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5 **Abstract**6 The work shows the role of the autonomic Nervous system in functioning of long-term  
7 memory, the identity of functioning of the mechanisms of long-term memory in the  
8 evolutionary adaptation of a man and dependence on psychoactive substances. It is shown  
9 that the dependences of the body on psychoactive substances are the states of progredient  
10 adaptation, that the states of dependence of the organism on psychoactive substances and on  
11 psychogenic psychoactive factors are the states of the same type.12 

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13 *Index terms*— hypermnesia, engrams of euphoria or any other psychotropic effect14 **1 I.**15 Urgency of the Issue identification and increase in the number of the organism's dependencies on various external  
16 factors of psychogenic origin makes us wonder whether they have the same biological mechanism of occurrence  
17 as the body's dependence on chemical psychoactive substances. And whether these states are states of the  
18 same type?! Purpose and objectives of the study. Hypermnesia as an integral part of the mechanism of human  
19 evolutionary adaptation. The role of the autonomic nervous system in long-term memory performance.20 It is a well-known fact that in long-term memory of a person, the effects of external factors remain longer,  
21 if they caused strong emotional reactions. Emotional memory is formed very quickly and often from the first  
22 time (unlike conditional memory). This phenomenon played an important role in the survival and evolutionary  
23 development of human. Memorizing such a psychogenic factor as a predator's attack, accompanied by pavor,  
24 allowed to avoid predators in the future. Memorizing situations accompanied by positive emotions -meeting the  
25 food needs, influence of heat contributed to seeking the influences beneficial for the body in the future.26 The leading role in the memory formation is played by the limbic system. But studying the mechanisms  
27 of long-term memory functioning reveals the instant dependence of the strength of fixation of some external  
28 influences in memory on the severity of the emotional responses accompanying those effects. This fact make us  
29 to pay attention to the role of the autonomic nervous system (ANS). Indeed, one of the main components of  
30 emotional responses are the responses of the autonomic nervous system showing as various bodily sensations:  
31 changes in the heart rhythm, increase or decrease in muscle tone, etc.32 According to a hypothesis of the Canadian scientist Hebb (1949) [1], the transition of information from  
33 short-term to long-term memory occurs due to the formation and fixation of very complicated, stable structural  
34 chemical changes at the systemic, synoptic, and cellular levels. This leads to consolidation of neurons with high  
35 synaptic conductivity and formation of memory engrams fixing the external situation and the subject's attitude  
36 to it. When speaking about the regulation of synaptic efficiency, attention is paid primarily to the systems  
37 of biologically active substances serving as intermediate agents in synaptic transmission, to factors providing  
38 modulation of the efficiency of synaptic transmission and the long-term preservation of these shifts in the neural  
39 networks.40 So, Kendel (1986) [1], Kruglikov (1986) [1], E. G. Gromova (1980) [1] in their studies have established  
41 that acetylcholine affects the synthesis of new receptor molecules or the unmasking and activation of already  
42 existing receptor proteins, the sensitivity of cortical neurons increasing up to recording the trace in the memory.  
43 Noradrenergic mechanisms of the brain provide the creation and temporary preservation of multineuronal  
44 constellations -engrams, the serotonergic system accelerates the learning process, facilitates fixation of engrams,  
45 and elongates the skill retention. Long-term memory processes are affected by GABA and glutamic acid.  
46 According to G. Ungar (1977) [1], I.P. Ashmarin (1987) [1], neuropeptides together with mediators, create  
47 specific receptor mosaic sets on the postsynaptic membrane that facilitates the rapid conduction of a certain type

## 2 OBJECT AND METHODS OF INVESTIGATION: VEGETOTROPIC PROPERTIES OF PSYCHOACTIVE SUBSTANCES. PHYSIOLOGY OF PROGREDIENT ADAPTATION. MECHANISMS OF FIXATION OF THE

