Medical Device for Automatic Noninvasive Health Screening Diagnostics

based on the analysis of thermodynamic parameters

realized under commercial names:

Noninvasive Hemogram Analyzer **AMP MODEL 19**
Automatic Noninvasive Express Screening Analyzer **ANESA® MODEL 19**
Dispositivo de Ayuda al Diagnóstico y Analizador No Invasivo **DAD-ANI® MODEL 19**
(**Hereinafter MD ANALYZER**)

EXAMPLES OF SCREENING DIAGNOSTICS FOR PRACTICAL DOCTORS

Recommendations for data interpretation

2021

In any case, these recommendations cannot be considered as the only true way to diagnose. The local established and approved protocols of diagnostics should be used by a user always. This guideline is advised for users only for the demonstration of the MD ANALYZER'S capabilities and a better understanding of its application.

CONTRAINDICATIONS for MD ANALYZER USE

It is not allowed to use MD ANALYZER in pediatrics, in critical and urgent states, in ICU department (both in operation room and Emergency Room), for patients in a process of chemotherapy and X-Ray therapy or after it, for patients with diabetes mellitus, jaundice, acute kidney insufficiency, for donors after blood transfusion (limited period for donors is 6 month) and for recipients after blood transfusion (period is not determined, as it primarily depends on the initial state of a patient before transfusion and the ability to recover).

Damages of a skin surface of a patient (of different nature: wounds, ulcers, injuries, inflammation and rashes etc) in the areas of sensors' placement are the absolute contraindication to an examination.

The MD ANALYZER is to be used in healthcare premises. Only specially trained medical staff (including paramedics and nurses) is permitted to operate the device. But the interpretation of the results of measurement and decision making as for diagnosis are allowed to be done only by the qualified medical doctors (like physicians, therapists, family doctors, general practitioners and so on).

EXAMPLES OF SCREENING DIAGNOSTICS FOR PRACTICAL DOCTORS.

The primary aim of any diagnostic medical device or software is to help to diagnose patients correctly and in time, as well as to monitor the course of treatment effectively. The widely used general blood test is helpful in many cases. Still, it gives limited information, which is often not enough for a complete assessment of the processes occurring inside a body.

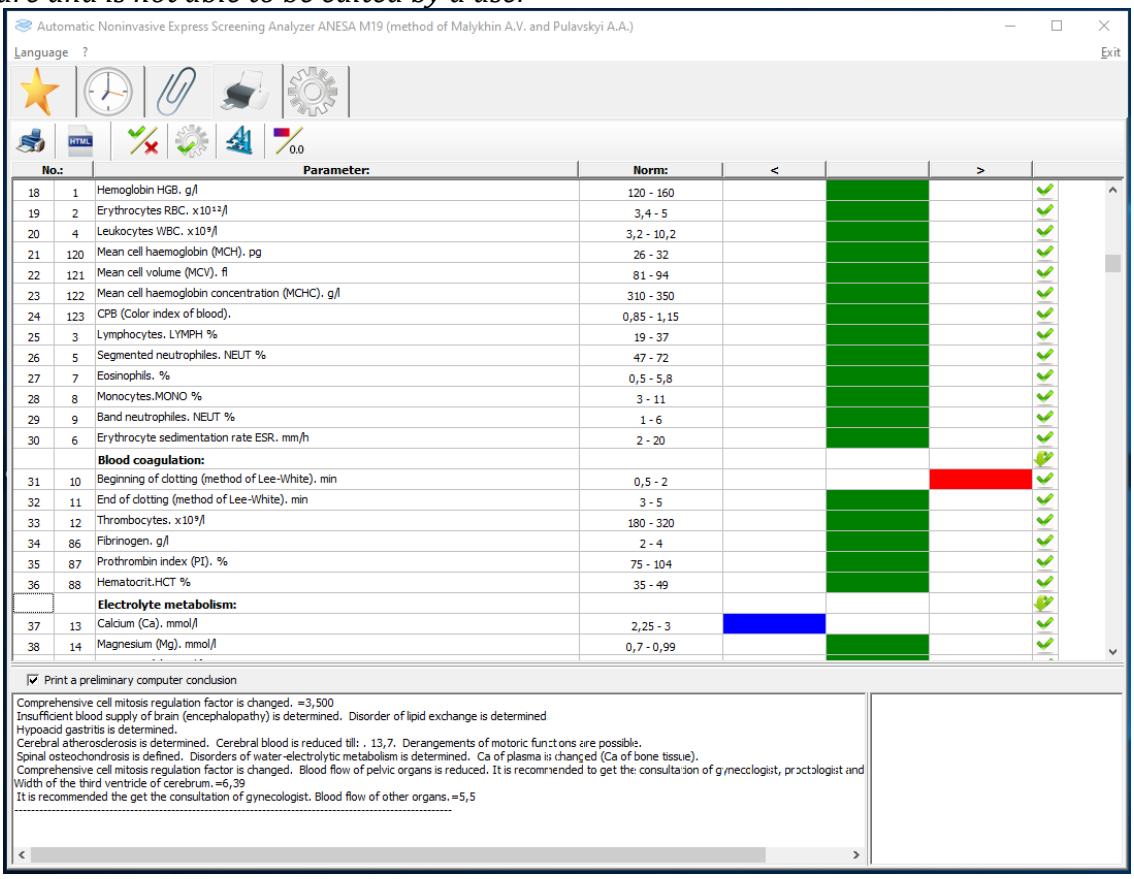
The long-term experience with MD ANALYZER proved that it could be a useful assistant of a practitioner. An essential condition, in this case, is the willing of a doctor to self-educating and practise. Of course, the interpretation of received data is possible even with basic medical knowledge obtained at the University. At the same time, a deeper understanding of the internal processes in a body gives much more possibilities for correct diagnosing and "reading" of the report from the position of parameters' correlation, but not the value of each.

The report, which is generated by the MD ANALYZER is displayed on the screen and can be printed out if necessary. Looking to the software version, the results are represented in the table form, where the following columns are included:

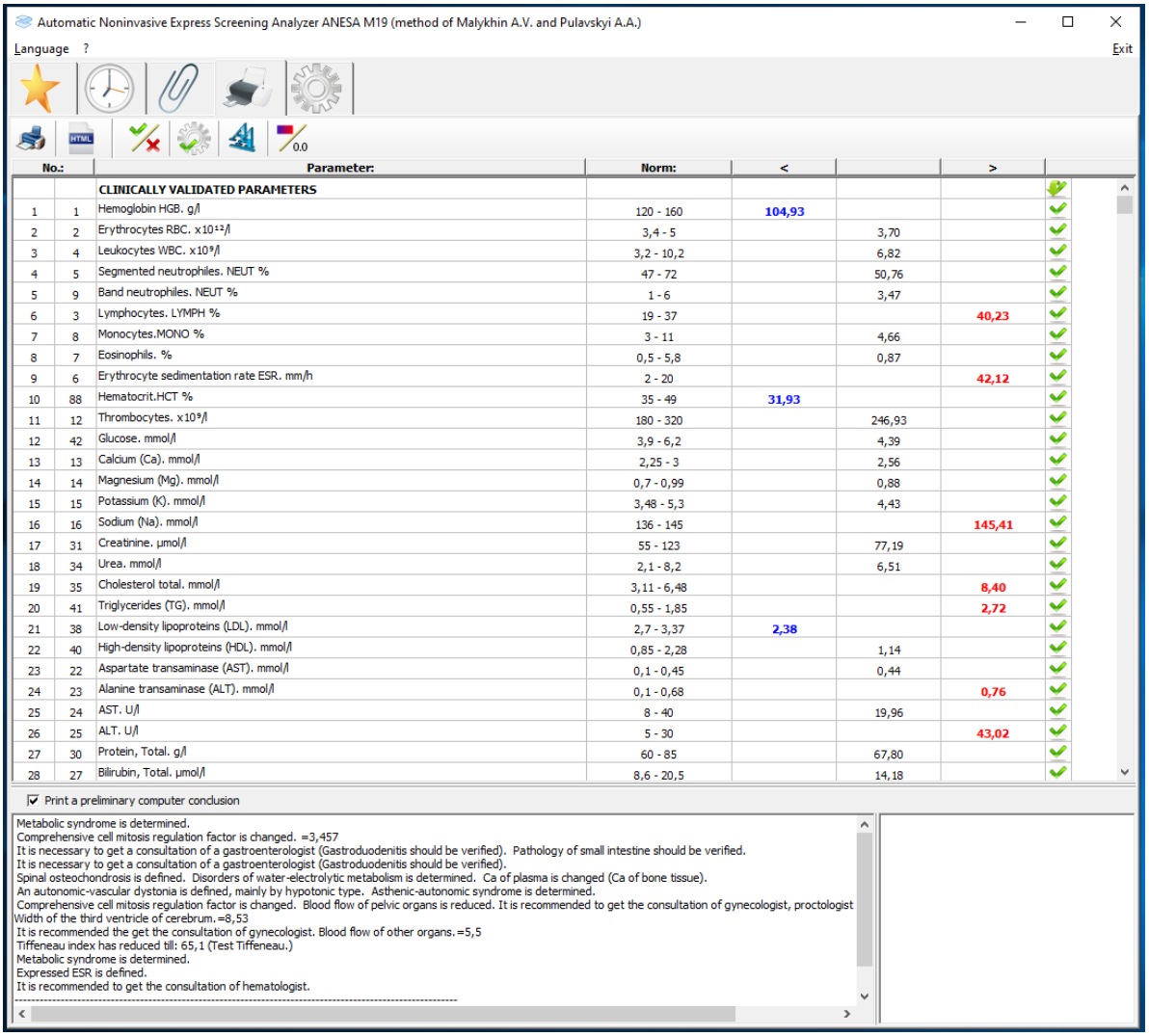
Order No.*	ID**	Name of a parameter and units of measurement	Normal ranges of the parameter (depending on gender)	Determined values, which are lower than the norm (Blue color)	Determined values, which are in the normal range (green color)	Determined values, which are higher than the norm (Red color)	Tick on/off the parameters, which are to be printed out (by default, all are ticked-on)
No.:		**Parameter**	**Norm**	**<**		**>**	

