

# Research on methods of inducing lucid dreaming in the framework of "Banchenko Algorithm"

Banchenko D.Y.<sup>1\*</sup>, Burilova T.V.<sup>2</sup>, Saveliev L.V.<sup>3</sup> and Shishkin L.K.<sup>4</sup>

<sup>1</sup>Independent Research Group Advanced Scientific Research Projects & Association of Sleep Research Projects, Baikonur, Kazakhstan

<sup>2</sup>Independent Research Group Advanced Scientific Research Projects & Association of Sleep Research Projects, Nicosia, Cyprus

<sup>3</sup>Independent Research Group Advanced Scientific Research Projects & Association of Sleep Research Projects Arambol, Pernem, India

<sup>4</sup>Independent Research Group Advanced Scientific Research Projects & Association of Sleep Research Projects, Orenburg, Russian Federation

## Abstract

The present article explores *the methods of inducing lucid dreams* (REM phase) as have been developed and researched by *Denis Yurievich Banchenko* over a twenty-year period. It discusses a unique methodological algorithm developed by *Denis Yurievich Banchenko* which we argue effectively induces lucid dreaming. Called the "Banchenko Algorithm" the process was successfully tested to a group of participants who followed strictly the sequence of actions outlined in the algorithm. During our experiment we also applied certain methods and mechanisms developed by *Lev Konstantinovich Shishkin* in collaboration with Banchenko. These methods include embodied activities carried out solely by the participant's consciousness during lucid dreaming which significantly increase the subjective duration and depth of lucid dreaming, stretching in effect the subjective time of the participants while in a state of lucid dreaming.

The main research methods are induction methods based on theoretical hypotheses, as well as analysis and synthesis of scientific information in the field of lucid dreaming. Hypotheses were put forward regarding the effect of the developed method on (a) sleep depth, (b) frequency of lucid dreams, and (c) the psychosomatic state of participants. Factors influencing sleep phases and participants' behavior were taken into account to reduce the likelihood of inaccurate results. An empirical research was conducted whereupon a group of participants artificially induced lucid dreams.

Summarizing the conclusions of the empirical study, the theoretical developments as well as the positions of other specialists, our results confirm the positive effect of the *Banchenko algorithm*. The research results show that the developed method is effective when applied by people from all walks of life, across geographic locations and regardless of health conditions. It thus proves to be a useful methodology for practicing physicians working on expanding the knowledge base of lucid dreaming. Contributing to the expanding scientific research field on Lucid Dreaming, the application of the *Banchenko algorithm* enables the rapid preparation of small as well as large groups of participants with no tendency for lucid dreams, no natural special frequency of their appearance, and no special training.

## Introduction

Paradoxical sleep (PS) is characterized by EEG activation with disappearance of muscle tone and appearance of 'rapid eye movements' (REM) in contrast to 'slow wave sleep' (SWS, also known as non-REM sleep) as indicated by the presence of delta wave phase. Soon after the discovery of PS, it was demonstrated that the structures necessary and which were considered sufficient for PS occurrence were limited to the brainstem.

According to some researchers, PS is also termed Lucid Dreaming because during this phase a person is aware of their state of sleep, controls ongoing dreaming processes and remembers dream events.

Lucid dreaming is directly related to the phase of PS which can only be registered by electroencephalography (EEG). Since this study was conducted without the use of EEG, the criteria for determining the presence or absence of lucid dreaming in participants were based on the criteria of awareness described by *Brigitte Holzinger and Lucille Mayer in their research article "Lucid Dreaming Brain Network Based on Tholey's 7 Klartraum Criteria"* [1].

Namely the 7 criteria are the following,

1. Awareness of (spatial) orientation
2. Awareness of the possibility of choice

3. Awareness of (intense) concentration - (awareness of "flow" Csikszentmihalyi, *et al.* [2])
4. Awareness of self (the "I")
5. Awareness of the dream environment
6. Awareness of the meaning of the dream
7. Awareness of memory.

Lucid dreams are defined as dreams in which dreamers are aware that they are asleep as the dreams unfold. At the current stage of development in the field, specialists are recognising the need to systematise information about the processes that occur in the brain during various phases of sleep, as well as the influence of external factors on lucid dreaming. For example, Researchers note that with laboratory meth-

**\*Correspondence to:** Dr. D.Y. Banchenko, Independent Research Group Advanced Scientific Research Projects & Association of Sleep Research Projects, Baikonur, Kazakhstan, E-mail: denisbanchenko@asrp.tech

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odologies, that is when subjects participate in laboratory conditions, results vary [3]. In this regard, when individual are training in interhemispheric interaction, research addressing the effects of a diverse range of topics such as : breathing techniques, diet, self-suggestion, brain training, red light therapy, special physical exercises as well as asynchronous bio-somatic movements of different parts of the body, are of particular interest.

These methods of work were adopted as the basis for empirical research on the "Algorithm-Banchenko" and form a determining factor when drawing from the literature on Lucid Dreaming.

