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INDICATORS OF CLINICAL-INSTRUMENTAL AND HEMOSTATIC DATA IN PATIENTS WITH BRAIN DISTURBANCES ON THE BACKGROUND OF TYPE 2 DM

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Abstract: Along with coronary artery disease, cerebrovascular diseases are among the serious causes of death in people with a comorbid background in the form of diabetes mellitus (1, 3). In modern literature, a large amount of data has been accumulated, where the presence of diabetes mellitus is associated with the risk of developing acute and chronic cerebrovascular accident and, as a consequence, disorders associated with cognitive changes.

Keywords: comorbid, insulin therapy, diabetes mellitus, glycated hemoglobin, greater risk of dementia.

Individuals receiving insulin therapy have a 20 % greater risk of dementia (5, 7). Evaluation of the relationship between diabetes mellitus, depending on the type, presence of glycated hemoglobin, age and duration of the disease with the nature of the brain catastrophe, is a topical issue of modern neurology (4, 6). An analysis of the literature data showed that a large number of works are devoted to acute strokes. Chronic disorders of cerebral changes in diabetes mellitus are mainly reflected as a factor in the progression of cerebral microangiopathy or in combination with arterial hypertension (2, 3, 7). The question of clinical and neurological signs of CNMC under the influence of DM remains open and debatable.

The study of the structure of the substance of the brain with the implementation of modern diagnostic methods, with the correlation of blood glucose indicators, with the establishment of prognostic matrices, is an urgent task. In this regard, the **purpose of the work:** To study the relationship between parameters of changes in carbohydrate metabolism and chronic cerebrovascular accident in patients with type 2 diabetes mellitus.

Material and research methods. The object of the survey was patients aged 50 to 80 years who are on outpatient and inpatient treatment in the multidisciplinary clinic of the Samara State Medical University for the period 2021-2022. in the Department of Neurology and Therapy. Inclusion criteria were primarily voluntary written consent to participate in the study. The total number of selected patients consisted of 67 patients with chronic signs of cerebrovascular disease, according to the type and increasing degree of dyscirculatory encephalopathy. The exclusion criteria are cardiovascular insufficiency (acute heart attack, angina pectoris); mental instability in history. Taking into account the goal and to complete the task, the

patients were divided into groups, where more than half had type 2 diabetes mellitus , which made up the first group of 37 people, the second group - patients with no signs of carbohydrate metabolism disorders (even in episodes) - 30 patients. The average age was 64.3 years, men accounted for 44.5%, women 55.5%, respectively. The groups were identical in age and gender. At the time of the study, patients with elevated glycemic levels remained on antidiabetic therapy as part of early appointments prior to hospitalization. All patients underwent ultrasound duplex scanning of the bronchocephalic arteries, MRI of the brain. Evaluation of cognitive functions on psychoneurological scales. Laboratory indicators of a standard nature in addition to glycated hemoglobin, coagulogram indicators .

Research result. The underlying factor in patients with CNMC on the background of type 2 diabetes was marked by the value of glycemia on the skin , the average value was estimated in the range of 8 mmol / l, and the level of glycated hemoglobin (HbA 1) averaged 7.9 ± 1.8%. In addition to the standard parameter, the level of lipid metabolism was determined in patients. Thus, lipid metabolism (HDL) indices in the examined groups, in patients in the first group, where CNMK has a background of type 2 diabetes, the HDL index with the second subgroup did not reach significant differences, however, in patients of the second group, slightly lower values of 1.5 mmol / l and 1.9 mmol /l, respectively ($p<0.001$). The anamnestic data of patients made it possible to assess the effect of the duration of type 2 diabetes disease on the course of clinical and neurological changes. The duration of the disease was in the range of 5-10 years. Newly diagnosed type 2 diabetes (with 1-2 episodes of increased blood sugar earlier) was noted in 31.1% of the examined patients, in other cases, patients were registered with an endocrinologist and received hypoglycemic therapy. The classical analysis of changes in the state of the blood is included in the mandatory paragraph of the examination of patients hospitalized in a therapeutic profile. Accordingly, the parameters of hemostasis on the basis of detailed blood biochemistry (blood coagulogram) showed changes in both groups (Table 1).

Table 1

Indicators of blood biochemistry in the examined groups (selection of all indicators)

Options	I (n= 37)	II group (n= 30)	R
Hematocrit, %	38%	38%	0.9
D - demir , ng / ml	288 ng /ml	230 ng /ml	0.01
Fibrinogen, g/l	3.9 g/l	4.3 g/l	0.2
Plasminogen , %	65%	78%	0.002

As can be seen from the table, fibrinogen parameters remained practically unchanged between the groups. At the same time, platelet aggregation between patients with CNMC with type 2 diabetes and without, showed a difference, higher in the first group. The level of D - demir was noted quite prominent among the indicators , where in patients of the first group (CNMC with type 2 diabetes) the level of patients of the second group (CNMC without type 2 diabetes) is higher.