### EFFECTS OF PSYCHOGENIC PSYCHOACTIVE FACTORS IN LONG-TERM MEMORY

48 of excitation. Adrenocorticotrophic hormone (ACTH) and corticosteroids, endogenous opioids -endorphins and  
49 ~~MEMORY~~ have a pronounced effect on learning and memory. Thus, the "keeper" for all forms of neurological  
50 memory is the system of interneuronal interactions, and the participation of neurotransmitters, neuropeptides,  
51 information biopolymers consists in their influence on the quality of these interactions, their fixation. That is, the  
52 neurotransmitters released by the ANS in response to an external stimulus are a sort of modulators of transition  
53 and fixation of information in long-term memory.

54 Identity of the mechanisms of hypermnnesia of psycho emotional effects under the influence of psychoactive  
55 substances to the evolutionary adaptive mechanism of hypermnnesia.

56 Memory is a constantly functioning neurodynamic system. The effects of any external factor regardless its  
57 nature -psychogenic or chemical, causing positive, favorable shifts in the person's psychophysical well-being are  
58 recalled more often, and a person subconsciously seeks to re-experience the of this factor. Therefore, the engrams  
59 of positive emotions serve as stigma-attitudes resulting in the person's adjusting behavior. They serve as a  
60 starting point for the beginning of the psychic dependence of the body on the external factor that caused a  
61 positive psychophysical shift in a person. The repeated influence of an external psychoactive factor contributes  
62 to a greater psychic stigmatization of a person. It is noticed that during the influence of the psychoactive factor,  
63 the sensations caused by the influence of the accompanying stimuli without psychoactive properties are also fixed  
64 at the same time. This indicates that the overall hypermnesticity of the brain increases under the influence of  
65 the psychoactive factor. Therefore, engrams of the emotional memory of euphoria, are able in the future to be  
66 stimulated by the influence of concomitant stimuli too -the environment in which the psychoactive factor was  
67 active, etc.

68 As humanity reveals that positive (from the point of view of the consumer) emotions can be caused by the use  
69 of alcohol, opium, marijuana, tobacco, this has led not only to the increase in the habitual, regular use of these  
70 substances, but also to the awareness of the fact that it can cause dependence and affect not only the consumer  
71 of these substances, but also the society at large.

72 These substances were classified under the general name -psychoactive substances (abbreviated as PAS).

73 The development of industrial production of alcohol and the chemical industry, the increase in the number of  
74 people suffering from dependence on various psychoactive substances, considering the dependence on psychoactive  
75 substances as a disease, the need for studying and treating such dependences, all this resulted in the creation of  
76 a medical branch -narcology.

## 77 2 Object and methods of investigation: Vegetotropic properties 78 of psychoactive substances. Physiology of progredient adap- 79 tation. Mechanisms of fixation of the effects of psychogenic 80 psychoactive factors in long-term memory.

81 Almost all dependence-producing psychoactive substances turned out to have vegetotropic properties primarily,  
82 they affect VNC receptors, causing the release of neurotransmitters. As it was mentioned above, neurotrans-  
83 mitters modulate the preservation of psycho emotional responses in long-term memory after the influence of  
84 these substances. "Catalyzing" role of neurotransmitters in long-term memory functioning can be confirmed by  
85 the fact that people with different types of dependence remember their feelings of the first episode of smoking,  
86 drinking alcohol, drugs even in decades. And it turned out that the more pleasant the subjective effect under  
87 the influence of a substance is and the more pronounced vegetative responses brightening the emotions are,  
88 the stronger the fixation of these sensations in long-term memory is and the higher the rate of occurrence of  
89 dependence is. This phenomenon is designated as narcogenicity of the substance. So, psychoactive substances  
90 with high narcogenicity -opiates -cause the accelerated development of dependence. But under the influence of  
91 substances with low narcogenicity, the occurrence of dependence requires the abuse period.

92 One of the urgent issues of medicine is the explanation of the biological mechanism of increasing resistance in  
93 a PAS-dependent person.

