



Research Article

Volume 4 Issue 1 - September 2017

DOI: 10.19080/GJARM.2017.03.555628

Glob J Add & Rehab Med

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Paroxysmal-Progredient Paranoid Schizophrenia in the Context of Entropy Neuron-Glial Networks of the Brain

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Submission: September 10, 2017; Published: September 22, 2017

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Review

In article attempt of systematization of the neurophysiological changes observed in progressive schizophrenia with new techniques - dispersion of amplitude-frequency characteristics of the alpha rhythm - with the aim of identifying common patterns of development of psychopathology, creating a natural-scientific systematization of mental illness on the basis of dimensioning neurophysiological methods.

Keywords: Paroxysmal-progressive schizophrenia; Entropy of the neuron-glial network of the brain; Dispersion of alpha-rhythm; Diagnosis of mental illness

Abbreviations: DSch: debut of paranoid schizophrenia (F20.09x ICD-10); MMR: PSchGD:Paranoid schizophrenia, growing defect(F20.014 ICD-10);PSchPD:Paranoid schizophrenia, persistent defect(F20.024 ICD-10); Mild Mental retardation(F70.x ICD-10); PD: Personality disorder (F60.x ICD-10); DAFCAR: Dispersion of Amplitude-Frequency Characteristics of the alpha rhythmEEG; NGNB: Neuron-Glial Network of the brain; HVT: Hyperventilation test; CDα1: Coefficient of Dispersion of alpha-Rhythm EEG-1(the quotient of the modal values of power of alpha rhythm to his total power in the range of 7-13 Hz); CDα2: Coefficient of Dispersion of the alpha-Rhythm EEG-2(the quotient of the power of the alpha rhythm in the range of "a modal value ±0.5 Hz" to his total power in the range of 7-13 Hz);O Mo f: Value of the Modal Frequencies in OccipitalElectrodes;F Mo f: Value of the Modal Frequencies in Frontal Electrodes; O Mo f - F Mo f : Value of the Difference of Modal Frequencies Between the Occipital and Frontal Electrodes; IIDA: Integral Index of Dispersion of the Alpha rhythm EEG(Value of the Kurtosis of the Normal Distribution CDα1 in the Occipital Electrodes); ADA: Asymmetry Distribution of the Alpha rhythm EEG (Value of the Asymmetry Distribution CDα1 in the Occipital Electrodes); IIH: Value of the Index Hypofrontality (Kurtosis of the Normal Distribution CDα1 in the Frontal Electrodes); AH: Value of the Asymmetry of CDα1 in the Frontal Electrodes; CV% - the coefficient of variation; CI: Confidence interval; c.u.: conditional unit

Introduction

According to their clinical diversity, the brightness of the psychopathological manifestations of schizophrenia, of course, is the main nosological form among other mental illnesses [1-3]. Moreover, for sure if we will be able to penetrate the mystery of the pathogenetic mechanisms of occurrence and development of schizophrenia, we get the key to the understanding of psychopathology in General, which will ensure the success of the methods of its treatment. This article like all other articles in the series [4-10] on a new method of studying NGNB - DAFCAR, is the attempt to find correlative relationships between psychopathology and experience new disruption NGNB - premature increase its entropy. Undoubtedly, this mechanism is not the only one that leads to mental disorders, but very significant. In addition, the search criteria, the extent of these violations, their topical characteristics will undoubtedly lead to quite close to the truth

notions of psychopathology. I don't think this study should detail to present the clinical scenario of various forms of schizophrenia. There is an extensive literature on the subject [1]. However, you should at least in General terms, to represent the existing views on the types of the course of the disease.

- A. Schizophrenia with continuous flow (continuous schizophrenia) is divided into malignant progressive (malignant and youth), a progressive (paranoid, delusional) and little progressive (schizophrenia with a sluggish flow).
- B. Circular type of schizophrenia (periodic, recurrent schizophrenia) is characterized by the development of affective depressive or manic phases with the presence of delusional, hallucinatory and limiting disorders. With the development of non-deployed phases picture reminds clinic or atypical affective psychosis (schizoaffective psychosis, by definition, American authors).

C. Paroxysmal-progressive type of course of schizophrenia (shift-like schizophrenia); it is characterized by characteristic and continuous, and circular schizophrenia.

Among the many forms of schizophrenia, attack-like progressive form to date is considered one of the most common. Shift-like schizophrenia combines two different types of current mental illness or pathological process in the psyche, continuous-current and passing periods. Each of the new attacks of the disease brings new positive symptoms. And this is the main difference of this form from the others in that there is an exacerbation of already existing disorders, manifested previously in history [2]. The level of positive symptoms is reduced, being replaced by a growing defect and replace it with negative symptoms. All this, ultimately, leads to a stable defect and severe dementia [3].

No doubt, most often, in practice, psychiatric hospitals have to deal with the paroxysmal-progressive paranoid schizophrenia. That's about it in the future and will be discussed in our study, for brevity, calling it a progressive schizophrenia with a growing (PSchGD) and stable defect (PSchSD). The

purpose of the study- to find patterns in the changes verified in the neurophysiological markers in paroxysmal-progressive schizophrenia, paranoid based on the measurement of the level of entropy NGNB using indexes, DAFCAR.

Materials and Methods

Performed by standard procedure of the EEG electrodes according to international system "10-20%" and the ipsilateral ear electrodes. Test with hyperventilation were carried out according to standard methods with dispersion assessment of the changes of alpha-rhythm method S. V. Rosman (2017). Settings DAFCAR was calculated by the method of S. V. Rosman (2013) using the programs Microsoft Excel and Statistica 10.0 [5]. For studies of selected young and middle-aged patients to exclude the effects of age-related changes, with minimal opportunity for comorbidity and minimize alcohol and drug factor. All patients the study was carried out during the therapy with psychotropic and sedative drugs. For comparison, take patients with psychopathology of interest from the point of view of differential diagnosis and a control group (patients, recognized experts mentally healthy). The distributions of patients according to groups are presented in table 1.

Results (Figures 1-5) (Tables 2-6).