The nature of clinical and neurological changes in the examined patients revealed damage from the central nervous system and had a multiprofile most common as a vestibulo - atactic syndrome. Changes in the frequency of occurrence of changes in motor and sensory disorders; speech and visual indicators were noted according to the severity of changes. In accordance with the above diagnostic methods, the analysis of the level of cognitive and psycho-emotional indicators is considered significant in the diagnosis of chronic brain damage (Table 2).

table 2

Analysis of disorders in the cognitive sphere and psycho-emotional state of the examined according to scales (questionnaires)

Options	I (n= 37)	II group (n= 30)
Scales		
MOCA (score)	23.7 points	25.9 points
HADS (score)		
Anxiety	7 points	6.8 points
Depression	7.7 points	6.2 points

where $p < 0.05$

As can be seen from the table, more significant changes for the worse were observed in patients with CNMC who have diabetes mellitus. Cognitive shifts are much lower in group 1. The level of indicators for HADS (anxious and depressive state) is relatively identical in the study groups. Without stopping there, it was necessary to study cognitive dysfunction, by solving primary data, in more detail and in detail in terms of the level of flexibility of thinking and memory using traditional tests. So, according to the “drawing clock” test, in group 1 , the average score was 8 points, in group 2, 9 points ($p < 0.001$), the “frontal dysfunction battery” test revealed almost the same difference between groups, in group 1, 16 points, in 2 17.2 points ($p < 0.001$). Assessing the result, in patients with CNMC with type 2 diabetes, memory changes and memory failure were revealed, which indicates changes in the structure of the hippocampus . To confirm these assumptions, the patients underwent neuroimaging examination (MRI study). Both groups were characterized by a change in the structure of the brain. Subatrophy of the white matter of the brain, leukomalacia , dilatation of the lateral ventricles, punctate signs of calcification , which corresponded to indicators of encephalopathy of vascular origin. The difference, in a comparative aspect, is a more pronounced expansion of cerebrospinal fluid spaces in group 1, in relation to group 2. So in group 1 , the severity of the expansion of the lateral ventricles in 35% of cases on average, in group 2 in 19%, where $p < 0.005$. No less important and indicative were the changes in the performance of ultrasound duplex scanning of bronchiocephalic vessels (Table 3).

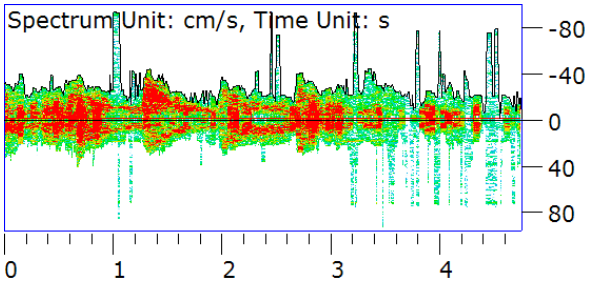
Table 3

Comparative aspect of lesions of bronchiocephalic vessels in the examined groups on ultrasound

Options	I (n= 37)	II group (n= 30)
ICA stenosis ≥50%	25%	20.1%
Atherosclerosis unilateral ICA	15.9%	23.2%
Bilateral ICA (defeat)	thirty%	43%

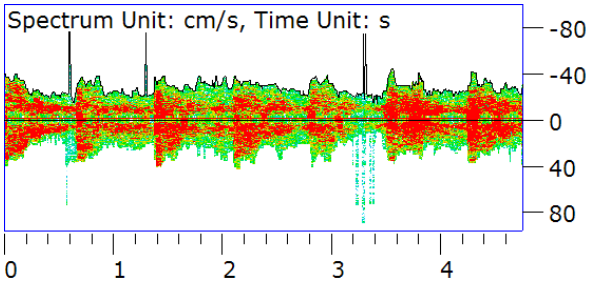
Evidence for the frequency of stenosis ≥ 50% was found in patients with CNMC with type 2 diabetes, compared with group 2 without diabetes (Fig. 1, 2). As for the process of connection with atherosclerosis, as can be seen from the table, in both groups there is a change from two sides. However, in patients of the 1st group, when collecting an anamnesis, with a longer course of type 2 diabetes, atherosclerotic changes in the bronchiocephalic vessels increase in duration of the comorbid background (the presence of a stable long-term process of carbohydrate disturbance).