**The order of parameters in the report can be changed by a user in a setting menu to display the results as it is comfortable for him/her.*

***ID of a parameter – is a unique number of the parameter, which is assigned for it in the software and is not able to be edited by a user*



The presentation of data can be changed by a user if the numerical version is more convenient.



No.:		Parameter:	Norm:	<		>
		CLINICALLY VALIDATED PARAMETERS				
1	1	Hemoglobin HGB. g/l	120 - 160	104,93		
2	2	Erythrocytes RBC. x10¹²/l	3,4 - 5		3,70	
3	4	Leukocytes WBC. x10⁹/l	3,2 - 10,2		6,82	
4	5	Segmented neutrophiles. NEUT %	47 - 72		50,76	
5	9	Band neutrophiles. NEUT %	1 - 6		3,47	
6	3	Lymphocytes. LYMPH %	19 - 37			40,23
7	8	Monocytes.MONO %	3 - 11		4,66	
8	7	Eosinophils. %	0,5 - 5,8		0,87	
9	6	Erythrocyte sedimentation rate ESR. mm/h	2 - 20			42,12
10	88	Hematocrit.HCT %	35 - 49	31,93		
11	12	Thrombocytes. x10⁹/l	180 - 320		246,93	
12	42	Glucose. mmol/l	3,9 - 6,2		4,39	
13	13	Calcium (Ca). mmol/l	2,25 - 3		2,56	
14	14	Magnesium (Mg). mmol/l	0,7 - 0,99		0,88	
15	15	Potassium (K). mmol/l	3,48 - 5,3		4,43	
16	16	Sodium (Na). mmol/l	136 - 145			145,41
17	31	Creatinine. µmol/l	55 - 123		77,19	
18	34	Urea. mmol/l	2,1 - 8,2		6,51	
19	35	Cholesterol total. mmol/l	3,11 - 6,48			8,40
20	41	Triglycerides (TG). mmol/l	0,55 - 1,85			2,72
21	38	Low-density lipoproteins (LDL). mmol/l	2,7 - 3,37	2,38		
22	40	High-density lipoproteins (HDL). mmol/l	0,85 - 2,28		1,14	
23	22	Aspartate transaminase (AST). mmol/l	0,1 - 0,45		0,44	
24	23	Alanine transaminase (ALT). mmol/l	0,1 - 0,68			0,76
25	24	AST. U/l	8 - 40		19,96	
26	25	ALT. U/l	5 - 30			43,02
27	30	Protein, Total. g/l	60 - 85		67,80	
28	27	Bilirubin, Total. µmol/l	8,6 - 20,5		14,18	

Print a preliminary computer conclusion

Metabolic syndrome is determined.
Comprehensive cell mitosis regulation factor is changed. =3,457
It is necessary to get a consultation of a gastroenterologist (Gastroduodenitis should be verified). Pathology of small intestine should be verified.
It is necessary to get a consultation of a gastroenterologist (Gastroduodenitis should be verified).
Spinal osteochondrosis is defined. Disorders of water-electrolytic metabolism is determined. Ca of plasma is changed (Ca of bone tissue).
An autonomic-vascular dystonia is defined, mainly by hypotonic type. Asthenic-autonomic syndrome is determined.
Comprehensive cell mitosis regulation factor is changed. Blood flow of pelvic organs is reduced. It is recommended to get the consultation of gynecologist, proctologist
Width of the third ventricle of cerebrum. =8,53
It is recommended the get the consultation of gynecologist. Blood flow of other organs. =5,5
Tiffeneau index has reduced till: 65,1 (Test Tiffeneau.)
Metabolic syndrome is determined.
Expressed ESR is defined.
It is recommended to get the consultation of hematologist.

Supposing that the users of MD ANALYZER could be medical professionals of different specialities, it was clear that each could not be an expert in all the sphere, like cardiology, gastroenterology, oncology, gynaecology, neurology, etc. For that purpose, the manufacturer developed and implemented into the software algorithm generation of the automated prompts for doctors about possible disorders of health, which is displayed below the parameters.

Obviously, such conclusions about suspected disorders are made by the algorithm based on the parameters determined as abnormal. But, it is necessary to keep in mind that the algorithm is not able to control all the known diseases (more than 12 thousands of nosologies). On the other hand, the software does not account the specific circumstances, which can be clarified only form the interview of a person (health history, symptoms, signs and manifestation, etc.).

Below, several examples of data interpretation are given. They are taken from the internal database of the manufacturer and belongs to real patients. That is a clear demonstration of the device's abilities which could be useful for diagnosing of patients based on both validated and recommended parameters determined.

EXAMPLE 1.

Gender: female	Age: 77	Weight(kg): 77	Pulse: 77	Resp.rate: 18	Atm.pres: 756,08
LCA: 33,74	RCA: 34,55	LAC: 36,1	RAC: 36,16	ABD: 34,54	175,09

Even on the base of temperature parameters, without the rest of data at the report, the following disorder is observed: there is a significant temperature difference between the two symmetric points located on the bifurcations of the carotid arteries, 0.81^0C.

LCA: 33,74	RCA: 34,55

The difference of temperature more than 0.5^0C between two points on bifurcation of carotid, when the sensors were correctly placed, is the sign of possible stenosis of the artery; at the left side in the example.

So, the consultation of the neurologist is recommended, as well as ultrasound dopplerography is required to verify the pathology.

According to the results of an ultrasound examination, a particular area of blood flow disturbance can be identified, as well as the severity of the problem. Then, the appropriate doctor can suggest the most suitable treatment (e.g. drugs or surgical method).

EXAMPLE 2.

The patient is a woman.
The following parameters were chosen from the report:

	ID	**Parameter**	**Norm**	<		>
Functional parameters of stomach						
	17	pH of gastric juice.	1,2 - 1,7			
	19	SH.	7,32 - 7,4			
	20	Basal pressure of Oddi's sphincter mm Hg	39 - 41			

The same results in numerical form looks like the following:

	ID	**Parameter**	**Norm**	<		>
Functional parameters of stomach						
	17	pH of gastric juice.	1,2 - 1,7			**1,99**
	19	SH.	7,32 - 7,4	**6,41**		
	20	Basal pressure of Oddi's sphincter mm Hg	39 - 41			**41,40**

pH of gastric juice > norm
SH. < norm
Basal pressure of Oddi's sphincter mm Hg > norm

First of all, the patient is asked about medication intake (antibiotics, antifungal, antivirus and so on) during the last one-two weeks; alcohol or drugs taken in the previous two-three days, etc; any excessive emotional stress recently. All the above items provoke the first natural reaction of the Oddi's sphincter, namely contraction (so, its pressure increases).

The acidity of the gastric juice may decrease with an inflammatory process in the stomach or stressful situations. This is due to an increase in the tone of the sympathetic nervous system, which is involved in the regulation of gastric motility and secretion of gastric juice. With an increased tone of the sympathetic nervous system, the secretion of gastric juice is blocked and pylorospasm occurs. As a result, the food stagnates in the stomach, begins to rot, wander, bad breath, heartburn and nausea appear. Hence, the determination of the presence of such symptoms during an interview with the patient gives the doctor additional information about the presence of any pathology. Depending on the results of the interview, a decision is made on the appointment of therapy, correction of the diet and lifestyle or an additional examination and consultation with a gastroenterologist.

EXAMPLE 3

The patient is a woman.

The following parameters were chosen from the report:

	ID	Parameter	Norm	<		>
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372			
Internal blood flow, in % to total blood flow:						
	70	Blood flow of other organs. %	5,76 - 6,7			
	77	Blood flow of other organs, ml/min	375-436,19			

Comprehensive cell mitosis regulation factor. < norm

Blood flow of other organs. % < norm

During a conversation with the patient, the day of cycle and history is to be clarified, particularly about any surgical interventions of organs of the urogenital system or gastrointestinal tract (GI), as they provoke the "natural" reduction of blood flow.