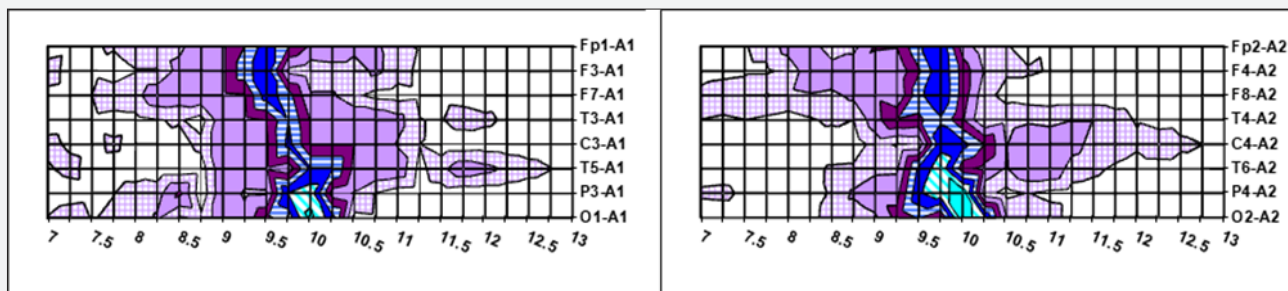


Figure 1 : Average dispersion map of the alpha rhythm in PSchGD, men. Here and below left – the left hemisphere, right- right hemisphere; on the horizontal axis is the frequency of the alpha rhythm, Hz, vertical axis – lead EEG.

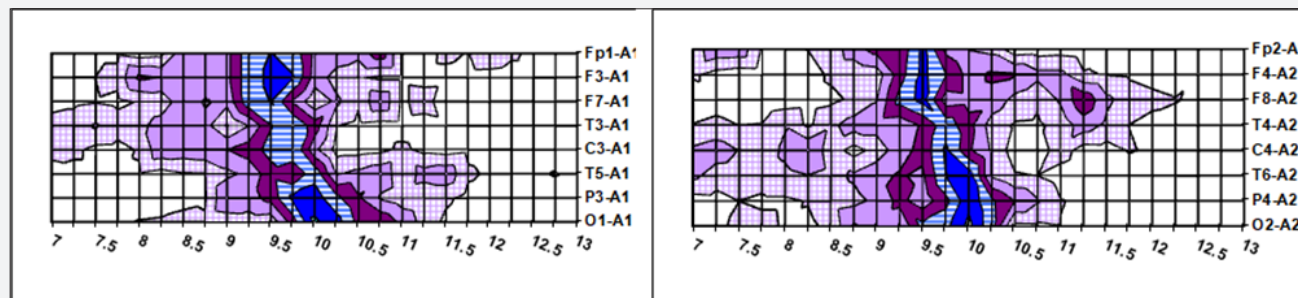


Figure 2 : Average dispersion map of the alpha rhythm in PSchGD, women.

Table 1: The distribution of patients in the comparative experiment study on DAFCAR among certain types of psychopathology.

Nosological form	women	Age	men	Age	Total
DSch (F20.09x)	23	29.0±0.9	58	27.1±1.2	81
PSchGD (F20.014)	52	38.8±1.1	54	31.3±1.3	106
PSchSD (F20.024)	48	44.7±1.2	63	37.4±1.1	111

MMR(F70.x)	45	28.6±0,8	65	27.4±1,3	110
PD(F60.x)	40	22.7±1.1	98	22.9±0,5	138
Control	15	34.1±0,5	60	21.5±0,6	74
Total	223		398		620

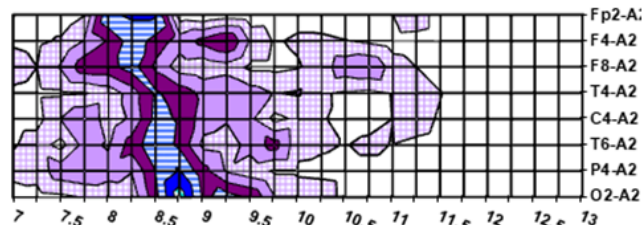
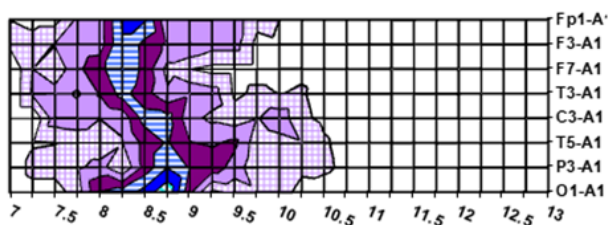


Figure 3 : Average dispersion map of the alpha rhythm in PSchSD, men.

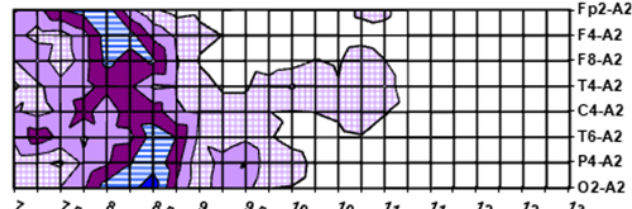
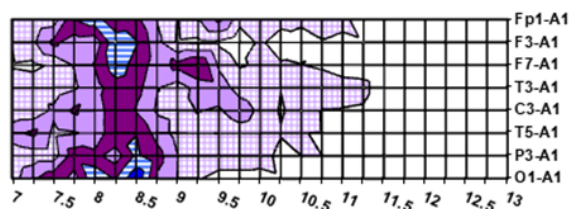


Figure 4 : Average dispersion map of the alpha rhythm in PSchSD, women.

Table 2: Comparative statistical data on indicators DAFCAR from the local population. Left hemisphere.