L ACA 45 mm -



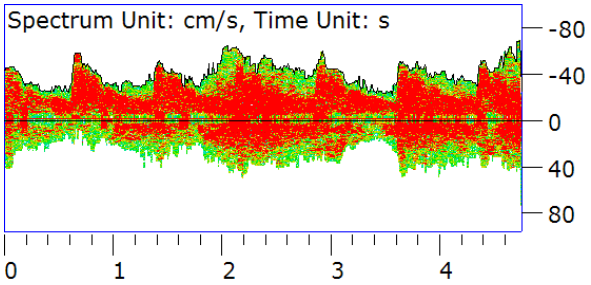
Mean: 32,1 Peak: 66,3 SBI: 0,47
PI: 1,46 Dias: 15,0 STI: 0,42
RI: 0,70 S/D: 5,10

L ACA 45 mm -



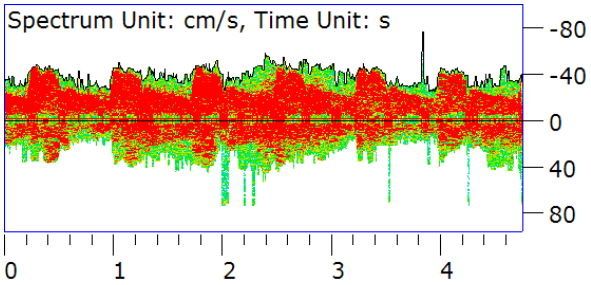
Mean: 35,6 Peak: 75,2 SBI: 0,53
PI: 1,67 Dias: 15,8 STI: 0,47
RI: 0,79 S/D: 4,78

L ACA 45 mm -



Mean: 37,4 Peak: 57,9 SBI: 0,35
PI: 0,84 Dias: 27,2 STI: 0,32
RI: 0,53 S/D: 2,20

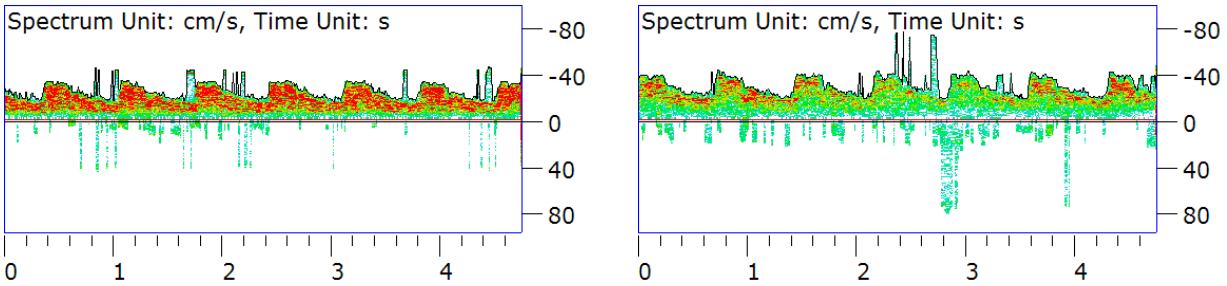
R ACA 45 mm -



Mean: 34,5 Peak: 50,9 SBI: 0,32
PI: 0,71 Dias: 26,2 STI: 0,29
RI: 0,48 S/D: 1,94

L VA 60 mm -

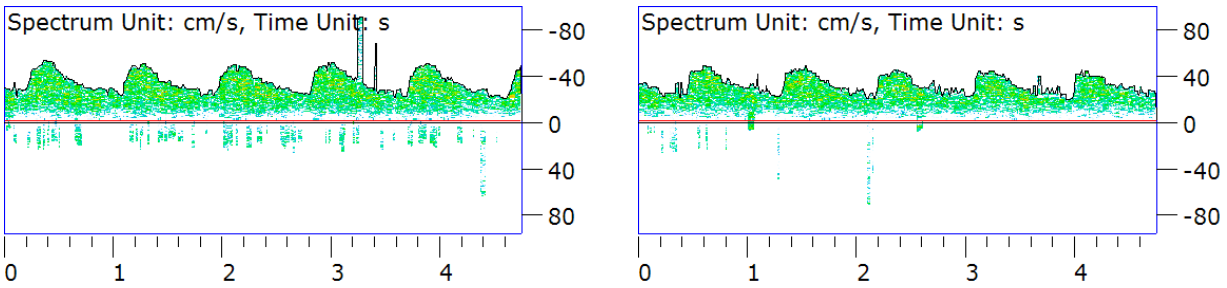
R VA 60 mm -



Mean: 24,9	Peak: 41,4	SBI: 0,39	Mean: 27,1	Peak: 41,1	SBI: 0,34
PI: 0,98	Dias: 16,7	STI: 0,35	PI: 0,78	Dias: 20,1	STI: 0,31
RI: 0,59	S/D: 2,47		RI: 0,51	S/D: 2,06	