The results of the latest visit to gynaecologist must be clarified (when it was and what was found). According to the practice, most often, the changes in parameter ID70/ID77 in women is caused by the pathologies of the reproductive system. At the same time, the pathologies of the urinary system and GI are to be excluded as well. The clarification can be done during an interview with the patient when discussing the related symptoms and signs. Depending on the results of the interview, the appropriate consultation can be recommended (gynaecologist, gastroenterologist, proctologist, urologist, etc). The consultation of the specialist is to be highly recommended to the patient, in the absence of the surgical interventions earlier. The thorough specific examinations should be carried aimed at the identification of suspected neoplasms in the relevant area.

At the same time, elevated value of the parameter ID70/ID77 in woman, after exclusion of natural influencing criteria (e.g cycle stage), can be a predictor of inflammatory process in the organs involved. So, the discussion should include the appropriate questions, after which the examinations and consultation are prescribed accordingly.

EXAMPLE 4

The patient is a woman.

The following parameters were chosen from the report:

	ID	Parameter	Norm	<		>
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372			
Internal blood flow, in % to total blood flow:						
	69	Skin blood flow. %	7,9 - 9,19			

This pair of parameters is rather informative for detection of breast pathologies. Unfortunately, it is impossible to say whether the process is benign or malignant. But the consultation of mammologist must be recommended for sure.

Based on the practical findings, it is recommended to make a visual examination of the patient's breast, when ID 57 is highly elevated (more than 4,5), and ID 69 is reduced. It is necessary to make sure that the nipple on each breast is positioned symmetrically and the surface of the skin on the breast has a natural appearance. Often, the pathological changes are already visible, namely the asymmetric nipple(s) and/or corrugated skin (looks like "lemon peel").

EXAMPLE 5

The patient is a man.

The following parameters were chosen from the report:

	ID	Parameter	Norm	<		>
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372			
Internal blood flow, in % to total blood flow:						
	70	Blood flow of other organs. %	5,76 - 6,7			
	77	Blood flow of other organs, ml/min	375-436,19			

Comprehensive cell mitosis regulation factor. < norm

Blood flow of other organs. < norm

During a conversation with the patient, the history is to be clarified, particularly about any surgical interventions of organs of the urogenital system or gastrointestinal tract (GI), as they provoke the "natural" reduction of this blood flow.

According to the practice, most often, the changes in parameter ID70 and ID 77 in men is caused by the pathologies of the prostate. At the same time, the pathologies of the urinary system and GI are to be excluded as well. The clarification can be done during an interview with the patient when discussing the related symptoms and signs, including the questions regarding urination at night (frequency), pain in urination, sexual function/dysfunction, control of urinogenital infections, frequency and nature of defecation, any painful feeling, blood in feces and urine, etc, etc. Depending on the results of the interview, the appropriate consultation can be recommended (gastroenterologist, proctologist, urologist, etc). The consultation of the appropriate specialist is to be highly recommended to the patient, in the absence of the surgical interventions earlier. The thorough specific examinations should be carried aimed at the identification of suspected neoplasms in the relevant area.

At the same time, elevated value of the parameter ID70/ID77 in man can be a predictor of inflammatory process in the organs involved. So, the discussion should include the appropriate questions, after which the examinations and consultations are prescribed accordingly.

The verification of the nature of prostate pathology is also possible in the following way. It is well known that the number of men suffering from prostate abnormalities increases with age. But so far in clinical practice, there is no simple and high-sensitive noninvasive test to identify the signs associated with the pathologies of the prostate gland. Especially it concerns asymptomatic patients. MD ANALYZER has a solution for such patients.

The parameters ID70/ID77 characterize, among others, the blood flow of the pelvic organs. In particular, it was found the blood flow of the prostate is very sensitive to the presence of pathologies, but it varies differently depending on the nature of the abnormalities.

Reduced blood flow through the prostate gland (⇓ID 77/ID70) characterizes the presence of fibrotic elements in the prostate. As fibrosis is the proliferation of connective tissue of the gland, so the compression of the blood capillaries is caused, which leads to hypoxia of the prostate tissue. This process is regulated by the transforming growth factor beta (TGF-β) being the main regulator of tissue hemostasis.

It is important, that late detection of prostate pathology and the lack of appropriate treatment can lead to the prostate adenocarcinoma. In most of the cases, it is identified in the patients with blood flow reduced to the level 250 ml/min (⇓ID77/ID70). The main claimed symptom, in this case, is erectile dysfunction, sometimes urinary retention and cystitis (all of them are considered as complications of the pathology).

Increased blood flow through the prostate gland (⇑ ID 77/ID70) specifies the hypertrophic and late hyperplastic pathology of the prostate gland. It is closely associated with prostate angiogenesis. Angiogenesis and prostate cell growth are regulated by the epidermal growth factor (EGF). The result of this process will be chronic inflammation There is no direct evidence

that prostatitis or benign prostatic hyperplasia (BPH) leads to prostate cancer. But one or both of mentioned pathologies can develop in men along with prostate cancer.

So, additional examinations that need to be assigned to the patient include sonography and blood level of PSA (prostate-specific antigen). As the elevated blood level of PSA is specific for both benign and malignant processes, the sonography test will be helpful to differentiate them. When hyperplasia is detected, then a biopsy is usually recommended.

EXAMPLE 6

The patient is a man.

The following parameters were chosen from the report:

	ID	**Parameter**	**Norm**	<		>
	117	Cardiac work. Joule	0,692 - 0,788			
	9	Band neutrophils. NEUT %	1-6			
	3	Lymphocytes. LYMPH %	19-37			
	93	Test Tiffeneau. %	86-109			

Lymphocytes. LYMPH % <= 18%
Band neutrophils. NEUT % >= 10%
Cardiac work. > 0.788 Joule
Test Tiffeneau. % < 86

Analysing this data, it is possible to suspect the pulmonary mechanism of homeostasis disorder (restrictive type of lungs functioning derangement), which can be verified by specific examinations. The consultation of appropriate specialist is recommended.

EXAMPLE 7

Gender does not matter.

The following parameters were chosen from the report:

	ID	**Parameter**	**Norm**	<		>
	4	Leukocytes WBC. $x10^9/l$	3.2 - 10.2			
	22	Aspartate transaminase (AST). mmol/l	0.1 - 0.45			
	27	Bilirubin, Total. µmol/l	8.6 - 20.5			
	130	Alkaline phosphatase (ALP). µkat/l	0.5 - 2.02			

High fever in the patient (temperature in armpits): LAC: 38,1 RAC: 38,16

Based on the results of screening testing, it is necessary to exclude the inflammation of bile duct (cholangitis). In most cases, cholangitis is caused by a gallstones, bacterial infection, worms or parasites and often happens suddenly. But in some cases, it may be long-term (chronic). Some people develop inflammation and cholangitis as part of an autoimmune condition.

In case of infection, ESR will be elevated significantly.

Additionally, made test for C-reactive protein will confirm the acute process if elevated.

During the interview of a patient, the present symptoms can be verified, they are the following:

Clinical manifestations of acute cholangitis occur suddenly in the form of the classical Charcot's triad, includes pain in the right hypochondrium, increased body temperature and jaundice. The temperature usually rises to 38-40°C and is accompanied by pronounced sweating and chills. Pain intense enough, by their nature, resemble biliary colic and radiating in the right shoulder, the neck and under the shoulder. Intoxication in acute inflammatory growing fast and manifest deterioration appetite, progressive weakness, headache, diarrhoea and vomiting with preceding nausea. Several later appears jaundice, accompanied by skin itching (especially at

night). In severe cases, the above symptoms may join the shock and sense of violation (pentad Reynolds).

In chronic inflammatory symptoms: dull pain in the right hypochondrium has weak intensity, accompanied by bloating in the epigastric region. Jaundice develops much later and reveals the long-term ongoing process.

Usually the imaging diagnostic procedures are recommended, including but not limited to ultrasound and/or CT of the liver and biliary duct to define an extension duct, structural and endemic changes in the liver parenchyma, etc. To verify the nature of disease, factional duodenal intubation with a further bacteriological study of bile can be recommended, as well as the study of helminth eggs and faeces elementary.

EXAMPLE 8

Gender does not matter.