Gender	Index DAFCAR	Control	PD	MMR	DSch	PSchGD	PSchSD
men	O Mo f	10.26 10.11 10.4	10.05 9.91 10.19	9.45 9.32-9.57	9.9 9.71-10.1	10.03 9.9-10.16	8.23 7.98-8.49
	F Mo f	10.25 10.11-10.4	10 9.85-10.14	9.31 9.18-9.43	8.99 8.71-9.28	9.51 9.21-9.8	7.98 7.53-8.43
	O Mo f - F Mo f	0 -0.02-0.03	0.05 0.01-0.1	0.11 0.05-0.17	0.91 0.6-1.21	0.53 0.26-0.79	0.25 -0.11-0.62
	Alpha-1/Alpha	0.13	0.188	0.299	0.301	0.237	0.512
		0.118-0.142	0.162-0.213	0.253-0.345	0.27-0.331	0.207-0.266	0.469-0.554
	Alpha-2/Alpha	0.772	0.703	0.589	0.583	0.622	0.387
		0.736-0.807	0.674-0.732	0.544-0.634	0.545-0.62	0.585-0.659	0.347-0.427
	Alpha-3/Alpha	0.134	0.152	0.14	0.145	0.176	0.119
		0.09-0.178	0.123-0.181	0.106-0.173	0.123-0.167	0.147-0.205	0.099-0.138
	IZ	0.138	0.177	0.156	0.143	0.13	0.074
		0.109-0.166	0.149-0.205	0.124-0.188	0.11-0.176	0.096-0.165	0.038-0.111
	CDα1	0.288	0.237	0.212	0.169	0.187	0.166
		0.278-0.297	0.221-0.253	0.192-0.233	0.149-0.19	0.163-0.211	0.147-0.186
	CDα2	0.748	0.66	0.596	0.509	0.54	0.509
		0.731-0.765	0.634-0.686	0.556-0.636	0.468-0.55	0.493-0.587	0.469-0.549
	IIDA	7.142	5.205	4.593	3.284	3.807	3.349
		6.657-7.627	4.536-5.873	3.675-5.51	2.388-4.181	2.792-4.822	2.508-4.189
	ADA	2.704	2.29	2.101	1.746	1.87	1.78
		2.63-2.778	2.166-2.414	1.918-2.283	1.543-1.949	1.63-2.111	1.585-1.975

	CD α 1 F	0.232	0.19	0.165	0.127	0.142	0.123
		0.219-0.245	0.173-0.207	0.147-0.183	0.112-0.141	0.123-0.16	0.102-0.144
	CD α 2 F	0.621	0.529	0.486	0.389	0.434	0.406
		0.595-0.647	0.499-0.559	0.45-0.521	0.355-0.423	0.391-0.476	0.361-0.451
	IIH	6.735	4.458	3.592	1.955	3.074	2.517
		6.164-7.305	3.693-5.224	2.624-4.561	1.146-2.764	2.094-4.054	1.648-3.386
	AH	2.58	1.998	1.743	1.299	1.624	1.473
		2.481-2.679	1.825-2.171	1.519-1.966	1.091-1.507	1.381-1.866	1.248-1.697
	O Mo f	10.17	10.13	9.41	10.03	10.07	8.29
		9.82-10.52	9.88-10.37	9.26-9.56	9.69-10.37	9.91-10.22	8.01-8.56
	F Mo f	10.1	9.98	9.27	9.41	9.48	7.93
		9.76-10.44	9.75-10.21	9.11-9.44	8.89-9.94	9.14-9.82	7.55-8.3
women	O Mo f - F Mo f	0.08	0.14	0.14	0.62	0.59	0.36
		-0.04-0.19	0.05-0.24	0.05-0.24	0.15-1.09	0.29-0.88	0.06-0.66
	Alpha-1/Alpha	0.118	0.187	0.324	0.25	0.25	0.544
		0.091-0.145	0.145-0.23	0.274-0.374	0.199-0.3	0.216-0.285	0.502-0.585
	Alpha-2/Alpha	0.802	0.706	0.57	0.599	0.609	0.367
		0.751-0.852	0.656-0.755	0.521-0.62	0.537-0.662	0.574-0.645	0.332-0.402
	Alpha-3/Alpha	0.114	0.143	0.129	0.184	0.178	0.106
		0.046-0.182	0.099-0.186	0.092-0.165	0.121-0.247	0.151-0.204	0.088-0.124
	IZ	0.16	0.193	0.166	0.167	0.126	0.089
		0.094-0.227	0.155-0.231	0.132-0.201	0.106-0.229	0.089-0.163	0.053-0.124
	CD α 1	0.279	0.242	0.218	0.176	0.16	0.147
		0.243-0.314	0.213-0.272	0.19-0.246	0.142-0.21	0.141-0.179	0.128-0.166
	CD α 2	0.759	0.655	0.61	0.548	0.504	0.481
		0.715-0.803	0.608-0.703	0.562-0.657	0.481-0.614	0.463-0.544	0.443-0.519
	IIDA	6.23	5.561	4.775	3.082	2.489	2.298
		4.786-7.673	4.335-6.787	3.492-6.059	1.527-4.638	1.628-3.35	1.304-3.292
	ADA	2.578	2.308	2.114	1.756	1.611	1.559
		2.317-2.838	2.065-2.55	1.861-2.367	1.406-2.105	1.414-1.807	1.353-1.765
	CD α 1 F	0.206	0.191	0.17	0.115	0.129	0.109
		0.172-0.24	0.166-0.216	0.147-0.193	0.094-0.135	0.112-0.147	0.094-0.123
	CD α 2 F	0.595	0.541	0.485	0.38	0.414	0.399
		0.529-0.662	0.498-0.583	0.447-0.524	0.325-0.436	0.374-0.455	0.362-0.435
	IIH	5.381	4.574	3.76	1.002	1.898	1.816
		4.433-6.329	3.41-5.737	2.541-4.979	0.014-1.99	1.044-2.752	1.081-2.552
	AH	2.365	2.047	1.802	1.112	1.325	1.359
		2.173-2.557	1.802-2.293	1.554-2.05	0.811-1.412	1.111-1.54	1.153-1.564

Note: the numerator is the mean value, the denominator confidence interval $\pm 95\%$