94 No matter how accurately scientific research explain qualitative changes at the cellular, molecular level, leading  
95 to an increase in resistance in a PASdependent person -these changes are obviously to have non-damaging,  
96 adaptive nature, otherwise they wouldn't lead to the increased resistance.

97 And according to the dialectical principle of the mutual transition of qualitative changes to quantitative ones,  
98 the accumulation of these changes should lead to qualitative and quantitative changes in the system responsible for  
99 the adaptation of the body as a whole in the neuroendocrine system. A new field in the physiology of adaptation  
100 -progredient adaptation, discovered by Baytubaev D. G. and Baytubaeva M. D. 2017 [2], based on the ability  
101 of the neuroendocrine system to hypertrophy under regular PAS exposure, allowed validating PAS-dependences  
102 not as diseases, but as states of progredient adaptation.

103 After all, in the 30s of the last century, P.K. Anokhin described the phenomenon of "advanced excitation", when  
104 the neuroendocrine system, in response to an external stimulus, makes an excessive release of neurotransmitters,  
105 hormones and take a pause for self-restoration, during which the assimilationrestoration processes in the endocrine  
106 system dominate predominance of assimilation processes over the processes of dissimilation under the PAS  
107 exposure leads to the hypertrophy of endocrine system. Histological evidence is the Selje's stress study: "the

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108 adrenals bloom” -the adrenal medulla -the modified sympathetic ganglion [3] -which during a pause, recovers and  
109 avoids exhaustion. The adrenal cortical zone, producing hormones adaptation-corticosteroids, is hypertrophied.  
110 Also, another urgent issue of medicine is the validation of the physiological process resulting under the influence  
111 of increasing doses of a psychoactive substance and the response increase in body toleranc .

112 Hypertrophy of the endocrine system leads to the direct growth of the adaptive capabilities of the organism  
113 relative to the exposure dose growth, and every subsequent, potentially pathogenic, extreme dose ”is met” by  
114 the hypertrophied, hyper productive endocrine system and the dose has already sub extreme -not a pathogenic  
115 -effect. That is, on each floor of adaptation, under the influence of a new increased dose of PAS, the body  
116 primarily experiences stress with orientation and resistance phases. But later the stage of depletion does not  
117 occur, since earlier due to extra output of neurotransmitters, the endocrine system ”took pauses” during which  
118 assimilation processes dominated over dissimilation processes and hypertrophy of the endocrine system ocured.  
119 So, the endocrine system is ready again to protect the body against the larger dose of PAS. The states of  
120 regular stress and chronic stress differs in pauses. It is conceivable that stress, whatever regular it may be,  
121 without depletion phase is not a disease. Also, while under the influence of normal pathogenic factors without  
122 vegetotropic properties first some tissue is damaged, and only after that the ANS produce a protective response,  
123 PASs, in contrast, affects primarily the receptors of the ANS, due to their vegetotrophy. This results in the timely  
124 high-level protective response of the body, preventing damage. Endocrine system hypertrophy, and therefore its  
125 high adaptive sufficiency, not only prevents damage, but also eliminates the need to compensate for the adaptive  
126 capabilities of the body at the expense of some tissues, systems of the body, so the disease does not develop.  
127 ANC productivity due to compensatory, excessive release of neurotransmitters explains adrenergic tension in  
128 deprivation syndrome, too. Productivity of the sympathetic part of the ANS against the background of the  
129 gradual exhaustion of the parasympaticus (the adrenergic system is more stable in ontogenesis, too) explains -  
130 according to ”the age” of narcotism -the transformation of initial sedative effect of hypnotics, alcohol and opiates  
131 into their stimulating effect. In the final stages of PAS dependence, depletion of the adaptive capabilities of the  
132 organism (the receptors of the protective systems alarm about it) leads to a concurrent decrease in the PAS doses  
133 tolerated by the dependent person, the body being not damaged repeatedly. Any pathology in PAS dependence  
134 is an associated event.