The following parameters were chosen from the report:

	ID	**Parameter**	**Norm**	<		>
	20	Basal pressure of Oddi's sphincter mm Hg	39 - 41			
	17	pH of gastric juice.	1,2 - 1,7			
	37	β- lipoprotein. mmol/l	3 - 6			

OR

	ID	**Parameter**	**Norm**	<		>
	20	Basal pressure of Oddi's sphincter mm Hg	39 - 41			
	17	pH of gastric juice.	1,2 - 1,7			
	37	β- lipoprotein. mmol/l	3 - 6			

Screening for infection with Helicobacter pylori (a significant excess)

Those parameters are sensitive to Helicobacter pylori infection, especially ID20. The following interrelations of parameters give a suspicious for infection:

- Reduced pH of gastric juice (⇓ ID 17) and increased basal pressure of the sphincter-Oddi (⇑ID 20)
- Reduced pH of gastric juice (⇓ ID 17) and abnormal β- lipoprotein (⇑ or ⇓ ID 37)

Differentiation is provided by a qualified medical doctor, who analyses the report and existing symptoms (in a conversation with the patient). A person infected with Helicobacter confirms a number of symptoms which are very typical for this strain of the bacterial infection, they are the following: acidity in the throat, reflux and dull pain under the sternum. Any of these symptoms may be aggravated by the irritating effects of food or drinks, for example, a glass of white wine can stimulate acidity in the stomach and a feeling of acidity in the throat of an infected person.

If the parameter basal pressure of the sphincter Oddi is elevated (⇑ID 20), but the patient does not feel any typical symptoms mentioned above, an absence of Helicobacter infection is suspected. Other parameters should be studied (like Amylase, AST, ALT, Bilirubin, ect).

Of course, the influence of taking medication (like antibiotics or anti-inflammatory, etc), often or recently taken alcohol or drugs, and excessive stress are to be excluded (all those items elevate the pressure of sphincter-Oddi).

Below, there are several samples of data interpretation, where analysis of automatic prompts about pathologies suspected is made in combination with the parameters from the report. It is helpful for the acceptance or rejection of the automatic assumption.

EXAMPLE 9

The patient is a woman.

Gender: female Age: 69 Weight: 80 Pulse: 80 Resp.rate: 16 Atm.pres: 753

LCA: 31,21	RCA: 30,83	LAC: 35,4	RAC: 35,24	ABD: 28,29

ID	Parameter:	Norm:	Value:
17	pH of gastric juice.	1,2 - 1,7	1,55
41	Triglycerides (TG). mg/dl	48,67 - 163,72	113,75
42	Glucose. mg/dl	71,9 - 107,9	**163,05**
50	Amylase (W.T.Caraway). g/l*h	12 - 32	**10,73**
64	Myocardial blood flow. %	4,32 - 5,02	**3,97**
70	Blood flow of other organs. %	5,76 - 6,7	**9,97**
84	Blood flow per 1gr of cerebral tissue. ml/g	2,9 - 3,2	**2,63**
113	Left ventricular Stroke Work Index. %	52-60	**48,54**

Preliminary computer conclusion about diagnosis:
It is necessary to get a consultation of a gastroenterologist (gastroduodenitis?). It is necessary to eliminate a pathology of small intestine.
There is the ischemic heart-disease.
It is recommended to test blood on glucose carefully.
There is the spinal osteochondrosis. There is the derangement of water-electrolytic metabolism. The Ca of plasma is changed (Ca of bone tissue).
There is the hypertension of pulmonary circulation.
Fibrinogen=6,66
The index Tiffeneau is reduced till: 60,0 (Cellular water.)

The first prompt tells us: "*It is necessary to get a consultation of a gastroenterologist (gastroduodenitis?)*". This assumption should be rejected, based on the following parameters:

- parameter ID.17 (pH of gastric juice.) and parameter ID.41 (Triglycerides (TG). mg/dl) are in normal rage;
- parameters ID.70 and ID.42 (Blood flow of other organs. % and Glucose. mg/dl) are higher than norm;

At the same time, some other parameters are to be the subject of careful analysis:

-parameter ID.64 (Myocardial blood flow. %) is reduced to 3.97,
-parameter ID.113 (Left ventricular Stroke Work Index. %) is reduced to 48.54,
-parameter ID.50 (Amylase (W.T.Caraway). g/l*h) is reduced to 10.73

As a result, a doctor might have certain doubts in proposed diagnosis "Gastroduodenitis".

At the same time, other mentioned abnormalities indicate another evident and important disorders: atherosclerotic encephalopathy, ischemic-heart disease and diabetes.

EXAMPLE 10

The patient is a woman.

She was tested twice, with four weeks interval. In addition, the second test was done after acute inflammatory disease.

The first automatic assumption was "*It necessary to eliminate an **impaired coagulation**. Blood coagulation must be under control*". We need to put this diagnosis as the main one. The reasons are the following: the parameter ID.87 is on the top level of a norm while the duration of clotting is less than 1 minute.

Gender: female	Age: 65	Weight: 76	Pulse: 72	Resp.rate: 20	Atm.pres: 749
LCA: 33,56	RCA: 34,12	LAC: 35	RAC: 35,98	ABD: 35,18	

	ID	Parameter	Norm	Value:
	10	Beginning of clotting (method of Lee-White). min	0,5 - 2	**02`37``**
	11	End of clotting (method of Lee-White). min	3 - 5	03`06``
	87	Prothrombin index (PI). %	75 - 104	97,01

The emphasized low value of parameter ID57 is also worth paying attention to, "Comprehensive cell mitosis regulation factor is changed. =3,441"

	ID	Parameter	Norm	Value:
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372	**3,4405**

The next parameter might confirm the diagnosis "***Hypoacid gastritis***"

	ID	Parameter	Norm	Value:
	17	pH of gastric juice	1.2-1.7	**1.98**

The suspected diagnosis "***Essential hypertension***" can be confirmed by the following parameters:

	ID	Parameter	Norm	Value:
	40	High-density lipoproteins (HDL). mg/dl	33-88	**30,17**
	45	Cellular water. %	39 - 42	**46,62**
	56	Creatine kinase MB (CK-MB). µmol/min/kg	35,1 - 38,1	**50,18**
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372	**3,4405**
	64	Myocardial blood flow. %	4,32 - 5,02	**3,56**
	70	Blood flow of other organs. %	5,76 - 6,7	**9,17**
	84	Blood flow per 1gr of cerebral tissue. ml/g	2,9 - 3,2	2,91
	87	Prothrombin index (PI). %	75 - 104	97,01
	114	Systolic arterial pressure. mm Hg	-----	176,00
	115	Diastolic arterial pressure. mm Hg	-----	82,47

Parameter ID.40 is significantly reduced. It indicates an atherosclerotic nature of the disease. Myocardial blood flow is less than normal. It should be noted, when the mentioned parameter is less than 4.0%, in most cases, we have a deal with a patient with the ischemic disease.
Blood pressure is elevated (parameters ID.114 and 115). There is high activity of Cardiac creatine kinase (parameter ID.56) and high level of Cellular water (parameter ID.45). Parameter ID.84 (Blood flow per 1gr of cerebral tissue) is on the low level of the norm. Blood flow of other organs is elevated (parameter ID.70) is higher than the norm.

Below parameters might confirm the diagnosis "***Hypertension of pulmonary circulation***"

	ID	Parameter	Norm	Value:
	78	Pulmonary vascular resistance (PVR). dyn/cm5*sec	160-250	188,62
	81	Time of systemic circulation. s	4-5.5	**5.77**

So, summarising all mentioned above, it is possible to conclude that the lady has derangements of blood coagulation, hypoacid gastritis, atherosclerotic process with formation of ischemic disease of heart and hypertension. The development of pathologies occurs against the background of water metabolism disorder. As a result, the following diagnoses were set:

1. ***Atherosclerotic encephalopathy***
2. ***Ischemic disease of heart***
3. ***Spinal osteochondrosis***
4. ***Hypertension of pulmonary circulation***

The second test of this woman was different a little bit. The main items were the following:

Gender: female Age: 65 Weight: 76 Pulse: 80 Resp.rate: 18 Atm.pres: 749

LCA: 35,01	RCA: 32,18	LAC: 35,54	RAC: 35,8	ABD: 28,46

	ID	Parameter	Norm	Value:
	10	Beginning of clotting (method of Lee-White). min	0,5 - 2	**02`50``**
	11	End of clotting (method of Lee-White). min	3 - 5	03`43``
	22	Aspartate transaminase (AST). mmol/l	0,1 - 0,45	**1,24**
	23	Alanine transaminase (ALT). mmol/l	0,1 - 0,68	**1,24**
	40	High-density lipoproteins (HDL). mg/dl	33-88	**30,45**
	45	Cellular water. %	39 - 42	**46,36**
	56	Creatine kinase MB (CK-MB). µmol/min/kg	35,1 - 38,1	**50,94**
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372	**3,4749**
	64	Myocardial blood flow. %	4,32 - 5,02	**4,10**
	70	Blood flow of other organs. %	5,76 - 6,7	**6,94**
	84	Blood flow per 1gr of cerebral tissue. ml/g	2,9 - 3,2	3,10
	87	Prothrombin index (PI). %	75 - 104	**69,45**
	98	Quantity of assimilated oxygen on 100 gr. of cerebral tissue. ml	2,8 - 3,4	**1,90**
	114	Systolic arterial pressure. mm Hg	-----	150,70
	115	Diastolic arterial pressure. mm Hg	-----	88,57

Blood clotting time remained almost the same, while prothrombin index reduced. Parameters ID.57 and ID.40 were still lower than normal value. The situation with myocardial blood flow was improved. Blood pressure and Blood flow per 1gr of cerebral tissue stabilized. Parameters ID.56 and ID.45 remained on high level, parameter ID.70 (Blood flow of other organs) remained high.