Breathing techniques are one of the most significant mechanisms for influencing the overall state of subjects. Within the framework of the study conducted, breathing techniques such as hyperventilation followed by subsequent deep inhalations and exhalations were used as they were successfully tested in the past [2]. As reflected in similar studies breathing techniques allow for conscious access to the autonomic (sympathetic and parasympathetic) nervous system, activate the brain layer of the adrenal glands, and contribute to the release of catecholamines [2].

In the framework of the conducted study this method can be used to activate the pineal gland and increase the production of endogenous DMT. At the same time studies have shown that rather than cholinergic and monoaminergic neurons of the brainstem, glutamatergic and GABAergic play a key role in the genesis of PS [1, 2]. Researchers have suggested that the entry into PS from REM sleep is due to the activation of PS-on glutamatergic neurons localized in the sublaterodorsal nucleus of the brainstem. Noradrenergic neurons, together with serotonergic neurons, as PS-off neurons, partially resolve PS by relieving their inhibition of cholinergic PS-on cells. Noradrenergic/serotonergic neurons, in turn, are inhibited by local GABAergic PS-stimulating neurons that can be excited by ACh. The cessation of activity of PS-off GABAergic neurons at the beginning and during PS will occur due to direct projections from mixed GABAergic PS-on neurons. Hence, neural activity is not always related to respiratory exercises, so additional techniques and methods are necessary for the purity of the experiment.

As part of the research methodology hand movements exercises were performed by the participants in order to synchronize the hemispheres and improve their connection through the corpus callosum. This was necessary because in the conscious state, the left hemisphere is responsible for conscious activity while the right is responsible for creative perception. Researchers note that the left and right hemispheres, which are responsible for different areas of human activity, influence the unconscious mind to a roughly equal extent. Synchronizing the hemispheres allows for optimizing the course of the study and obtaining more effective induction of lucid dreams by facilitating more efficient information exchange between conscious and unconscious areas.

Proper nutrition can achieve detoxification of brain areas, restoration of functions, and production of sufficient amounts of endogenous neurotransmitters and hormones [5]. An important element of the "Algorithm-Banchenko" dietary system is limiting sugar intake since sugar affects the function of the dopaminergic and opioid systems of the brain [6]. Thus during the study participants were required to follow a specific diet that involved abstaining from sugar and sugary foods altogether.

Some researchers associate endogenous N,N-dimethyltryptamine (DMT) with the processing of hallucinatory-like images and consider it a neurotransmitter [7]. One of the goals of our research was to achieve a sufficient level of DMT within the framework of the "Algorithm-Banchenko" and realize its function in the brain. The pineal gland plays an important role in the production of endogenous DMT so theobromine, spirulina, and chlorella were used to restore pineal gland function and produce sufficient amounts of endogenous DMT [8]. There is a

possible connection between the amount and frequency of consuming raw chocolate and pineal gland function, which is why a specific type of diet was chosen. However, additional research using specialized equipment and regular testing of subjects' samples is necessary to accurately determine the level of theobromine's impact on the pineal gland.

Calcification of the pineal gland is another problem that was addressed within the hypotheses put forward by 'Banchenko Algorithm'. It can negatively affect brain functions, leading to disruption in the production and function of various endogenous substances, including, for example, DMT, serotonin, and melatonin. Toxic loading caused by bacteria that absorb methylmercury is another damaging factor for metabolic processes in the brain. The consumption of spirulina and chlorella is considered beneficial as they can both neutralize methylmercury, thereby eliminating the toxic load on biological tissues [9]. It is known that spirulina and chlorella have neuroprotective effects and improve brain morphology and cognitive function [4], which determines the possibility of using elements of the choline diet, as choline is a precursor of acetylcholine, which plays an important role in processing visual images [10].

In addition, the composed diet contains a lot of raw chocolate, some studies have shown its sufficient safety [11]. The substance from raw chocolate - theobromine - can penetrate into the brain through the blood-brain barrier and [11,12]. It is known that theobromine has a positive effect on the pineal gland and can contribute to the restoration of its function.

Also, red light therapy was carried out to restore the function of the pineal gland [13]. It should be noted that only short-wave light affects the synthesis of melatonin by the pineal gland, while the production of cortisol by the adrenal glands is modulated by both short-wave and long-wave light [14].

Numerous researchers have tested the positive effect of this therapy, which facilitates the increase of melatonin and serotonin productions, improving sleep quality and affects the endocrine and autonomic systems [15].

In addition to diet and breathing exercises, participants were offered other methods of work, such as self-analysis, self-hypnosis, and brain training. These methods allowed participants to clear their minds and focus on achieving specific tasks, which were performed daily at certain intervals. This approach was used in a previous study and led to numerous positive results.

This research may have practical value in developing innovative methods and technologies aimed at improving the quality of life and health of individuals.

From the above, it can be concluded that the study was based on carefully studied techniques and methods, which allowed for effective organization of the control group's work, identification and exclusion of violators, and achievement of high-quality results. Through the use of experience from both domestic and foreign experts, it was possible to minimize errors and apply a comprehensive approach to optimizing the results.