135 Over time it has been observed, that the dependence can occur in a person under the influence of psychogenic  
136 factors too: people who committed bad sexual crimes can develop overanxiety to repeat them, the state of  
137 falling in love results in affection and attraction to the object of love. These situations, as well as in PAS  
138 dependence, are accompanied by strong emotions and vegetative responses: fear and excitement in case of crime,  
139 a feeling on top of the world in case of love, etc. They provide fixation of the effects of these psychogenic  
140 psychoactive factors (PAFs) in longterm memory. Also, like in PAS dependence, vegetative responses under  
141 the influence of psychogenic PAFs increase the overall hypermnesticity of the brain -those who commit serial  
142 sexual crimes remember in detail every crime they commit, the lovers remember their first meeting, etc. With  
143 the development of civilization, a lot of psychogenic factors capable of causing dependence emerged. These are  
144 ideological psychogenic influences -totalitarian and authoritarian regimes, cult of personality, radical religious  
145 schools and sects, modern information technologies, and so on.

### 146 **3 Results of the study and their discussion: Dependence on** 147 **chemical and psychogenic psychoactive factors for the state** 148 **of the same type.**

149 It turned out that the dependence can be caused by exposure to any psychogenic external factor, if it resulted in  
150 the subject’s strong, positive (from his/her point of view) emotions accompanied by bodily sensations. Indeed,  
151 in parties and sects with totalitarian ideology, personality cult, authoritarian regimes, under Nazism and racism  
152 -psychogenic psychoactive influences are carried out. These effects are intended to deceiving into belief about the  
153 ”selectness” of the adepts, the achievement of ”perfection” or the utopian ”bright future,” the ”outstanding”  
154 abilities of the head of the state, the ”selectness” of the nation, the race. These beliefs lead to positive  
155 psychosomatic shifts in the individual, group or community of people: inspiration, placidity, winged sentiment,  
156 thuggish behavior, elation, etc., inducing long-term memory to form and remember the engrams of euphoria  
157 corresponding to the influencing psychoactive factor. Psychogenic psychoactive factors also can have a narcogenic  
158 effect. Some factors can cause a psycho emotional ”splash” captured by long-term memory even after a single  
159 exposure, for instance, ”love at the first sight” in love mania. Meanwhile, for the dependence on psychogenic  
160 factors with low narcogenicity -totalitarian political regimes, the personality cult -a prolonged ideological people  
161 are more susceptible to various kinds of mania. People with reduced psycho emotional functionality (”emotionally  
162 greedy”) and with the torpid psycho emotional sphere (”emotionally phlegmatic”) are less susceptible to various  
163 dependences.

164 All this undoubtedly indicates that the dependences on psychogenic factors are the states of the same type as  
165 the dependences on PASs. To denote the whole variety of factors of chemical and psychogenic origin capable to  
166 cause dependence, the term ”psychoactive factors” is acceptable. The psychoactive factor (PAF) is a psychogenic  
167 or chemical factor that can cause euphoria or other psychotropic effects desirable from the point of view of

## 7 MANIOLOGY

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168 the consumer even after single exposure, and in a regular exposure they can cause psychological-psychic or  
169 psychologicalpsychophysical dependence.

### 170 4 Differentiation of the states of progredient adaptive depen- 171 dence of the body. Classification of psychoactive factors.