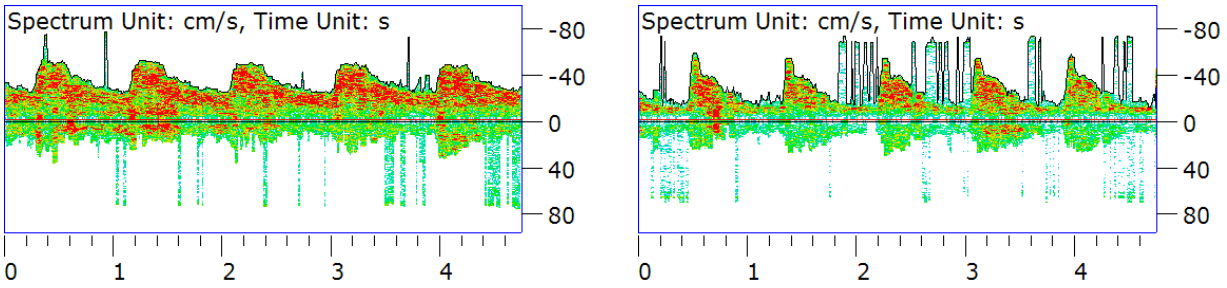
Fig . 1. Patient K. , born in 1955 Asymmetry of blood flow in the ICA. Increasing the speed parameters on the left ICA. Comparative decrease in speed parameters along the right ICA.

R ACA 67 mm - R MCA 52 mm +



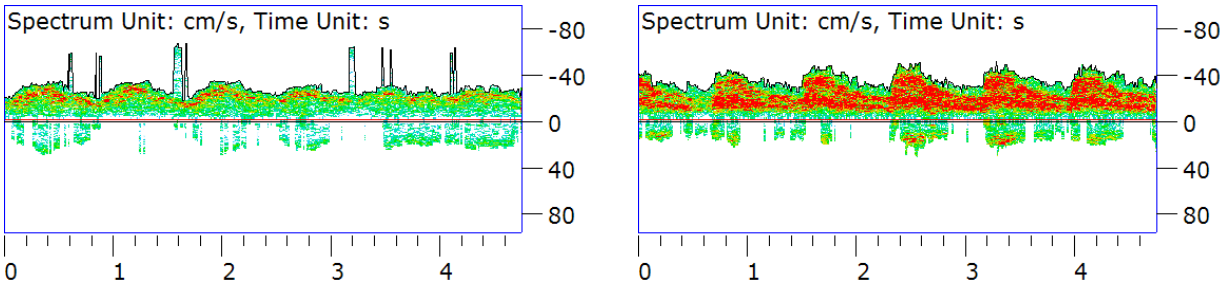
Mean: 31.8	Peak: 51.3	SBI: 0.38	Mean: 29.1	Peak: 46.1	SBI: 0.37
PI: 0.92	Dias: 22.0	STI: 0.34	PI: 0.87	Dias: 20.6	STI: 0.33
RI : 0.57	S/ D: 2.33		RI: 0.55	S/D: 2.24	

R ACA 51mm-L ACA45 mm-



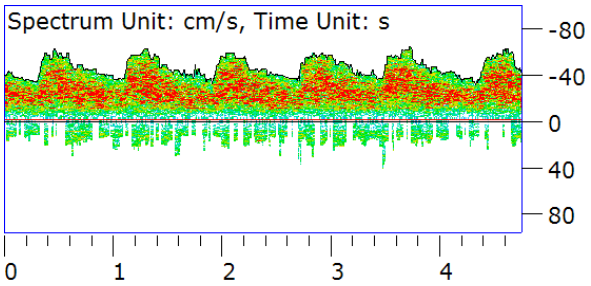
Mean: 42.2	Peak: 75.6	SBI: 0.44	Mean: 32.4	Peak: 72.5	SBI: 0.55
PI: 1.19	Dias: 25.5	STI: 0.40	PI: 1.86	Dias: 12.3	STI: 0.50
RI : 0.66	S/ D: 3.00		RI: 0.83	S/D: 5.88	

56mm -L VA60mm-



Mean: 30.6 Peak: 57.9 SBI: 0.47 Mean: 32.2 Peak: 46.9 SBI: 0.31
PI: 1.34 Dias: 17.0STI: 0.42PI: 0.68Dias: 24.8STI: 0.28
RI: 0.71 S/D: 3.41 RI: 0.47S/D: 1.89

BA 75mm-



Mean: 42.9 Peak: 60.2 SBI: 0.29
PI: 0.60 Dias: 34.3STI: 0.26
RI : 0.43 S / D : 1.76

Rice. 2. Patient M. , born in 1955 It was not possible to locate the MCA of the ACA on the left. Increasing the speed parameters for SMA PMA and PA on the right . Hypertonicity of the arterial bed.