The most important changes concerned to parameters "Quantity of assimilated oxygen on 100 gr. of cerebral tissue", which reduced significantly, still low value of "Comprehensive cell mitosis regulation factor", and rapidly increased AST and ALT (graphs below).

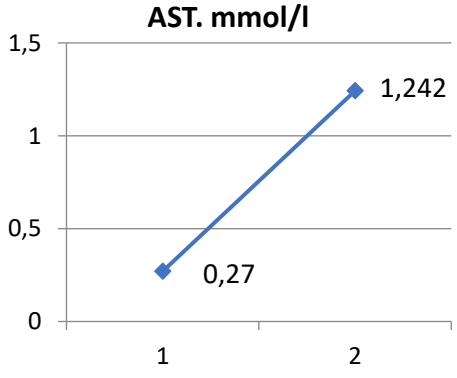


Diagram 1. Changes of AST

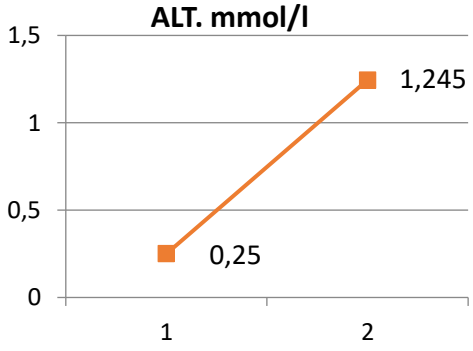


Diagram 2. Changes of ALT

Analysing the tests in dynamic, the previously set diagnoses were confirmed. Additionally, the attention was paid to the reduced parameters "Comprehensive cell mitosis regulation factor" and "Blood flow of other organs" together with an increasing of the parameters AST and ALT.

This suggests that the oncological process is developing in the organs involved. So, the recommendations to visit gastroenterologist, gynecologist and proctologist are obvious.

From the history of the patient: a tumour of the small intestine was founded during tomography examination. The patient was operated on.

EXAMPLE 11

The patient is a man.

This patient was tested also twice. He took the cure in the clinic of the Institute of neurology, psychiatry and narcology of the AMS of Ukraine. Tests were done before admission to the hospital and after the course of treatment (with two-week interval).

At the beginning of automated conclusion in the report, there was an assumption *"It is recommended to test blood on glucose carefully. Rising of astroproteins and activity of enzymes (aspartattransaminase, alaninetransaminase) are determined"*. This information in combination with the data from the report and history of the patient allows setting up several diagnoses:

1.Encephalopathy with alcoholic-metabolic genesis.

Background of the diagnosis, the main parameters:

- ALT is higher than AST in 1.2times, what is typical for hepatic alcoholic diseases;
- Total bilirubin and conjugated bilirubin are higher than the norm, while "Lipoproteins of high density (HDL)" reduced;
- All other parameters confirmed our diagnosis (tables below)

Gender: male	Age: 33	Weight: 68	Pulse: 90	Resp.rate: 20	Atm.pres: 737
LCA: 33,26	RCA: 32,95	LAC: 35,38	RAC: 35,2	ABD: 33,26	

	ID	**Parameter**	**Norm**	**Value:**
	22	Aspartate transaminase (AST). mmol/l	0,1 - 0,45	**0,71**
	23	Alanine transaminase (ALT). mmol/l	0,1 - 0,68	**1,28**
	27	Bilirubin, Total. mg/dl	0,5 - 1,198	**1,97**
	28	Bilirubin, Direct. mg/dl	0,129 - 0,357	**0,67**
	40	High-density lipoproteins (HDL). mg/dl	30-67	**28,02**
	45	Cellular water. %	39 - 42	**43,10**
	98	Quantity of assimilated oxygen on 100 gr. of cerebral tissue. ml	2,8 - 3,4	**2,10**
	99	Oxygen saturation in arterial blood (SaO_2). %	95 - 98	**93,16**
	113	Left ventricular Stroke Work Index. %	52-60	**49,10**
	117	Cardiac work. Joule	0,692 - 0,788	**0,96**

2.Dilated cardiomyopathy. Derangement of oxidative phosphorylation.

Confirmed by the following abnormalities:

	ID	**Parameter**	**Norm**	**Value:**
	32	Dopamine β-hydroxylase (DBH). nm/ml/min	28 - 32,5	**19,63**
	56	Creatine kinase MB (CK-MB). µmol/min/kg	35,1 - 38,1	**39,87**
	111	Interval QT. sec	0,355 - 0,4	0,389
	112	Interval QRS. sec	0,065 - 0,1	**0,108**

After two weeks of treatment, the patient has been tested again. The situation changed a little: ALT remained still higher than AST, but the ratio reduced a little; Total bilirubin, Direct bilirubin and HDL reduced also, but remained high; Cardiac work and Dopamine β-hydroxylase (DBH) were almost normal.

	ID	Parameter	Norm	Value:
	22	Aspartate transaminase (AST). mmol/l	0,1 - 0,45	**0,64**
	23	Alanine transaminase (ALT). mmol/l	0,1 - 0,68	**1,16**
	27	Bilirubin, Total. mg/dl	0,5 - 1,198	**1,85**
	28	Bilirubin, Direct. mg/dl	0,129 - 0,357	**0,52**
	32	Dopamine β-hydroxylase (DBH). nm/ml/min	28 - 32,5	**25,26**
	40	High-density lipoproteins (HDL). mg/dl	30-67	**28,21**
	45	Cellular water. %	39 - 42	**42,36**
	56	Creatine kinase of cardiac. mkmol/min/kg	35,1 - 38,1	**39,26**
	98	Quantity of assimilated oxygen on 100 gr. of cerebral tissue. ml	2,8 - 3,4	**2,06**
	99	Oxygen saturation in arterial blood (SaO_2). %	95 - 98	**92,84**
	111	Interval QT. sec	0,355 - 0,4	0,371
	112	Interval QRS. sec	0,065 - 0,1	0,095
	113	Left ventricular Stroke Work Index. %	52-60	**48,58**
	117	Cardiac work. Joule	0,692 - 0,788	**0,93**

Conclusion: The set diagnoses remained the same. The most progress was indicated in the parameter DBH, which became almost normal. As DBH is connected with the noradrenergic and cholinergic exchange, its improvement undoubtfully characterized the course of treatment as effective.

EXAMPLE 12

The patient is a man.

This patient was tested three times. It was two days interval between the 1st and the 2d test, and 10 days between the 2d and the 3d.

The first automatic assumption for this patient was "*It is necessary to control protein S100*."
It is necessary to note, that high level of protein S100 can be considered as an indicator of possible neoplasm or tumors in a body.

The next assumption emphasized on the high enzymes activity, low rate of O_2 content in arterial blood and high level of bilirubin.

Gender: male Age: 36 Weight: 79 Pulse: 90 Resp.rate: 18 Atm.pres: 749

LCA: 32,2	RCA: 32,16	LAC: 34,25	RAC: 34,75	ABD: 34,46

	ID	Parameter	Norm	Value:
	18	pH of blood.	7,36 - 7,45	**7,23**
	22	Aspartate transaminase (AST). mmol/l	0,1 - 0,45	**1,71**
	23	Alanine transaminase (ALT). mmol/l	0,1 - 0,68	**1,90**
	27	Bilirubin, Total. mg/dl	0,5 - 1,198	**2,08**
	28	Bilirubin, Direct. mg/dl	0,129 - 0,357	**0,54**
	32	Dopamine β-hydroxylase (DBH). nm/ml/min	28 - 32,5	**26,70**
	40	High-density lipoproteins (HDL). mg/dl	30-67	**28,58**
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372	**4,1424**
	84	Blood flow per 1gr of cerebral tissue. ml/g	2,9 - 3,2	**2,85**
	99	Oxygen saturation in arterial blood (SaO_2). %	95 - 98	**87,21**

Note: it was suspected that the patient has ***hepatic neoplasm***, which developed against the background of alcohol abuse; the levels of AST and ALT are critically high.

The conclusion was the following: ***Metabolic-alcoholic hepatitis; possible neoplasm in liver. Patient should be under control.***

After the second test, the picture was the following:

	ID	**Parameter**	**Norm**	**1st test Value:**	**2d test Value**
	18	pH of blood.	7,36 - 7,45	**7,23**	**7,24**
	22	Aspartate transaminase (AST). mmol/l	0,1 - 0,45	**1,71**	**0,96**
	23	Alanine transaminase (ALT). mmol/l	0,1 - 0,68	**1,90**	**1,10**
	27	Bilirubin, Total. mg/dl	0,5 - 1,198	**2,08**	0,61
	28	Bilirubin, Direct. mg/dl	0,129 - 0,357	**0,54**	0,16
	32	Dopamine β-hydroxylase (DBH). nm/ml/min	28 - 32,5	**26,70**	**22,52**
	40	High-density lipoproteins (HDL). mg/dl	30-67	**28,58**	**28,93**
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372	**4,1424**	**4,1788**
	84	Blood flow per 1gr of cerebral tissue. ml/g	2,9 - 3,2	**2,85**	**3,33**
	99	Oxygen saturation in arterial blood (SaO_2). %	95 - 98	**87,21**	**88,35**

Comprehensive cell mitosis regulation factor increased till 4.17.
AST and *ALT* are still high.
Content of O_2 in arterial blood, HDL and pH of blood are still low.
Parameters of *Total bilirubin* and *Dopamine β-hydroxylase* (DBH) reduced.