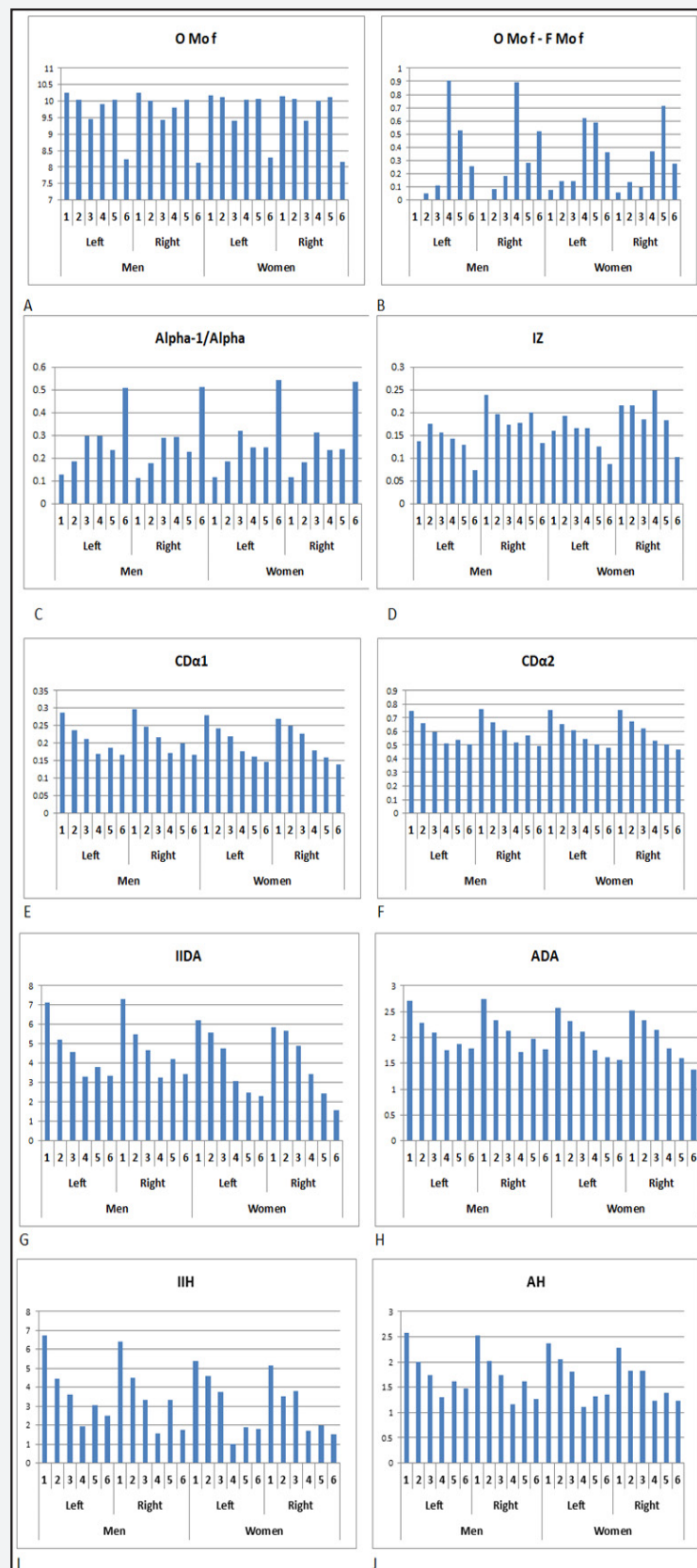


Figure 5 : Comparative analysis of indexes DAFCAR in different types of psychopathology

1 - control, 2 – PD, 3 – MMR 4 – DSch, 5 – PSchGD, 6 – PSchSD

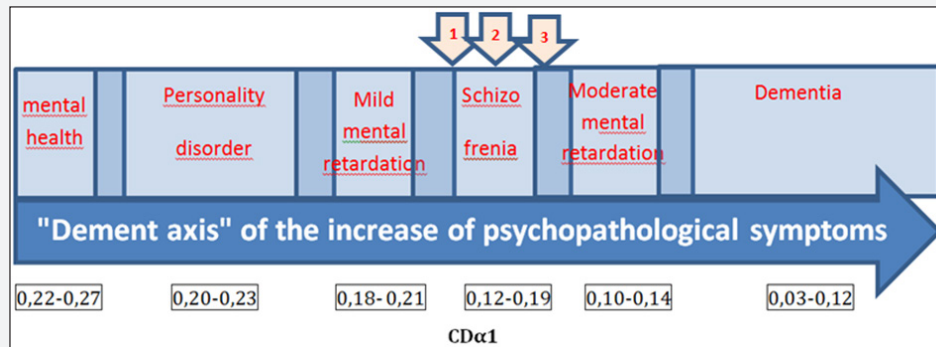


Figure 6 : “Axis ofDementia “ of the matching indexes, DAFCAR and distribution of some of the major forms of mental illness.Arrow №1, №2,№3 - positionin “Dementaxis” DSh, PSchGD and PSchSD.

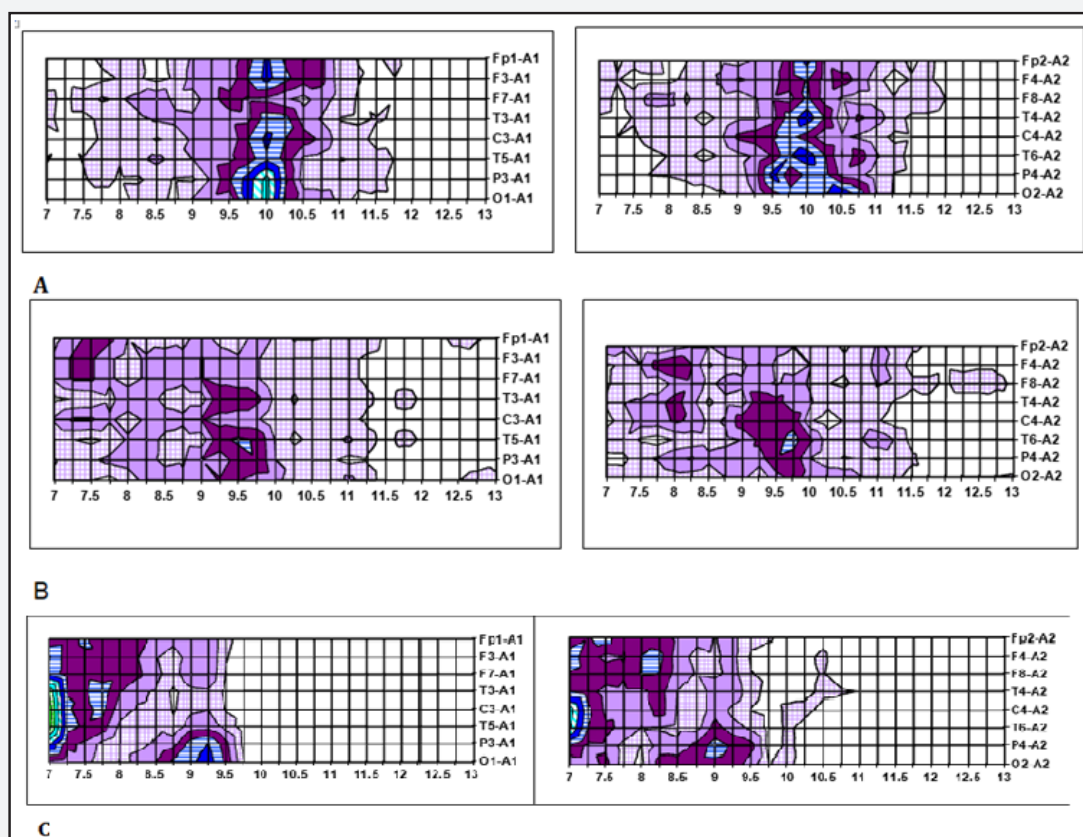


Figure 7: The dynamics of the debut of schizophrenia with the outcome in a progressive form, patient S., 39 years of age. A - Source cartogram of background EEG.; B– the result of HVT at the same time; C– recording of background EEG present(after 8 years).