Thus, the above examination indicators revealed all signs of chronic disorders of brain structures, namely vascular genesis in both groups, however, in patients with diabetes mellitus, especially those with this pathology for a long time, the signs of encephalopathy are the most striking and tend to progress. Accordingly, the use of neuroprotective therapy is necessary and timely.

Cerebralysin was proposed as the drug of choice in this study , as the variant most confirmed by randomized trials and having an effective neurotrophic property, as a stimulation of the brain repair process. Cerebralysin was administered intravenously , 10 ml per saline solution (100 ml) for 10 days, once a day. To do this, from each group (1 and 2), patients were selected in equal proportions, identical in

age and gender difference. Thus , 18 patients were taken from group 1 , who were administered Cerebralysin in an additional regimen , the remaining patients remained on traditional treatment. In the second group of 30 people, 14 received cerebralysin . A re-examination in dynamics was carried out after 1 month (from the moment of discharge from the hospital), which included a clinical and neurological examination, scales (questionnaires, tests) for cognitive and psycho-emotional state. The effective action of cerebrolysin is based on several key mechanisms: improved glucose utilization, increased ATP energy synthesis; the plasticity of the central nervous system improves (using RNA synthesis), synaptic transmission to the central nervous system is activated; powerful antioxidant and antihypoxic action. Positive dynamics was also manifested in the field of clinical and neurological parameters, and in terms of testing indicators in subgroups who received cerebralysin as an additional treatment . In the 1st group of patients with CNMC with a background of diabetes mellitus, in the 1a subgroup treated with Cerebralysin , MoCA indicators increased in points to 26.2 ; and in the 1b subgroup remained within 24 points on average. In the 2nd group of patients with CNMK without diabetes mellitus, also, 2a-receiving cerebralysin MoCA score was 29 points. According to the results of neuropsychological testing of a person studying the sphere of psycho-emotional state according to HADS , depression decreased by an average of 12 points in subgroup 1a in 50%, and by 3 points in subgroup 1b in 18%, anxiety in the same subgroups skillfully decreased more in 1a subgroup by 10 points in 29%, in subgroup 1b in 16% of patients by 5 points. The level of depression in the group of patients with CNMC without type 2 diabetes decreased on average by 11 points in the 2a subgroup in 33%; in the 2b subgroup by 3 points in 10% of patients, that is, a significant difference is visible compared to group 1. The level of anxiety on average decreased by 11 points in the 2a subgroup in 29.5%; in the 2b subgroup by 5 points, only in 3% of cases. The battery of frontal dysfunction and the clock drawing test, according to the scoring system in the four subgroups, had an identical change. In the first case , in 1a-subgroup 17.8 points after treatment with cerebralysin , in 1b it remained practically at the same level after standard treatment. In the 2a-subgroup in patients with CNMC without type 2 diabetes against the background of cerebralysin , the score was estimated as after effective therapy, it averaged within 18.2 points; compared with the 2b subgroup, where the numbers remained within 16.9 points. In the second case, initially the indicators between the groups were not sharply contrasting, respectively, an increase in the score by 1 or 1.5 was not very significant.

The patients themselves, by feeling, expressed the opinion that after the received therapy of a neuroprotective nature, they felt clarity, became more active, there was an interest in the surrounding reality, there was an interest in modern gadgets. These indicators, it is quite appropriate to consider them effective, in addition, patients showed interest in improving and stabilizing their health.

Thus, the factor of instability of carbohydrate metabolism leads to chronic cerebrovascular accident, with a disease duration of more than 5 years, and not regularly controlling glucose levels; and unstable taking hypoglycemic drugs. Within the framework of this study, the need for additional replenishment of the deficiency

from the side of the central nervous system was proven to reduce the progression of the process. The drug Cerebralysin effectively reduced the level of cognitive impairment. Accordingly, the drug cerebralysin is not bypassed as an additional therapy for patients with CNMC who have a comorbid background of type 2 diabetes mellitus, and is recommended as a prevention of acute cerebral accidents.

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