Analysis of the received information confirmed the previously set diagnoses. As *Dopamine β-hydroxylase* reduced and *Blood flow per 1gr of cerebral tissue* increased, we can talk about metabolic disorders, which are provoked by hepatic malfunction (which is typical for alcoholic disease).

After 10-days treatment, the situation was the following:

	ID	**Parameter**	**Norm**	**1st test Value:**	**2d test Value**	**3d test Value**
	18	pH of blood.	7,36 - 7,45	**7,23**	**7,24**	**7,27**
	22	Aspartate transaminase (AST). mmol/l	0,1 - 0,45	**1,71**	**0,96**	**0,59**
	23	Alanine transaminase (ALT). mmol/l	0,1 - 0,68	**1,90**	**1,10**	**0,75**
	27	Bilirubin, Total. mg/dl	0,5 - 1,198	**2,08**	0,61	0,72
	28	Bilirubin, Direct. mg/dl	0,129 - 0,357	**0,54**	0,16	0,20
	32	Dopamine β-hydroxylase (DBH). nm/ml/min	28 - 32,5	**26,70**	**22,52**	**23,37**
	40	High-density lipoproteins (HDL). mg/dl	30-67	**28,58**	**28,93**	**29,10**
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372	**4,1424**	**4,1788**	**4,4039**
	84	Blood flow per 1gr of cerebral tissue. ml/g	2,9 - 3,2	**2,85**	**3,33**	3,18
	99	Oxygen saturation in arterial blood (SaO_2). %	95 - 98	**87,21**	**88,35**	**88,89**

Comprehensive cell mitosis regulation factor increased more. Elevation of this parameter was caused by the adaptive reaction of hematopoietic system. By the way, parameter ID57 is lower than the norm, in case of any neoplasms in a body.

AST and *ALT* reduced, both types of *bilirubin* and *Blood flow per 1gr of cerebral tissue* normalized. Some of parameters, as DBH, Content of O_2 in arterial blood and HDL remained low.

The diagnostic decision was confirmed again. State of the patient was typical for people with hepatic and cerebral diseases.

EXAMPLE 13

The patient is a woman.
The patient was tested before, during and after surgical operation of brain tumor removing (parasagittal meningioma).

The first test was done after intubation of trachea and anesthesia injection. It was noted, that CBC was in normal ranges, as well as hepatic function, pulmonary ventilation, haematocrit and quantity of assimilated oxygen on 100 gr. of cerebral tissue.

Several parameters were reduced, namely Thrombocytes, HDL, Myocardial blood flow, Left ventricular Stroke Work Index, Oxygen saturation in arterial blood (SaO_2) and Comprehensive cell mitosis regulation factor. Cellular water, Minute ventilation (VE) and Interval QRS were high.

Gender: female Age: 59 Weight: 98 Pulse: 64 Resp.rate: 20 Atm.pres: 749

LCA: 34,1	RCA: 33,49	LAC: 36,73	RAC: 36,19	ABD: 33,01	173,52

	ID	Parameter	Norm	Value:
	12	Thrombocytes. $x10^9/l$	180 - 320	**137**
	13	Calcium (Ca). mg/dl	9 - 12	9,03
	31	Creatinine. mg/dl	0,62 - 1,39	0,92
	32	Dopamine β-hydroxylase (DBH). nm/ml/min	28 - 32,5	28,40
	40	High-density lipoproteins (HDL). mg/dl	33-88	**30,42**
	45	Cellular water. %	39 - 42	**46,50**
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372	**3,6395**
	64	Myocardial blood flow. %	4,32 - 5,02	**3,68**
	88	Hematocrit.HCT	35 - 49	44
	90	Minute ventilation (VE) l/min	4 - 12	**14,46**
	98	Quantity of assimilated oxygen on 100 gr. of cerebral tissue. ml	2,8 - 3,4	2,95
	99	Oxygen saturation in arterial blood (SaO_2). %	95 - 98	**89,45**
	112	Interval QRS. sec	0,065 - 0,1	**0,107**
	113	Left ventricular Stroke Work Index. %	52-60	**48,06**

So, the following diagnoses were fixed:
Brain tumor, coronary cardiosclerosis, ischemic heart disease and spinal osteochondrosis.

The second test: Opening of cutaneous covering. Beginning of operation.
The results were the following:

	ID	Parameter	Norm	1st test Value:	2d test Value
	12	Thrombocytes. $x10^9/l$	180-320	**137**	190
	13	Calcium (Ca). mg/dl	9 - 12	9,03	10,44
	31	Creatinine. mg/dl	0,62 - 1,39	0,92	0,62
	32	Dopamine β-hydroxylase (DBH). nm/ml/min	28 - 32,5	28,40	28,38
	40	High-density lipoproteins (HDL). mg/dl	33-88	**30,42**	**30,62**
	45	Cellular water. %	39 - 42	**46,50**	**46,94**
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372	**3,6395**	**3,5809**
	64	Myocardial blood flow. %	4,32 - 5,02	**3,68**	**3,85**
	88	Hematocrit.HCT	35 - 49	44	44
	90	Minute ventilation (VE) l/min	4 - 12	**14,46**	**14,00**
	98	Quantity of assimilated oxygen on 100 gr. of cerebral tissue. ml	2,8 - 3,4	2,95	2,95
	99	Oxygen saturation in arterial blood (SaO_2). %	95 - 98	**89,45**	**89,63**
	112	Interval QRS. sec	0,065 - 0,1	**0,107**	**0,107**
	113	Left ventricular Stroke Work Index. %	52-60	**48,06**	**48,08**

The third test: The patient was tested after operation, in ICU department.
The results were the following:

	ID	Parameter	Norm	Value:
	12	Thrombocytes. x10^9/l	180 - 320	**164**
	13	Calcium (Ca). mg/dl	9 - 12	10,68
	31	Creatinine. mg/dl	0,62 - 1,39	**2,55**
	32	Dopamine β-hydroxylase (DBH). nm/ml/min	28 - 32,5	29,49
	40	High-density lipoproteins (HDL). mg/dl	33-88	**31,10**
	45	Cellular water. %	39 - 42	**47,41**
	57	Comprehensive cell mitosis regulation factor.	3,7828 - 3,9372	**3,5219**
	64	Myocardial blood flow. %	4,32 - 5,02	**2,92**
	88	Hematocrit.HCT	35 - 49	**33**
	90	Minute ventilation (VE) l/min	4 - 12	**13,33**
	98	Quantity of assimilated oxygen on 100 gr. of cerebral tissue. ml	2,8 - 3,4	3,02
	99	Oxygen saturation in arterial blood (SaO_2). %	95 - 98	96,51
	112	Interval QRS. sec	0,065 - 0,1	**0,111**
	113	Left ventricular Stroke Work Index. %	52-60	**48,16**

It is necessary to note, that myocardium disfunction appeared: Myocardial blood flow and Thrombocytes reduced, AST value exceeded ALT.

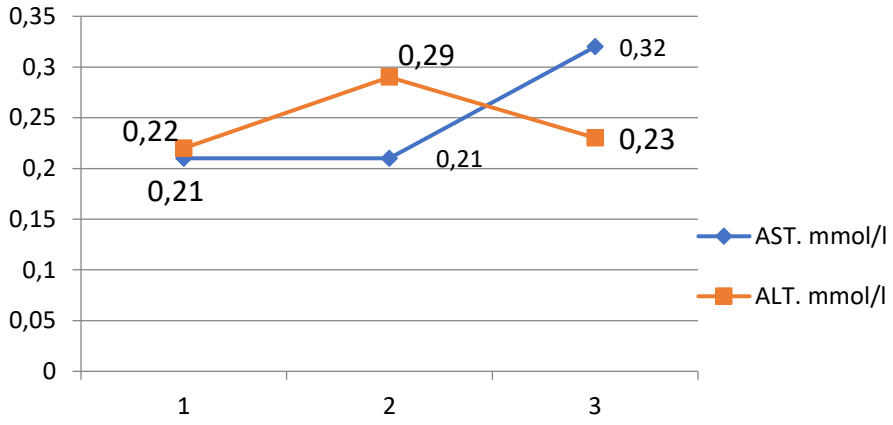


Diagram 3. Changes of AST and ALT

Haematocrit reduced also, while Concentration of creatinine significantly increased (twice).

