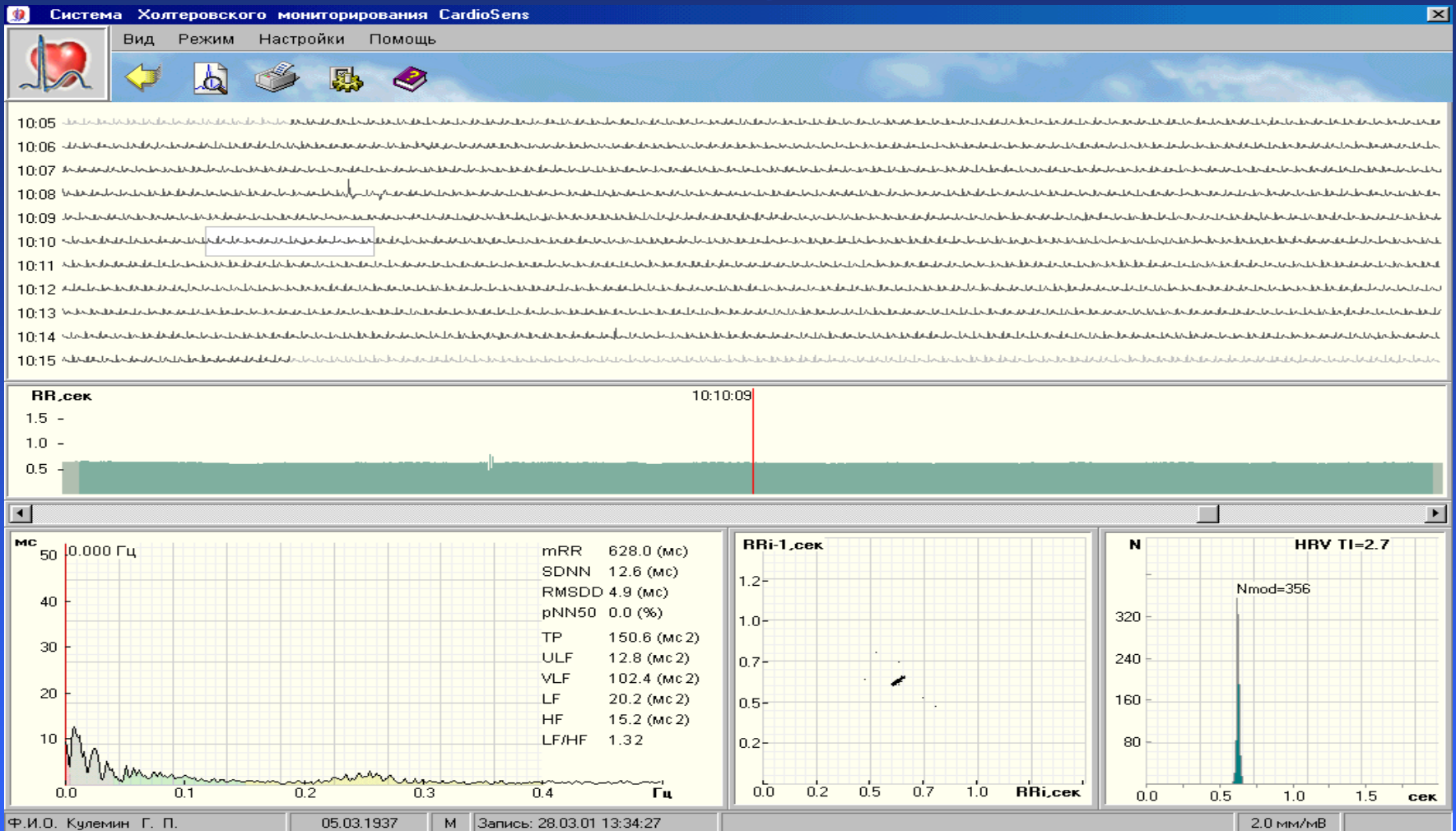
Halter monitoring: quasicinusoidal rhythmgram – demonstration of significant disorders of humoral regulation, extrasystoles in periods of “long” RR-intervals.