Table 3: Comparative statistical data on indicators DAFCAR from the local population. Right hemisphere.

Gender	Index DAFCAR	Control	PD	MMR	DSch	PSchGD	PSchSD
men	O Mo f	10.25	10.02	9.44	9.8	10.04	8.14
		10.1-10.39	9.88-10.16	9.31-9.58	9.6-9.99	9.9-10.19	7.85-8.43
	F Mo f	10.25	9.93	9.37	8.91	9.76	7.62
		10.11-10.39	9.79-10.08	9.16-9.58	8.64-9.17	9.5-10.02	7.15-8.09
	O Mo f - F Mo f	0	0.08	0.18	0.89	0.28	0.52
		0-0	0.02-0.15	-0.11-0.47	0.58-1.2	0.05-0.52	0.12-0.92
	Alpha-1/Alpha	0.113	0.178	0.292	0.297	0.23	0.514
		0.102-0.125	0.152-0.205	0.247-0.338	0.266-0.327	0.197-0.264	0.468-0.56

	Alpha-2/Alpha	0.792	0.719	0.609	0.582	0.639	0.394
		0.756-0.829	0.689-0.749	0.562-0.655	0.543-0.622	0.6-0.678	0.349-0.438
	Alpha-3/Alpha	0.094	0.103	0.099	0.121	0.131	0.092
		0.056-0.132	0.082-0.124	0.075-0.123	0.099-0.143	0.107-0.154	0.077-0.108
	IZ	0.24	0.197	0.174	0.178	0.201	0.134
		0.217-0.263	0.169-0.225	0.142-0.205	0.14-0.215	0.165-0.237	0.102-0.167
	CDα1	0.298	0.247	0.217	0.172	0.199	0.167
		0.287-0.308	0.23-0.264	0.198-0.236	0.151-0.193	0.174-0.224	0.146-0.188
	CDα2	0.767	0.669	0.606	0.516	0.571	0.493
		0.75-0.784	0.641-0.697	0.567-0.644	0.474-0.558	0.524-0.619	0.451-0.536
	IIDA	7.325	5.502	4.682	3.254	4.209	3.427
		6.814-7.835	4.816-6.187	3.87-5.495	2.287-4.22	3.12-5.298	2.557-4.298
	ADA	2.738	2.324	2.135	1.713	1.973	1.774
		2.662-2.814	2.184-2.464	1.96-2.31	1.481-1.945	1.73-2.216	1.571-1.976
	CDα1 F	0.231	0.191	0.164	0.121	0.148	0.117
		0.218-0.244	0.174-0.208	0.146-0.182	0.107-0.135	0.125-0.17	0.098-0.136
	CDα2 F	0.623	0.535	0.48	0.377	0.437	0.398
		0.596-0.65	0.506-0.564	0.445-0.516	0.344-0.41	0.393-0.481	0.36-0.437
	IIH	6.395	4.498	3.357	1.579	3.313	1.766
		5.784-7.005	3.729-5.266	2.446-4.269	0.746-2.412	2.152-4.474	0.976-2.557
	AH	2.517	2.024	1.741	1.162	1.614	1.261
		2.404-2.631	1.858-2.191	1.533-1.948	0.937-1.387	1.324-1.904	1.043-1.479
women	O Mo f	10.25	10.02	9.44	9.8	10.04	8.14
		10.1-10.39	9.88-10.16	9.31-9.58	9.6-9.99	9.9-10.19	7.85-8.43
	F Mo f	10.25	9.93	9.37	8.91	9.76	7.62
		10.11-10.39	9.79-10.08	9.16-9.58	8.64-9.17	9.5-10.02	7.15-8.09
	O Mo f - F Mo f	0	0.08	0.18	0.89	0.28	0.52
		0-0	0.02-0.15	-0.11-0.47	0.58-1.2	0.05-0.52	0.12-0.92
	Alpha-1/Alpha	0.113	0.178	0.292	0.297	0.23	0.514
		0.102-0.125	0.152-0.205	0.247-0.338	0.266-0.327	0.197-0.264	0.468-0.56
	Alpha-2/Alpha	0.792	0.719	0.609	0.582	0.639	0.394
		0.756-0.829	0.689-0.749	0.562-0.655	0.543-0.622	0.6-0.678	0.349-0.438
	Alpha-3/Alpha	0.094	0.103	0.099	0.121	0.131	0.092
		0.056-0.132	0.082-0.124	0.075-0.123	0.099-0.143	0.107-0.154	0.077-0.108
	IZ	0.24	0.197	0.174	0.178	0.201	0.134
		0.217-0.263	0.169-0.225	0.142-0.205	0.14-0.215	0.165-0.237	0.102-0.167
	CDα1	0.298	0.247	0.217	0.172	0.199	0.167
		0.287-0.308	0.23-0.264	0.198-0.236	0.151-0.193	0.174-0.224	0.146-0.188
	CDα2	0.767	0.669	0.606	0.516	0.571	0.493
		0.75-0.784	0.641-0.697	0.567-0.644	0.474-0.558	0.524-0.619	0.451-0.536
	IIDA	7.325	5.502	4.682	3.254	4.209	3.427
		6.814-7.835	4.816-6.187	3.87-5.495	2.287-4.22	3.12-5.298	2.557-4.298
	ADA	2.738	2.324	2.135	1.713	1.973	1.774
		2.662-2.814	2.184-2.464	1.96-2.31	1.481-1.945	1.73-2.216	1.571-1.976
	CDα1 F	0.231	0.191	0.164	0.121	0.148	0.117
		0.218-0.244	0.174-0.208	0.146-0.182	0.107-0.135	0.125-0.17	0.098-0.136
	CDα2 F	0.623	0.535	0.48	0.377	0.437	0.398

		0.596-0.65	0.506-0.564	0.445-0.516	0.344-0.41	0.393-0.481	0.36-0.437
	IIH	6.395	4.498	3.357	1.579	3.313	1.766
		5.784-7.005	3.729-5.266	2.446-4.269	0.746-2.412	2.152-4.474	0.976-2.557
	AH	2.517	2.024	1.741	1.162	1.614	1.261
		2.404-2.631	1.858-2.191	1.533-1.948	0.937-1.387	1.324-1.904	1.043-1.479

Note: the numerator is the mean value, the denominator confidence interval $\pm 95\%$

Table 4: Statistically significant gender differences between the average values of the indices DAFCAR in groups of patients with progressive schizophrenia on the Student test (t-value).