It was a confirmation that tumor resection was done for a patient with ***ischemic disease.***

The fourth test: Patient was examined after three days in ICP department. Some improvements were determined: Hematocrite and Oxygen saturation in arterial blood (SaO_2), hepatic activity and Myocardium current of blood became better.

	ID	Parameter	1st test Value:	2d test Value	3d test Value	4th test Value
	12	Thrombocytes. x10^9/l	**137**	190	**164**	262
	13	Calcium (Ca). mg/dl	9,03	10,44	10,68	**8,75**
	31	Creatinine. mg/dl	0,92	0,62	**2,55**	1,12
	32	Dopamine β-hydroxylase (DBH). nm/ml/min	28,40	28,38	29,49	**27,93**
	40	High-density lipoproteins (HDL). mg/dl	**30,42**	**30,62**	**31,10**	**32,76**
	45	Cellular water. %	**46,50**	**46,94**	**47,41**	**47,85**
	57	Comprehensive cell mitosis regulation factor.	**3,6395**	**3,5809**	**3,5219**	**3,3095**
	64	Myocardial blood flow. %	**3,68**	**3,85**	**2,92**	**4,04**
	88	Hematocrit.HCT	44	44	**33**	38

	90	Minute ventilation (VE) l/min	**14,46**	**14,00**	**13,33**	**14,43**
	98	Quantity of assimilated oxygen on 100 gr. of cerebral tissue. ml	2,95	2,95	3,02	**1,78**
	99	Oxygen saturation in arterial blood (SaO_2). %	**89,45**	**89,63**	96,51	97,06
	112	Interval QRS. sec	**0,107**	**0,107**	**0,111**	**0,121**
	113	Left ventricular Stroke Work Index. %	**48,06**	**48,08**	**48,16**	**47,29**

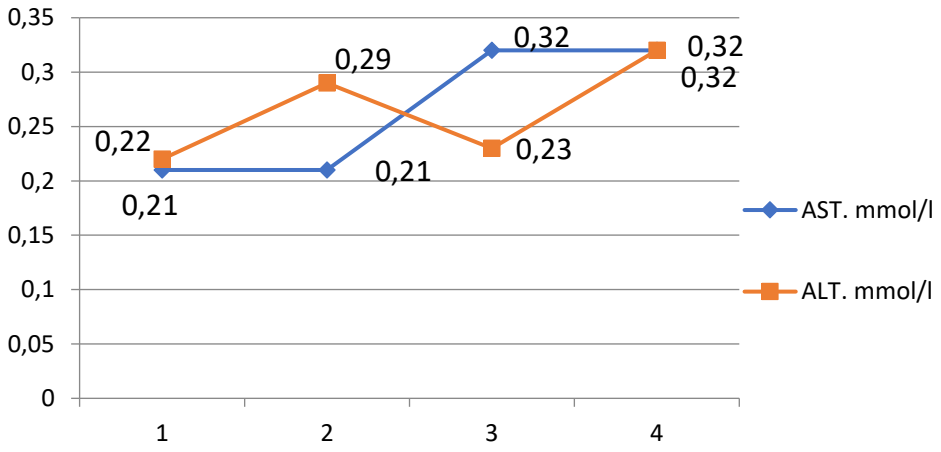


Diagram 4. Changes of AST and ALT

Analysing the received data and estimating in general, the following diagnoses were set:

1. ***Metabolic syndrome***
2. ***Circulatory encephalopathy of atherosclerotic genesis***
3. ***Ischemic-heart disease***

The state of the patients was adequate to the severity of the made operation.

Several parameters, which combination can be used by the user as a signal to analyse carefully other parameters involved, from the position of a possible development of the **oncological process** in a patient.

-lower than norm, - higher than norm

For both genders		
57	Comprehensive cell mitosis regulation factor.	↓
104 105 106 107	Transport and elimination of CO_2	↑
98	Quantity of assimilated oxygen on 100 gr. of cerebral tissue. ml	↓
The above mentioned changes are the signal for a doctor to verify if a patient has or has not some neoplasm. Usually, localisation of suspisious oncological process may be identified by parameters, listed in the part "Internal blood flow" (ID63-70). In the most of cases, involved/affected system of organs has changed value of blood flow (usually reduced).		

Verification of **cardio-vascular pathologies** come to fore when the below changes observed.

For any gender		
26	De Ritis coefficient (AST/ALT).	↑
111	Interval QT. sec	↑
112	Interval QRS. sec	↑
15	Potassium (K). mg/dl	↑
56	Creatine kinase MB (CK-MB). µmol/min/kg	↑
113	Left ventricular Stroke Work Index. %	↓
64	Myocardial blood flow. %	↓
Changes in above mentioned ranges are the signal for a doctor to verify if a patient has or has not problem with cardio-vascular system.		

CONCLUSION:
Here, a few examples that will help doctors correctly interpret the results of screening diagnostics are represented.
The authors of the method, as well as the scientists who use the MD Analyzer in their practice and studies, made a lot of publications about both the device application and data interpretation. They described the theory and practice of using this medical device and its software. The list of publications is available below.

List of publications:

Year	Name of scientific work	Publisher, journal	Status
2006	Malykhin A.V. Bacherikov A.M. Malykhina N.A. Pulavskyi A.A. Methodical recommendations «Noninvasive comprehensive evaluation of the parameters of homeostasis, hemogram, biochemical, metabolic and hemodynamic parameters» (In Ukranian)	Institute of Neurology, Psychiatry and Narcology of Ukraine Academy of Medical Science (Kharkiv, Ukraine) TOV EDENA, Moskovskyi prospect 122,3 p.2.off.1, ,23 pages	Published
2006	Malykhin A.V and other. Dynamics of temperature indicators of active points, as a reflection of the state of the thrombin-plasmin system and its role in the regulation of nucleic exchange of homeostasis	Bulletin of psychotherapy and psychopharmacotherapy, №1-2 (9-10), p.142-145, 2006	Published
2007	Malykhin A.V Vegetative paroxysmal conditions and thermoregulation of the body	Monograph, pages 419	Published
2009	С.С. Кривенко, О.В. Крылова, А.А. Пулавский Application of near infrared spectroscopy for quantitative analysis of blood elements. Применение спектроскопии ближнего инфракрасного диапазона для количественного анализа форменных элементов крови	Применение лазеров в медицине и биологии Материалы XXXI Международной научно-практической конференции (Харьков 20-23 мая 2009) Лазер и здоровье, 2009 с.138-140 УДК 615.837(063)	Published (5)
2010	Nechipurenko O.N., Tondiy L.D., Malykhin A.V., Pulavskiy A.A. Features of electrolyte exchange for children suffering different clinical forms of Bronchitis.	*Tavricheskiy Mediko-biologicheskiy Vestnik* [Tavricheskiy Biomedical bulletin], 2010, Vol. 13, i. 4(52), pp.118-122	Published
2012	Malykhin A.V. Thermoregulation of organism as a basic of the Methods of Non-Invasive Hemogram Analyzes “AMP”.	*International Seminar, February 23-24, 2012, Mexico*	Published
2012	Kryvenko S.S., Pulavskyi A.A. The thermospectroscopic noninvasive glucometer	The Eighth Winter Symposium on Chemometrics	Published (3)
2013	Ian Stoy, A. Pugachev, I. Pugacheva Preliminary results of the research of the effectiveness of the drug DINO96 in clinical practice. (The efficiency of the drug DINO96 as an independent biomarker and pharmacological test for non-invasive (**AMP**) diagnostics.)	https://pdfs.semanticscholar.org/1572/2735859f2d06feb1eb72b3c543eafe277c48.pdf	Published (18)
2013	Malykhi A.V. , Malykhina N.A., Vasilyeva O.O. Acetaldehyde and endogenous alcohol in pathogenetic mechanism of formation of Parkinson’s Diseases.	Of the Twentieth International Congress “Parkinson’s Disease and Related Disorders” (8–11 December 2013, Geneva, Switzerland, page. 7-8)	Published
2013	Malykhi A.V. Pugachov A.T. Pulavskyi A.A. Reasons of mistakes in laboratory medicine. Methodic guidelines.	Kharkiv 172p., 2013	Published
2013	Malykhin A., Malykhina N, Pulavskyi A Glomus caroticus, environment, time parameters of cardiac and pathogenic mechanisms of formation of somatogenic depression and mixed encephalopathies on the methodological grounds of non-invasive hemogram analyzer.	Cardiometry (open access journal), 2013. pp. 86-101.	Published (9)
2013	Krivenko S., Pulavskiy A. Accuracy improvement of noninvasive determination of glucose concentration in human blood	IEEE 12-th International Conference THE EXPERIENCE OF DESIGNING AND APPLICATION OF CAD SYSTEMS IN MICROELECTRONICS	Published (1)