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

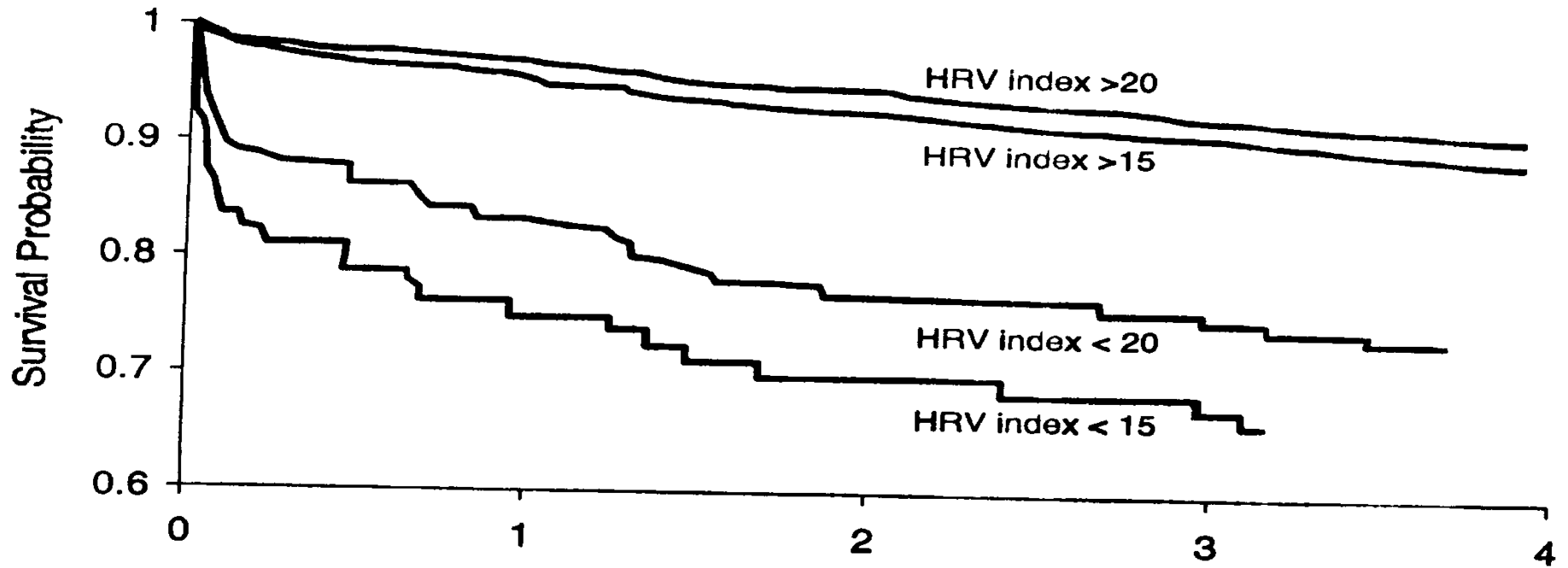
Low heart rate variability indicates a low level of health in general including immune functions

JM Dekker, EG Schouten, P Klootwijk et al// Am J Epidemiol., 1997, v.145, N10, 899-908.