Diagnostic group	Hemisphere	Index DAFCAR	Mean women	Mean men	t-value	df	p
PSchGD	Left	IIDA	2.489	3.807	-1.994	97	0.049
	Right	O Mo f - F Mo f	0.713	0.283	2.016	91	0.047
		IIDA	2.454	4.209	-2.503	91	0.014
		ADA	1.594	1.973	-2.365	91	0.020
		CD α 1	0.159	0.199	-2.549	91	0.012
		CD α 2	0.507	0.571	-2.067	91	0.042
PSchSD	Right	F Mo f	8.270	7.621	2.039	115	0.044
		IIDA	1.582	3.427	-3.197	115	0.002
		ADA	1.377	1.774	-2.820	115	0.006
		CD α 1	0.139	0.167	-2.127	115	0.036

Table 5: Statistical significance of differences between the average values of indices of dispersion DAFCAR in different groups of patients according to Student's test (t-value), women.

Compare group	Index DAFCAR	Left hemisphere					Right hemisphere				
		Mean	Mean2	t-value	df	p	Mean	Mean2	t-value	df	p
PSchGD-PSchSD	O Mo f	10.065	8.286	11.314	96	p<0.001	10.112	8.152	9.731	96	p<0.001
	CD α 1 F						0.133	0.108	2.141	96	0.035
	F Mo f	9.48	7.927	6.169	96	p<0.001	9.399	8.27	4.409	96	p<0.001
	Alpha-1/Alpha	0.25	0.544	-10.964	96	p<0.001	0.241	0.522	-9.559	96	p<0.001
	Alpha-3/Alpha	0.178	0.106	4.46	96	p<0.001	0.137	0.096	2.874	96	0.005
PSchGD-DSch	IZ						0.172	0.249	-2.277	68	0.026
PSchGD-MMR	O Mo f	10.065	9.411	5.976	93	p<0.001	10.112	9.411	6.439	90	p<0.001
	CD α 1	0.16	0.218	-3.513	93	0.001	0.159	0.226	-3.963	90	p<0.001
	CD α 2	0.504	0.61	-3.413	93	0.001	0.507	0.622	-3.587	90	p<0.001
	IIDA	2.489	4.775	-3.031	93	0.003	2.454	4.896	-3.438	90	0.001
	ADA	1.611	2.114	-3.199	93	0.002	1.594	2.148	-3.546	90	0.001
	IIH	1.898	3.76	-2.558	93	0.012	1.97	3.818	-2.365	90	0.02
	AH	1.325	1.802	-2.938	93	0.004	1.384	1.826	-2.512	90	0.014
	CD α 1 F	0.129	0.17	-2.832	93	0.006	0.133	0.175	-2.832	90	0.006
	CD α 2 F	0.414	0.485	-2.543	93	0.013	0.418	0.492	-2.445	90	0.016
	Alpha-1/Alpha	0.25	0.324	-2.463	93	0.016	0.241	0.313	-2.341	90	0.021
	Alpha-3/Alpha	0.178	0.129	2.195	93	0.031					

PSchSD-DSch	O Mo f	8.286	10.033	-7.632	69	p<0.001	8.152	10.022	-6.068	72	p<0.001
	CD α 1						0.139	0.18	-2.84	72	0.006
	IIDA						1.582	3.444	-2.538	72	0.013
	ADA						1.377	1.788	-2.297	72	0.025
	F Mo f	7.927	9.413	-4.642	69	p<0.001	8.27	9.652	-4.143	72	p<0.001
	IZ	0.089	0.167	-2.392	69	0.02	0.119	0.249	-4.001	72	0
	Alpha-1/ Alpha	0.544	0.25	8.592	69	p<0.001	0.522	0.236	7.402	72	p<0.001
	Alpha-3/ Alpha	0.106	0.184	-3.21	69	0.002	0.096	0.142	-2.036	72	0.045
PSchSD-MMR	O Mo f	8.286	9.411	-7.051	91	p<0.001	8.152	9.411	-6.107	94	p<0.001
	CD α 1	0.147	0.218	-4.328	91	p<0.001	0.139	0.226	-5.834	94	p<0.001
	CD α 2	0.481	0.61	-4.286	91	p<0.001	0.466	0.622	-4.986	94	p<0.001
	IIDA	2.298	4.775	-3.094	91	0.003	1.582	4.896	-5.246	94	0
	ADA	1.559	2.114	-3.448	91	0.001	1.377	2.148	-5.305	94	0
	IIH	1.816	3.76	-2.79	91	0.006	1.541	3.818	-3.356	94	0.001
	AH	1.359	1.802	-2.786	91	0.006	1.236	1.826	-3.624	94	0
	CD α 1 F	0.109	0.17	-4.525	91	p<0.001	0.108	0.175	-4.984	94	p<0.001
	CD α 2 F	0.399	0.485	-3.306	91	0.001	0.386	0.492	-3.904	94	0
	F Mo f	7.927	9.272	-6.484	91	p<0.001	8.27	9.289	-4.496	94	p<0.001
	IZ	0.089	0.147	-2.409	91	0.018	0.119	0.205	-3.28	94	0.001
	Alpha-1/ Alpha	0.544	0.324	6.858	91	p<0.001	0.522	0.313	5.965	94	p<0.001

Table 6: Statistical significance of differences between the average values of indices of dispersion DAFCAR in different groups of patients according to Student's test (t-value), men.