2013	Krivenko ss and Pulavskyi AA The new method for noninvasive measuring of glucose in human whole blood	Academia Journal of Scientific Research (AJSR) 1(4): 069-081.	Published (2)
2013	Anatolii Malykhin, Nataliia Malykhina, Anatolii Pulavskyi Pathogenic Mechanisms of Formation of Mixed Encephalopathies on the Methodological Grounds of Non-Invasive Hemogram Analyzer	The collection of abstracts of the 12th International Conference on the Experience of Designing and Application of CAD Systems in Microelectronics (CADSM 2013) Lviv, Ukraine 19 – 23 February 2013 page 243 IEEE Catalog Number: CFP13508-POD ISBN: 978-1-4673-6461-4	Published (10)
2014	Krivenko S., Pulavskyi A., Correlation of Heart Rate Variability Parameters and Glucose Concentration in Human Blood	IEEE International Conference on "Modern Problems of Radio Engineering, Telecommunications and Computer Science" (TCSET'2014) Proceedings of TCSET. Lviv-Slavske, Ukraine, 2014, pp. 702-704.	Published (7)
2015	Malykhin A.V., Vasylieva O.O., Posokhov M.F., Ischenko O.S., Pulavskyi A.A., Krivenko S.S. Effect of phototherapy on pathogenetic mechanisms of the neurotrophic factor in the process of formation of depression in patients with alcohol dependence syndrome. (In Russian)	Materials of the XLIII International scientific-practical conference "*Primeneniye lazerov v meditcine i biologii*" [Lasers' application in medicine and biology], 2015, Kharkiv, pp. 35-39	Published
2015	Anatolii A. Pulavskyi, Sergey S. Krivenko, Stanislaw A. Krivenko Noninvasive evaluation of glucose concentration in the human blood based on electrocardiograms	IEEE 35th International Conference on ELECTRONICS AND NANOTECHNOLOGY ELNANO-2015, Kiev, Ukraine, April 21-24, 2015, pp. 304-309.	Published (4)
2015	Malykhin A.V., Pugachov O.T., Pulavskyi A.A. *Istochniki oshybok v laboratornoy medicine. Metodicheskoye rukovodstvo* [Reasons of mistakes in laboratory medicine. Methodic guidelines]. (In Russian).	2d ed. KIT Publ., Kharkiv, 2015, 302p.	Published
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2018	Sergey S. Krivenko, Anatolii A. Pulavskyi, Stanislaw A. Krivenko Identification of Diabetic Patients Using the Nonlinear Analysis of Short-Term Heart Rate Time Series	2018 IEEE 38th International Conference on Electronics and Nanotechnology (ELNANO), page 249-254 978-1-5386-6382-0/18/$31.00	Published (13)
2018	Anatolii A. Pulavskyi, Sergey S. Krivenko, Liudmyla S. Kryvenko Diagnosing the Signs of Pathological States of a Human based on the Analysis of Heart Rate Variability	2018 7th Mediterranean Conference on Embedded Computing (MECO 2018), 10-14 June 2018 page 519 IEEE Catalog Number: CFP1839T-PRT ISBN 978-1-5386-5682-2	Published (12)
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Вегетативные пароксизмы состояния и терморегуляция организма
МОНОГРАФИЯ

Малыхин А.В.

стр.219

Калий. Нормальные величины: 3,4-5,3 ммоль/л.
Понижение содержания калия (гипокалиемия) наблюдается при
– недостаточном поступлении калия в организм (поражения желудочно-кишечного тракта, парентеральное введение жидкостей, не содержащих калий);
– нарушении всасывания у больных с поражением кишечника;
– лечении диуретиками;
– повышенной потере калия (поносы, рвоты, промывание желудка);
– терапии кортикостероидными гормонами;
– диабетической коме;
– болезни Иценко — Кушинга;
– полиурии;
– алкалозе.
Повышение содержания калия (гиперкалиемия) могут вызвать следующие заболевания и состояния:
– анурия или олигурия;
– острая и хроническая почечная недостаточность;
– острая и хроническая недостаточность надпочечников;
– диабет с кетоацидозом;
– диабетическая кома до начала инсулинотерапии;
– введение большого количества калия;
– ацидоз.
Кальций. Нормальные величины:
– общее содержание составляет 2,3-2,75 ммоль/л;
– ионизированный кальций— 1,05-1,3 ммоль/л.
Понижение содержания кальция вызывают:
– понижение функции паращитовидных желез;
– беременность;
– алиментарные дистрофии;
– рахит у детей;
– острый панкреатит (снижение концентрации кальция менее 1,74 ммоль/л — плохой прогностический признак);
– стеаторея при панкреатитах, закупорке желчевыводящих путей;

– почечная недостаточность;
– вливание больших количеств цитратной крови.
Повышение содержания кальция (гиперкальциемия) вызывают:
– повышение функции паращитовидных желез;
– переломы костей;
– полиартриты;
– метастазы злокачественных опухолей в кости;
– множественные миеломы;
– передозировка витамина D и кальция;
– желтухи (в большей мере механическая);
– саркоидоз Бенье — Бека — Шауманна.
Магний. Нормальные величины: 0,7-1,2 ммоль/л.
Понижение содержания магния чаще всего сочетается с гипокалиемией и вследствие тех же причин. В связи с этим магний включен в ряд лекарственных препаратов солей калия (панангин, аспаркам).
Повышение содержания магния также сочетается с повышением концентрации калия и наблюдается в тех же случаях, что и гиперкалиемия: при распаде тканей, инфекциях, уремии, диабетическом ацидозе, тиреотоксикозе, хроническом алкоголизме.

Натрий. Нормальные величины: 130-156 ммоль/л.
Натрий является основным внеклеточным элементом клеток, влияет на распределение воды в организме. Изменение содержания натрия приводит к изменению объема внеклеточной жидкости, влияя на кровообращение, функцию почек и нервной системы, что требует неотложных мер.
Понижение содержания натрия вызывают:
– недостаточное поступление натрия (при бессолевой диете);
– большие потери натрия при физической работе, в условиях жаркого климата (с потом);
– потери натрия с рвотой, диарея;
– парентеральное введение жидкостей, бедных электролитами;
– депонирование натрия в полостях организма (плевральный выпот, асцит);
– острая и хроническая недостаточность надпочечников (снижение содержания альдостерона).
Повышение содержания натрия может быть при олигурии, ограничении поступления жидкости в организм, гиперальдостеронизме.

Хлориды. Нормальные величины: 96—109 ммоль/л.
Потеря хлоридов ведет к развитию алкалоза, избыток — к ацидозу. Хлориды (преимущественно хлорид натрия) регулируют осмотическое давление жидких сред организма.
Понижение содержания хлоридов (гипохлоремия) вызывают:
– повышенное выделение хлоридов из организма (работа в горячих цехах, в жарком климате, при лихорадочных состояниях — выделение с потом);
– диарея, частые рвоты;
– респираторный и метаболический ацидоз;
– частые зондирования, непроходимость кишечника;

– недостаточность функции надпочечников.
– Повышение содержания хлоридов имеет место при:
– почечной недостаточности;
– гиперпаратиреозе;
– дегидратации.

Активность **АЛТ** повышается при заболеваниях печени, особенно при инфекционном гепатите (в инкубационном периоде). Активность АсАТ в 2-20 раз повышается при инфаркте миокарда, и этот показатель имеет прогностическое значение: если на 4-й день болезни активность АсАТ не снижается, то это плохой прогностический признак. При стенокардии активность АсАТ не изменяется. При инфаркте миокарда может быть одновременное повышение активности АлАТ. Диагностически ценным является определение активности АлАТ и АсАТ одновременно и расчет коэффициента де Ритиса — АсАТ/АлАТ. В норме этот коэффициент равен 1,3. При инфекционном гепатите он ниже, при инфаркте миокарда выше.

Амилаза. Амилаза крови (*а*-амилаза, К.Ф.3.2.1.1) катализирует гидролиз гликозидных связей крахмала, гликогена. Секретируется поджелудочной и слюнными железами.
Нормальные величины: 3,3-8,9 мг/(с·л).
Повышение активности наблюдается при:
– остром панкреатите;
– раке поджелудочной железы;
– вирусном гепатите;
– поражении слюнных желез (эпидемический паротит);
– почечной недостаточности;
– приеме кортикостероидных препаратов, салицилатов, тетрациклина.
Снижение активности имеет место при:
– гепатитах;
– недостаточной функции поджелудочной железы;
– при токсикозе беременных.

Щелочная фосфатаза (ЩФ, фосфомоноэстераза I, К.Ф.3.1.3.1). Оптимум pH 8,6-10,1. Богаты ферментом печень, костная ткань, кишечник, плацента. Различают 5 тканевоспецифических изоферментов ЩФ: плацентарньй, костный, печеночный, кишечный, почечный.
Нормальные величины: 278-830 нмоль/(с·л).
Повышение активности наблюдается при:
– заболеваниях костей, связанных с увеличением количества остеобластов;
– злокачественных опухолях, поражающих кости;
– гиперпаратиреозе;
– остеомаляции;
– при заболеваниях печени и желчных путей.