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

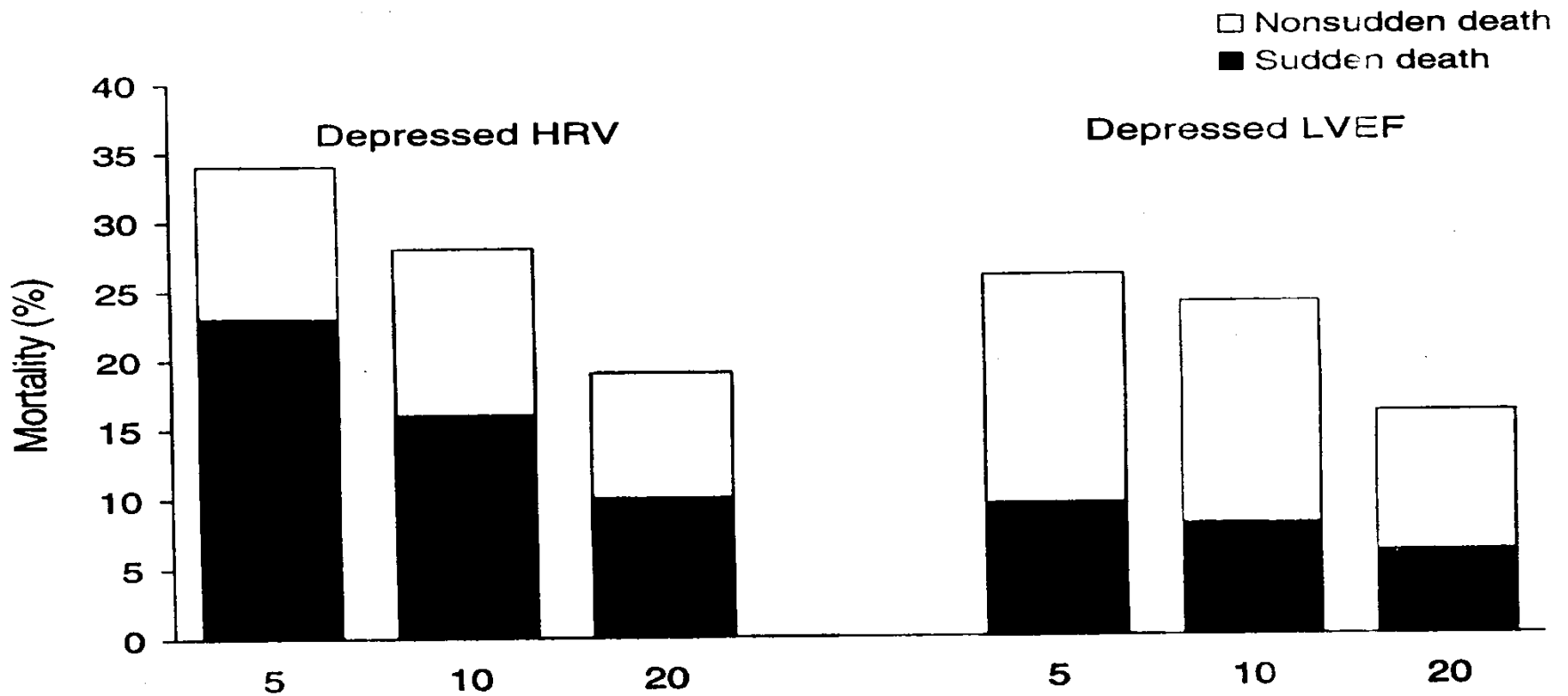
Of course, *not only* low heart rate variability is associated with a high death rate among elderly age people as well as among mean age people “, *but* low non-perfect regulation , when besides there are some problems with heart intelligibility.

HRV index and survival probability



CM Pratt, AL Waldo, AJ Camm// Am. Heart J 1998, v. 81, 24D-34D.

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



So, what is heart illegibility in CHD?