172 The principal difference between the state of progredient adaptation dependence and addiction consists in psychic  
173 stigmatization -the formation of stable neuronal engrams in the biological structures responsible for long-term  
174 memory, that affects further human behavior and creates a permanent psychic dependence on PAFs. But  
175 in addictions, processes occur at the psychological level, relatively stable conditional connections arise, and  
176 a relatively stable psychological dependence on the behavioral pattern arises -dependence on stereotypes of  
177 behavior, habits, ways of responding to some external psychogenic stimulus, etc. Although it is clear that in  
178 progredient adaptive dependences both on chemical and psychogenic PAFs, addictive behavior also takes place.  
179 Sometimes it is formed after the development of psychic dependence: when using heroin, at first a psychic  
180 dependence is formed, then the stereotype of the addict's behavior is formed. And in dependencies on chemical  
181 PASs with low narcogenicity -tobacco and alcohol -psychological addiction, such as imitative smoking, alcoholic  
182 traditions -is formed at first, and then, in abuse, psychic and further psychophysical dependences are formed.

183 Under the influence of psychogenic PAFs capable of exerting a mass influence, such as the cult of personality,  
184 totalitarian regimes, one part of the society may develop a psychic dependence, while the other one only develops  
185 the psychological dependence -addictive behavior.

186 It is necessary to differentiate the states of progredient adaptive dependence from the person's appetencies  
187 conditioned by endocrine diseases (i.e. bulimia -gluttony, polydipsia -unquenchable thirst) and psychic illnesses  
188 when emotions caused by delusional ideas dominate in the psychoemotional sphere of a mentally ill person.  
189 Clinical identification of mental dependence on a PAS in a dependent person is possible.

### 190 5 II. The Progression of the Hypermnesia Processes

191 Feelings of positive psychophysical shifts under the influence of the PAF are fixed in memory. Such fixation is  
192 enhanced due to the regularity of PAF influence and the quantitative increase in the force of influence. That  
193 explains the stability of dependence on drug addiction, totalitarian political and religious ideologies, etc. The  
194 expansion of the memory engrams about positive psychophysical shifts is due to the memorization of concomitant  
195 stimuli accompanying the PAF influence. That explains the existence of rituals of joint smoking, alcohol  
196 consumption. All the mentioned above indicates the formation of adaptive, super-strong, expanded memory  
197 hyperengrams.

198 In PAF dependence changes in the biological mechanisms responsible for the euphoria hypermnesia are of a  
199 physiological, adaptive nature, and the available types of treatment consist only in blockade of the adaptation  
200 mechanisms against the repeated PAF influence. In this regard, euphoria hyperengrams remain saved in long-  
201 term memory and generally are the only cause of relapse. That is why a person dependent on illegal sexual  
202 activity can commit a sexual crime after having served long prison terms. Alcohol or drug dependent people  
203 after successful treatment and prolonged remission can resume alcohol and drug use. For love mania there is the  
204 expression "to fell in love for a lifetime". Dependences on psychogenic PAFs (the cult of personality, totalitarian  
205 ideologies) persist up to the alternation of generation. The following studies are considered to be promising:  
206 studies of neurophysiological mechanisms of formation and fixation of euphoria engrams or other psychotropic  
207 effects desirable from the point of view of the consumer in the memory, development of methods of selective  
208 neutralization-"erasure from memory" of euphoria engrams (by patient's consent).

### 209 6 III.

210 Classification of Psychoactive Factors

### 211 7 Maniology

212 Narcology can only be a section of a new, broader branch of medicine that studies dependences both on chemical  
213 and psychogenic psychoactive factors. To denote a new branch, the term "maniology" is acceptable. (mania-  
214 propensity, appetency, Logos doctrine, i.e, the doctrine of propensities, appetencies).

215 Maniology is a branch of medical science that studies adapto genesis and adaptive manifestations of the  
216 progredient adaptation psychic-psychological and psychological-psychophysical dependence of an individual, a  
217 group of people and a society on various chemical and psychogenic psychoactive factors of the environment,  
218 medical, psychological, social and legal aspects of these problems, and develops methods of their prevention,  
219 treatment of deprivation syndrome and neutralization of appetency for the psychoactive factor.