Comparison Diagnoses	Indicators	Left hemisphere					Right Hemisphere				
		Mean	Mean2	t-value	df	p	Mean	Mean2	t-value	df	p
PSchGD-PSchSD	O Mo f	8.234	10.031	-11.417	110	p<0.001	8.14	10.043	-10.226	110	p<0.001
	O Mo f - F Mo f	0.107	-0.362	2.196	110	0.03					
	F Mo f	7.98	9.505	-5.344	110	p<0.001	7.621	9.761	-7.068	110	p<0.001
	CD α 2						0.493	0.571	-2.421	110	0.017
	IIH						1.766	3.313	-2.291	110	0.024
	AH						1.261	1.614	-1.991	110	0.049
	CD α 1 F						0.117	0.148	-2.048	110	0.043
	IZ	0.074	0.13	-2.182	110	0.031	0.122	0.223	-4.279	110	p<0.001
	Alpha-1/ Alpha	0.512	0.237	9.951	110	p<0.001	0.515	0.21	10.651	110	p<0.001
	Alpha-3/ Alpha	0.119	0.176	-3.397	110	0.001	0.097	0.126	-2.052	110	0.043
PSchGD-DSch	F Mo f	9.505	8.991	2.508	105	0.014	9.761	8.905	4.57	102	p<0.001
	IIH						3.313	1.579	2.5	102	0.014
	AH	1.624	1.299	2.053	105	0.043	1.614	1.162	2.516	102	0.013
	CD α 1 F						0.148	0.121	2.116	102	0.037
	CD α 2 F						0.437	0.377	2.258	102	0.026
	Alpha-1/ Alpha	0.237	0.301	-2.991	105	0.003	0.21	0.297	-3.92	102	p<0.001

PSchGD-MMR	O Mo f	10.031	9.446	6.233	112	p<0.001	10.043	9.442	5.922	109	p<0.001
	F Mo f						9.761	9.369	2.374	109	0.019
	Alpha-1/ Alpha	0.237	0.299	-2.126	112	0.036	0.21	0.292	-2.729	109	0.007
PSchSD-DSch	O Mo f	8.234	9.901	-10.199	119	p<0.001	8.14	9.797	-9.158	122	p<0.001
	F Mo f	7.98	8.991	-3.734	119	p<0.001	7.621	8.905	-4.58	122	p<0.001
	IZ	0.074	0.143	-2.764	119	0.007	0.122	0.178	-2.296	122	0.023
	Alpha-1/ Alpha	0.512	0.301	7.877	119	p<0.001	0.515	0.297	8.097	122	p<0.001
PSchSD-MMR	O Mo f	8.234	9.446	-8.515	126	p<0.001	8.14	9.442	-7.998	129	p<0.001
	F Mo f	7.98	9.308	-5.782	126	p<0.001	7.621	9.369	-6.74	129	p<0.001
	CD α 1	0.166	0.212	-3.282	126	0.001	0.167	0.217	-3.486	129	0.001
	CD α 2	0.509	0.596	-3.08	126	0.003	0.493	0.606	-3.933	129	p<0.001
	IIDA	3.349	4.593	-1.994	126	0.048	3.427	4.682	-2.104	129	0.037
	ADA	1.78	2.101	-2.396	126	0.018	1.774	2.135	-2.695	129	0.008
	IIH						1.766	3.357	-2.638	129	0.009
	AH						1.261	1.741	-3.184	129	0.002
	CD α 1 F	0.123	0.165	-3.023	126	0.003	0.117	0.164	-3.594	129	p<0.001
	CD α 2 F	0.406	0.486	-2.784	126	0.006	0.398	0.48	-3.098	129	0.002
	IZ	0.074	0.139	-2.62	126	0.01	0.122	0.191	-3.172	129	0.002
	Alpha-1/ Alpha	0.512	0.299	6.774	126	p<0.001	0.515	0.292	7.136	129	p<0.001

Discussion of the results

You should immediately notify some of the objections in respect of the data submitted.

a. All patients with progressive schizophrenia in this study over several years received enough intensive therapy, including antipsychotics, including prolonged action therefore, no question of refusal from the administration of drugs at the time of the study cannot go. If we want the "purity of the experiment", we will have to abandon it altogether. By the way, this applies to all experimenters who write in their works that the period of the study drugs were abolished - to put it mildly, not true. However, statistical processing of the obtained data shows that in the presence of a sufficiently large representative sample, the General trend of changes to the NGNB in different types of psychopathology is quite convincing, even if it was used medicines [6].

b. Indices DAFCAR with long flowing processes have a fairly large scatter of the average values in the sample. Despite this, each patient in the calculation allows them with certainty to trace the dynamics of pathological process

As in all previous articles of a cycle [6-10], estimation of variance of change begins with a study of cartograms (Figures 1-4). A common feature of maps at PSchGD and PSchSD is the presence of shift schedules to the left in the frontal leads (Fp1,Fp2,F3,F4,F7,F8) with respect to the occipital (O1, O2). As

mentioned in the article about the debut of schizophrenia this symptom is most frequent in schizophrenia and is a marker of hypofrontality, and the more the magnitude of this shift, the worse is the disease when the values of this difference of more than 1 HZ, the patients have hallucinations and delusions when PSND and PSSD this difference is less than 1 Hz and less than with DSch.

Observed the same violation of the stratification of the graph in the form of expansion of zones with low values K α 1 that shows the increase of variation of this parameter around the modal values, the violation of normality of distribution and the increase of dispersion of the alpha rhythm. With sufficient practice, such a cartogram reliably indicates the presence of an endogenous process, especially if these diagrams are symmetric in both hemispheres. However, PSchSD different from PSchGD the fact that the value of the modal frequency in the first case much lower than in the second. This is evident by the chart shift to the left not only in frontal derivations, but also in the occipital. This is not surprising, as in this case, the positive is replaced by negative symptoms, with a clear tendency for total dementia, which usually ends schizophrenic process. In future articles, we will show that the endpoint for the Dement axis is characterized by a sharp slowing of the alpha rhythm.

Analysis of changes in the index D shows that in progressive process they undergo completely natural changes within the of schizophrenia and in the framework of entropy NGNB, which reflects the "Dement axis" (Figure 5). In tables

2 & 3 the presented index values DAFCAR in the process of research in comparison with other types of psychopathology that, in our opinion, are the result of entropy NGNB. Of course, you can rate and digital values, but it seems to us a more graphical way. Figure 6 shows the same statistics but in the form of histograms. They are quite clearly seen that the indices DAFCAR gradually diminishes as the displacement of the pathological process at the Dement axis [7-10].

i. **O Mo f** - the modal frequency of the alpha rhythm (Figure 5A). A decrease in values from normal to mild mental retardation, the rise in early forms of schizophrenia, and then a sharp drop in the stability of the defect of schizophrenia. Gender differences are substantial (table 4).