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

Environment

Associated Risk Factors

↑ BP, IHD

Associated Risk Factors

+

+

↓

↑

+

+

**Remodelling
Atherosclerosis
Arteriosclerosis**



**European Society
of Cardiology**

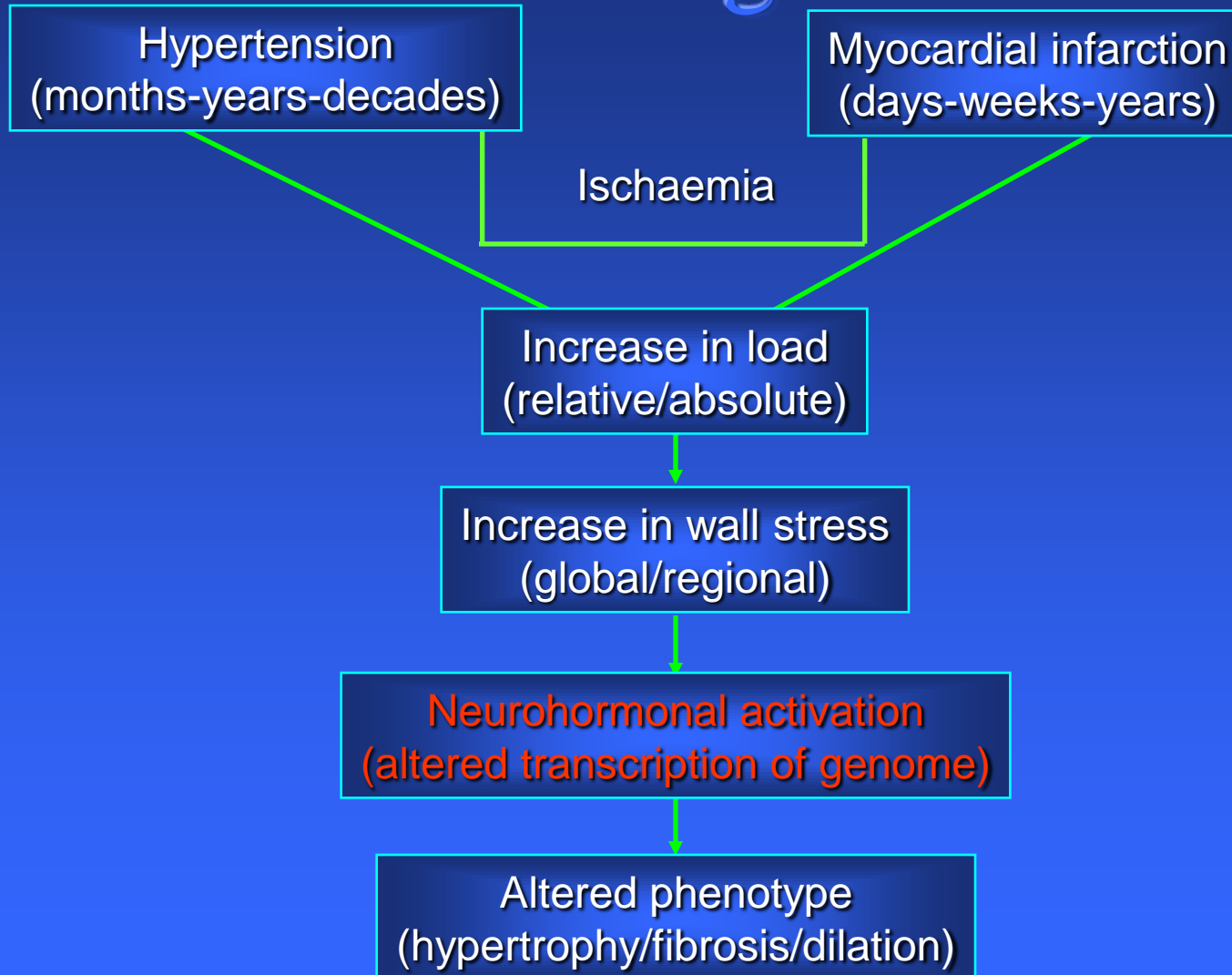
CV events
CV death

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

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

*There is a place for regulation !
Is it just enough?*

Remodelling Process



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

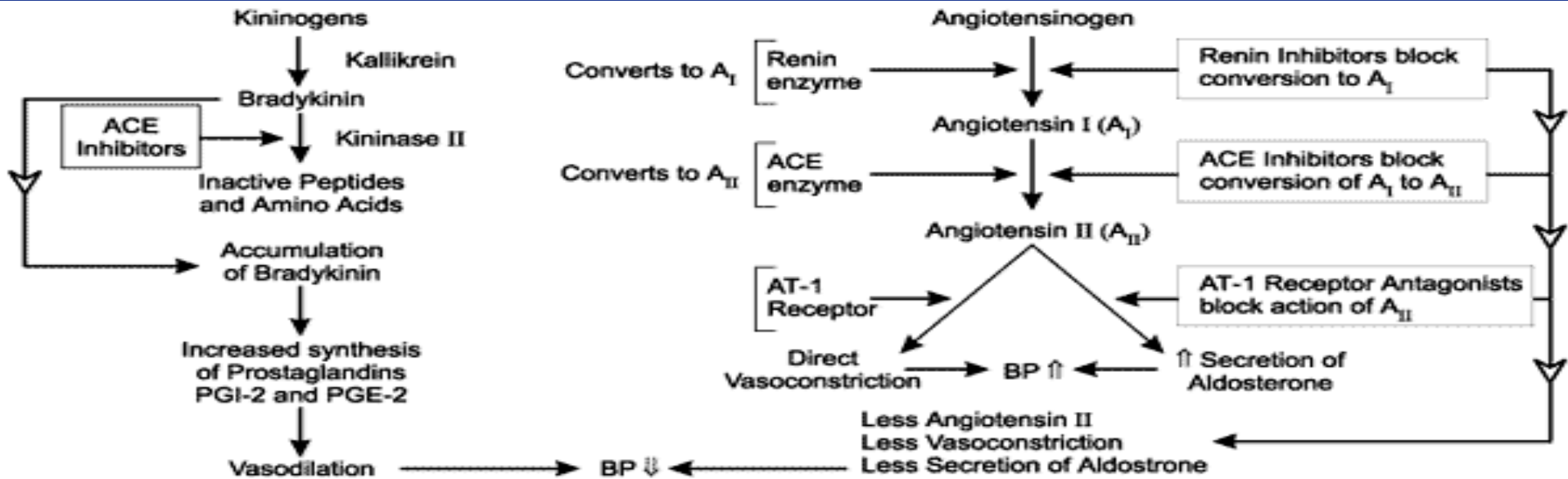
- Integrative medical and psycho-social approach
- Cognitive behavior therapy
- Neurohumoral regulation optimizing
- Traditional therapy