220 In this regard, some definitions of various maniology sections, for example, narcology, should be changed.

221 Narcology is a section of maniology as a medical branch, which studies the adaptogenesis and adaptive  
222 manifestations of a person's progredient adaptation psychological-psychophysical dependence on various chemical  
223 psychoactive factors, the medical, psychological, social and legal aspects of these problems, and develops methods

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224 for their prevention, treatment of deprivation syndrome and neutralization of appetency for chemical psychoactive  
225 factor.

226 To develop a new branch of medicine, there is a need in formation of Maniology scientific departments in  
227 higher medical schools.

## 228 8 Recommendations

229 It is necessary to create a new branch of medicine combining the study of human dependence both on chemical  
230 and psychogenic psychoactive factors.

231 Hypermnesia of euphoria or any other desired, from the point of view of the consumer, psychotropic effect as  
232 the initial and leading link in the occurrence and maintaining the body's dependence on psychoactive factors

233 The work shows the role of the autonomic nervous system in functioning of long-term memory, the identity  
234 of functioning of the mechanisms of long-term memory in the evolutionary adaptation of a man and dependence  
235 on psychoactive substances. It is shown that the dependences of the body on psychoactive substances are the  
236 states of progreident adaptation, that the states of dependence of the body on psychoactive substances and  
237 on psychogenic psychoactive factors are the states of the same type. It is proposed to create a new branch of  
238 medicine combining study of the body's dependence both on chemical and psychogenic psychoactive factors. c)  
239 Psychogenic PAF -illegal actions capable of causing individual adaptation psychological and psychic dependence  
240 -dependence on sexual acts, b) Psychogenic PAF capable of causing a group adaptation psychological and mental  
241 dependenceof religious and other totalitarian sects.

## 242 9 VI.

classification of states of progreident adaptation of the body depending on psychoactive factors.

V.

Conclusions

1. Hypermnesia of external influences accompanied by strong emotional responses is an integral part of the evolutionary adaptive mechanism of the body.
2. The neurotransmitters released by the ANS in response to an external stimulus causing strong emotional responses are modulators of transmitting information from short-term to long-term memory.
3. The mechanism of preservation of psycho emotional sensations in long-term memory under the influence of psychoactive substances is identical to the evolutionary adaptive mechanism of hypermnesia.
- 4.

Figure 1:



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- 244 [Voronezh (ed.) ()] , Voronezh . 11.03. N.N. Burdenko VSMA (ed.) 2015.
- 245 [Pyatnitskaya] *Alcohol abuse and initial stage of alcoholism. Publisher "Medicine" Moscow, I N Pyatnitskaya .*  
246 p. .
- 247 [Batuyev ()] S Batuyev . *Higher nervous system. -Moscow: High School, 1991. p. .*
- 248 [Pyatnitskaya ()] *Clinical Drug Addiction.-Moscow: Publisher "Medicine, I N Pyatnitskaya . 1975. (Leningrad*  
249 *branch. 3-6; 22-45, 47-55; 255-256, 261 -263; 268-274)*
- 250 [Sh et al. ()] 'General pathophysiology'. A Sh , L P Zaichik , Churilov . *Publisher LLC "ELBI SPB, (St.*  
251 *Petersburg) 2005. 525 p. .*
- 252 [Korobkov et al. ()] 'Normal physiology. Chapter 2 "Physiology of adaptation'. A V Korobkov , A A Bashkirov  
253 , K T Vetchinkina . *Moscow: Publisher "High School, 1980. p. .*
- 254 [Baitubayev and Baitubayeva] *Physiology of progredient adaptation // Materials of 17th scientific and practical*  
255 *conference, D G Baitubayev , M Baitubayeva . (Actual issues of psychiatry, narcology and medical psychology)*
- 256 [Smirnov and Yakovlev] *Physiology of the central nervous system, V M Smirnov , V N Yakovlev . (Publishing*  
257 *center "Academy", 2004. -P.184-185; 250-251)*
- 258 [Kirilov ()] *Stress hypertrophy of the adrenal glands" M.Nauka, O Kirilov . 1994. 176.*