ii. **O Mo f - F Mo f** - the difference between modal frequencies in the occipital and frontal leads (Figure 5B). Natural increases in the debut of schizophrenia, reaching almost 1 Hz, reduced to PSchGD(perhaps as a result of treatment); the drop in its values when already PSchSD is associated with an increase in negative clinics and a sharp decrease O f Mo

iii. **Alpha-1/Alpha** - slow component of the alpha rhythm (Figure 5C) gradually increases, decreasing when PSchGD(perhaps as a result of treatment) and natural increases in PSchSD.

iv. **IZ** - index zoning (Figure 5D) the index, which is undeservedly little attention is given in the study of EEG, probably due to lack of verification. In this study it was calculated using our own unique methodology. It rises up from the norm for personality disorders, since PD is very often there is a "disturbing" pattern of the EEG, accompanied by "spilled" alpha rhythm. While zonal differences smoothed. Subsequently, however, the figure is falling, reaching the inverted indices in PSchSD. Negative values of DT is almost constant symptom of dementia

v. **CD α 1 and Cd α 2** - major indices of dispersion (Figures 5E & 5F) vary simultaneously due to the fact that one index is derived from the other. A natural decline in a row from normal to PSchSD

vi. **IIDA** - index the kurtosis of a normal distribution CD α 1, flattening it on the chart when the decline (Figure 5G). On the chart it takes the form of violations of the stratification of the graph, the extension of the individual zones of representation of the frequency of the alpha rhythm until the complete disappearance of these zones. In a number of psychopathology - the regular decrease of this indicator; for men in left hemisphere values are somewhat higher than in women

vii. **ADA** - asymmetry normal distribution (Figure 5H). Decreases in the number of "Dement axis", which indicates

the increase of the zone of representation of the low-frequency part of the spectrum of the alpha rhythm

viii. **IIH, AH** - indexes similar to IIDA and ADA (Figures 5I & 5J), but in the frontal derivations; basic indicators of the severity of functional hypofrontality. Undergo the same changes that IIDA and ADA, but their values are lower than in the occipital leads. We should not forget that the phenomenon of hypofrontality can be expressed in the following forms:

a. The material of unimodal displacement **O Mo f** in the frontal leads (increasing the value **O f Mo - F Mo f**); IIH, AH can be almost normal - often happens at the onset of schizophrenia

b. Simple dispersion changes in the frontal leads when indicators IIH, AH and the value **O f Mo - F Mo f** almost does not change - is often observed in neurophysiological immaturity and "sluggish" or treated schizophrenia (PSchGD).

c. Combined form - a marked decrease in the values of IIH, AH with (**O Mo f - F Mo f**)>0.5. Almost always indicates changes to the NGNB characteristic of diseases of the schizoid circle.

In table 5 shows the statistical significance of differences of average values of indices according to student's criterion in various forms of psychopathology. I think that it makes no sense to compare schizophrenic with normal and personality disorder of the index values in this case vary dramatically. However, very often it is necessary to make the differential diagnosis between MMR and schizophrenia. It is clearly seen that, despite a significant decrease **O Mo f** at MMR, the dispersion changes in schizophrenia are more pronounced, especially when PSchSD.

Thus, summing up our observations, we can say that schizophrenia is a particular form of entropy neuron-glial networks of the brain in which the growth takes place unevenly in different parts of the brane with a significant disruption in frontal departments, leading to desynchronization of activity NGNB and violation of the process of afferent synthesis in the perception of afferent information. This leads to incorrect interpretations of it and of the inadequacy of the patient. In addition, the presence of brain areas with different levels of functional ability due to process variance leads to multiple interpretations of afferent information that appears hallucinatory syndrome up to the "split personality" when the dominance of the interpretation of the information moves from one center to another.

In conclusion, not to mention the value of the sluggish forms of schizophrenia their diagnosis is very stressful and contentious, sometimes turning the face of political persecution, since deviant behavior of dissidents can

always be interpreted as a manifestation of schizophrenia. Conversely, the schizophrenic can be taken for the patient's "weird". In this case, may come to the aid and the method of analysis of variance of the alpha rhythm. Unfortunately, such cases are difficult to bring in any statistics because they are often anecdotal in nature. So here is an example of the correct interpretation of schizophrenia in a particular patient.

In figure 6 we see the dynamics of changes in the dispersion diagrams in the beginning of the disease, when the hospital raised doubts in the differential diagnostic plan. Assessment of the background EEG are also not allowed to put forward a serious diagnosis, because the presence were only some of the dispersion impairments at the level of PD. Retrospectively evaluating the EEG was evaluated HVT according to the method of S. V. Rosman (2017), after which it can be clearly seen that the reaction is very endogenous, which is typical for diseases of the schizoid circle, and in such a harsh way - for sub compensated debut of schizophrenia. In Figure 7, we see the outcome of this process is currently a significant slowing of the alpha rhythm in General, a rough functional hypofrontality, from which we can conclude that the diagnosis of schizophrenia, set 8 years ago was justified.

I want to stress again that the technique DAFCAR is not intended to replace the doctor in the diagnostic process, but allows verifying the changes to the NGNB, to give confidence to clinicians that the diagnosis billed correct and substantiated by objective measurements. It should be added that often under the guise of widespread depression lie sub compensated entropy disturbances in NGNB, which often turn into real violations of the dispersion characteristic of the schizophrenic process. To reveal this fact enables the analysis of variance of the alpha rhythm with the holding of the HVT. To spend the rest of the diagnostic procedure in a simplified form, without the involvement of skilled specialists, enables the device developed in Russia - Detector "neuropsychiatric disorders" (company "Medical Computer System", Zelenograd). This device calculates all indices and builds DAFCAR dispersion maps in automatic mode when shooting standard EEG.

Conclusion

A. Schizophrenia is a progressive dementia consistent process, which is caused by entropy NGNB a special type, in which along with the growing dispersion changes throughout the brain at a faster pace, there comes a

disruption in the frontal lobes, therefore increasing the functional hypofrontality; further development of this process in the framework of a progressive, ultimately leads to the development of deep dementia.

B. Using the method of identifying DAFCAR on early diagnosis of sub-compensated change of the schizoid circle and in dynamics to track what is happening in NGNB processes, including controlling the treatment process. Analysis of variance of the maps and indexes DAFCAR allows you to open new, hitherto unknown nuances of the development of psychopathology.

C. Extensive study of the method DAFCAR will allow unifying it, to identify the boundaries of diagnostic competence and to initiate the removal of psychiatry at the rank of dimensioning Sciences.

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DOI: [10.19080/GJARM.2017.03.555628](https://doi.org/10.19080/GJARM.2017.03.555628)

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