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 ACE
 - Spironolacton diuretics
 - Digoxin (*digoxin for all!*)
- And some new medicines (selective antagonist aldosteron receptors – eplerenon, NEP(neutral endopeptidase)-ACE-I – omapatrilat, endothelin antagonists – selective and non-selective (bosentan), metalproteas inhibitors, and others.
- And besides immune and inflammation modulation, molecular-genetic therapy...

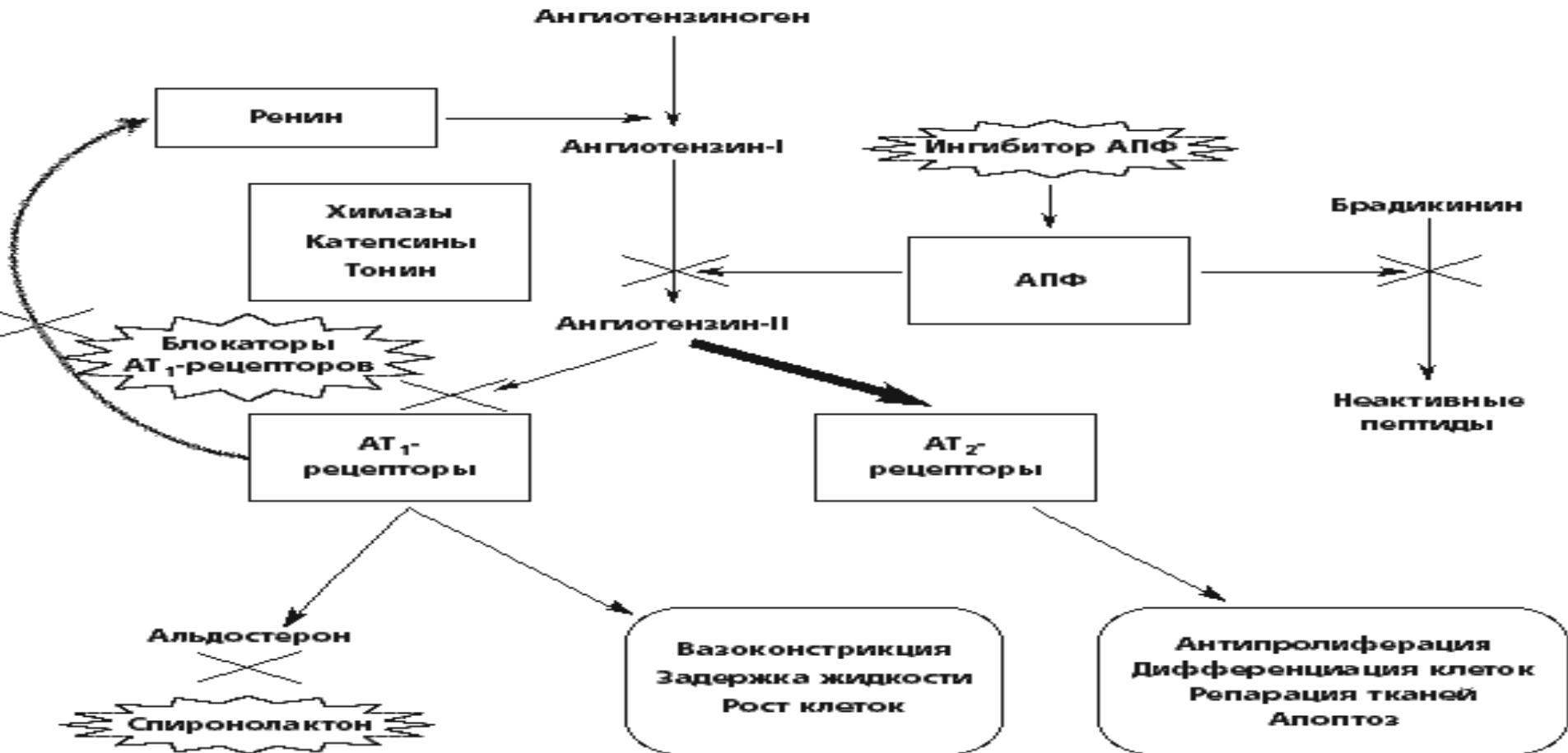
Are we ready?

Site of action of ACE inhibitors and angiotensin II receptor blockers

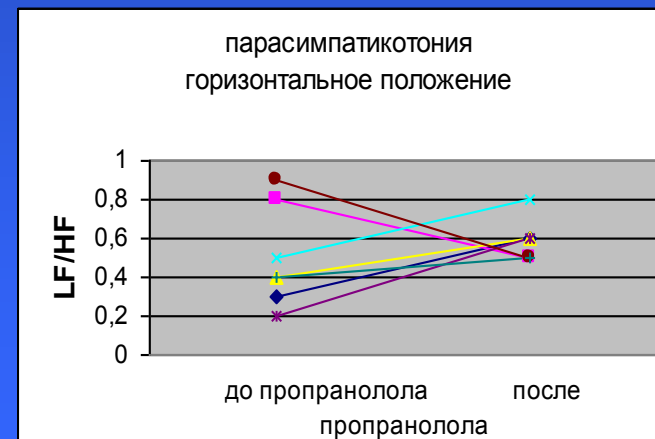
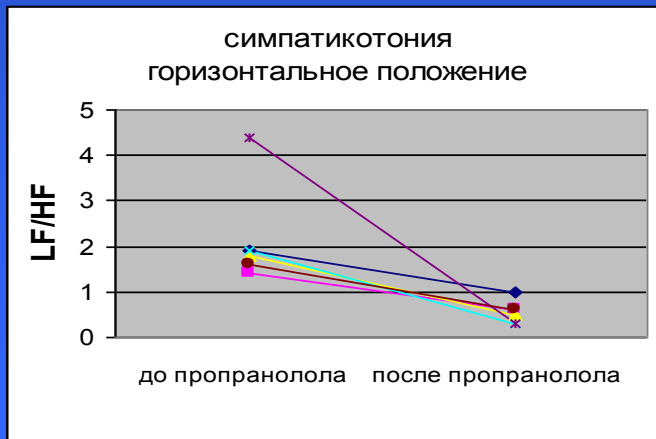
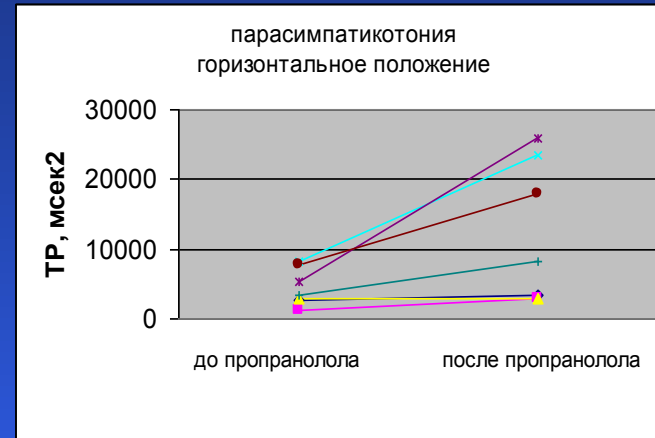
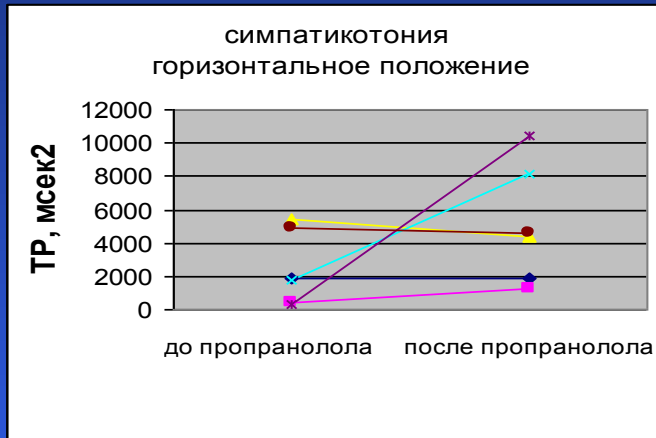


- I. Mode of action of ACE inhibitors: block conversion of A_I (an inactive substance) to A_{II} (a vasoconstrictor). This action (1) decreases the generation of A_{II}, and also by blocking the activity of kininase II, (2) decreases the breakdown of bradykinin: this vasodilator substance increases; 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

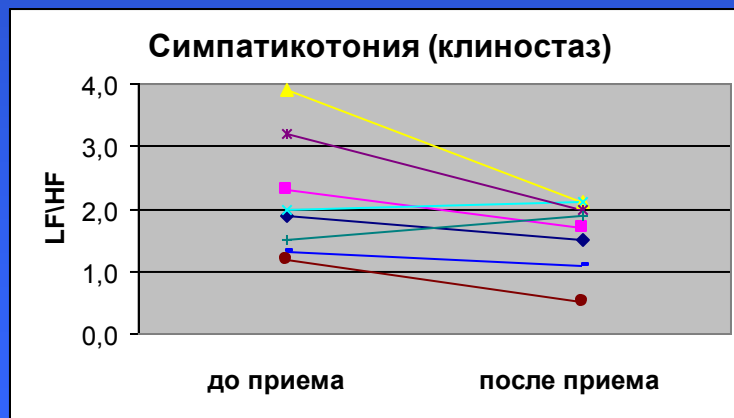
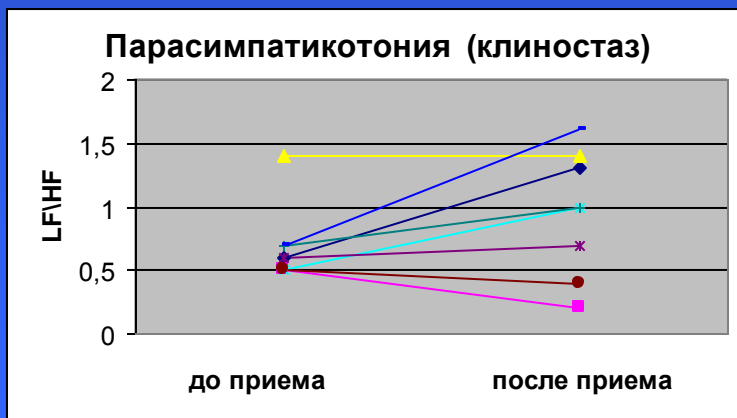
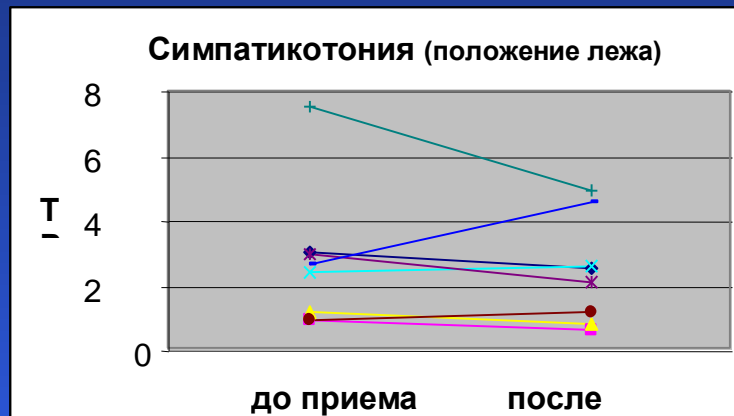
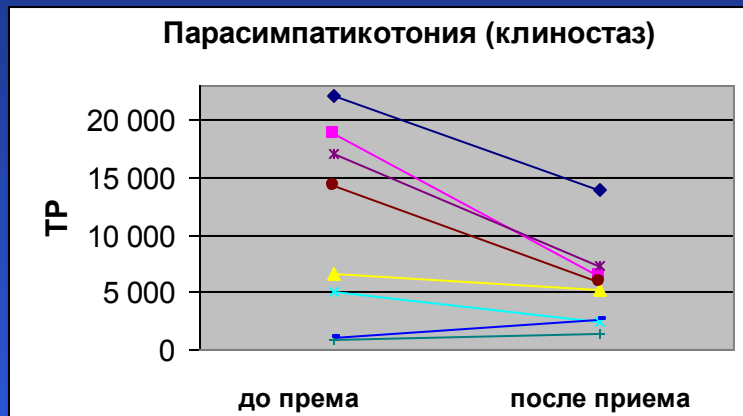


B-blockators, ACE inhibitors, spironolactonic diuretics, digoxin increase NHR power and modulate sympathetic-vagal balance



Anaprilin influence on TP, LF/HF in an acute pharmacological dose of healthy volunteers

Not all preparations have such an influence



Here you are - cerucal

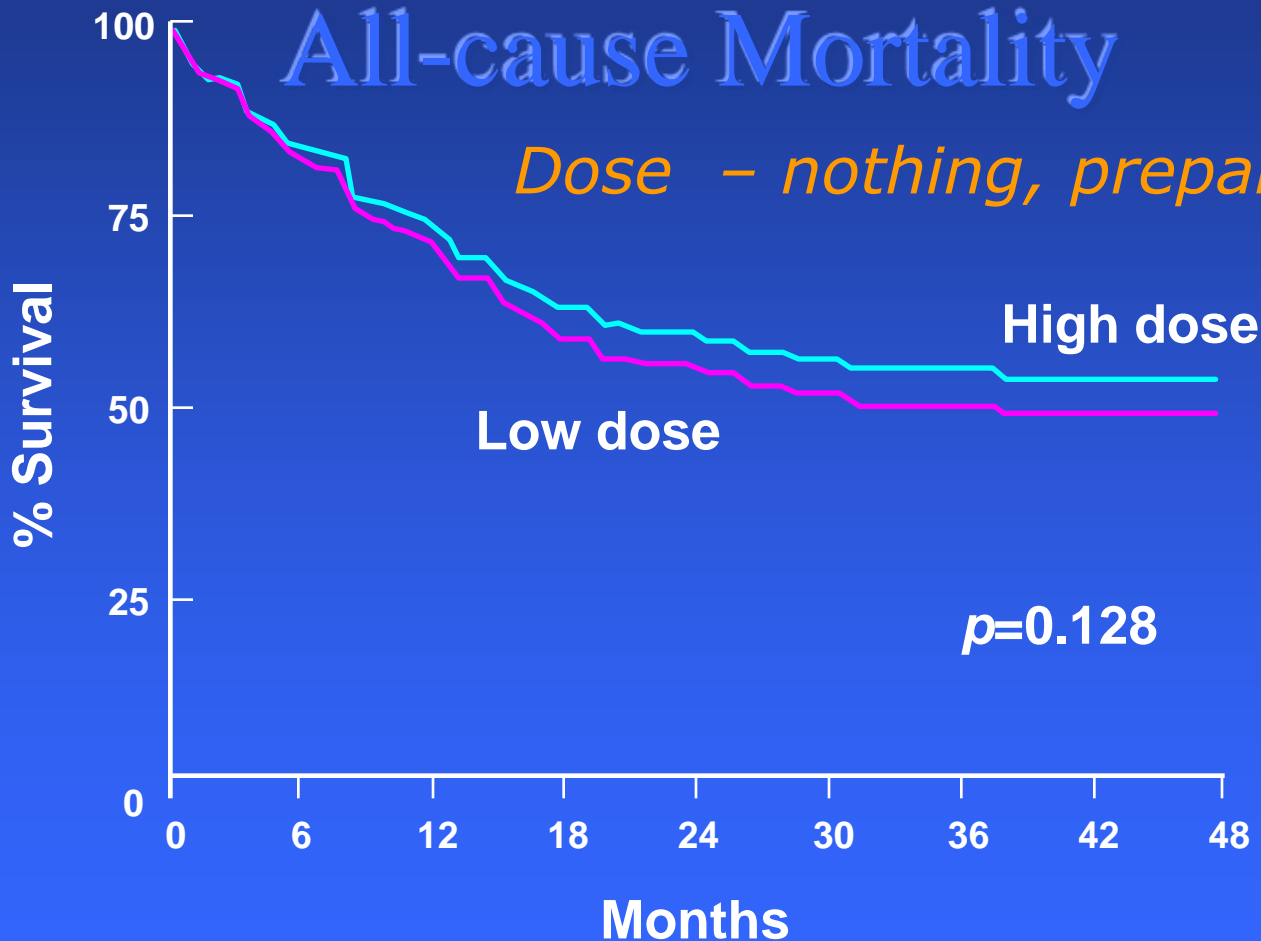
ATLAS



Assessment of
Treatment with Lisinopril
And Survival

All-cause Mortality

Dose - nothing, preparation - all !



And once again

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 peripheric vasodilators
- NHR preparations are preferable