## Materials and methodology

To achieve the set goal and implement the tasks, a number of research methods were applied, including:

1. Method of comparison and analogy: theoretical and practical aspects of studying sleep phases were considered
2. Analysis and synthesis of collected information: generalization of the obtained data and identification of the main trends and problems related to the study of sleep phases

3. Inductive methods of conducting empirical research: conducting a complex of measures with a control group during empirical research (breathing techniques, diet, self-hypnosis, brain training, red light therapy, etc.).

Based on the data obtained as a result of processing scientific literature and practices oriented towards studying sleep phases, an experiment was conducted and results were obtained which lead to the development of combined system which we term the "Algorithm-Banchenko". Various methods of working with the control group were applied which were applied parallel to observing rules of nutrition and behavior such as performing certain actions:

These include,

Breathing practices

Special hand exercises

Diet

Schedule

Keeping dream journals with a special mechanism for recording dreams (markers, mandalas, text)

Specific combined actions performed by the body throughout the day (kneeling, walking 10,000 steps forward and 10,000 steps backward, also with stones held between the fingers);

Being exposed to red light before sleep

Watching media materials together with subsequent discussion (synchronization of the group of participants within one mental space);

Visual exercises using negative images, joint work of the visual system and the brain.

The participants were also encouraged to perform certain practices in the state of *lucid dreaming*, which were supposed to be reflected in the dream journals, such as *entering a mirror*, *folding hands like a sail near the mouth and filling them with air* when blowing into the center of the sail. Each of these actions led to a subjective increase in the duration of the REM phase relative to its normal course.

The goal of the experiment was to achieve a state of stable induction and regulation of the phase of paradoxical sleep by combining various processes in the human body. One of the tasks was to identify the degree of influence of various factors on the phases of paradoxical sleep. Several hypotheses were put forward.

### Hypothesis I

According to this hypothesis, there is a connection between a person's ability to induce lucid dreams and the condition of their pineal gland, specifically its calcification, which is present in almost all people, especially those who have had contact with fluoride (water, toothpaste, etc.).

However, notes that schizophrenic patients with vivid visual hallucinations have reduced or absent calcification of the pineal gland [7]. The study shows an inverse correlation between the size of pineal gland calcification and the severity of hallucinations in schizophrenia and suggests that the size of pineal gland calcification may serve as a marker of hallucinatory behavior in the disease.

The finding that patients with schizophrenia and prominent visual hallucinations have reduced or absent pineal gland calcification (PGC) suggests that changes in melatonin secretion may have a significant impact on the pathophysiology of hallucinations. According to the hypothesis, the images that arise during lucid dreaming have a close nature to those that arise during the onset of visual hallucinations.

Thus, this experiment investigated the possibility of regulating the phase of paradoxical sleep, and Hypothesis I postulated a connection between a person's ability to induce lucid dreaming, its strength and vividness, and the condition of the pineal gland, specifically, the level of calcification.

Calcification of the pineal gland, as shown in, can be caused by the use of fluorine, and is practically present in each person [8]. The hypothesis I suggests that the level of calcification of the epiphysse can influence the ability of a person to induce conscious dreams.

### Hypothesis II

Suggests a link between endogenous dimethyltryptamine and melatonin, which affect the quality of sleep and the vividness of dreams, including inducing lucid dreaming.

The effect of red light on the production of endogenous melatonin is described in humans and in horses [13,15,16].

Endogenous dimethyltryptamine was generated using special breathing practices described in [2].

### Hypothesis III

The hypothesis suggests that practices related to vision work in combination with static and dynamic imagery can cause increased blood flow to the occipital cortex of the brain, which may lead to the activation of previously dormant groups of neurons and the intensification of the visual image in a lucid dream. This hypothesis needs further testing, but there are studies exploring the connection between post-imaging work and brain activity [10].

### Hypothesis IV

This hypothesis suggests that interhemispheric communication may influence lucid dreaming, and various exercises using fingers of both hands (such as the "finger ladder" or "finger lock") may strengthen and train this connection. Similar methods are described in the study [17]. In general, these hypotheses are aimed at identifying factors affecting the phases of paradoxical sleep and the quality of conscious dreams. However, not all of them have sufficient scientific substantiation and require additional testing.

### Hypothesis V

This hypothesis claims that the vascular pattern of blood flow in the brain during sleep and wakefulness, as well as the activity of the hemispheres, are different. From this hypothesis, the authors conclude that sleep is quickly forgotten when the vascular pattern of brain blood flow changes, but memory of dreams can be restored by squeezing and releasing the left hand (for right-handers), which causes a surge of blood to the right hemisphere.

### Hypothesis VI

This hypothesis suggests that a low-sugar diet may promote the induction of lucid dreams. The study included replacing classic sugar with alternatives such as fruits or natural honey and excluding all sugar-containing products from the participants' diets.

### Hypothesis VII

The hypothesis states that the consumption of single-celled algae, such as chlorella and spirulina, can help remove methylmercury from human tissues, including brain tissues. However, additional research is needed to confirm this effect and determine the exact mechanisms involved in this process. Some studies show that spirulina can chelate heavy metals and remove toxins from the body, including the brain.

### Hypothesis VIII

The hypothesis is that successful induction of lucid dreaming requires tuning serotonin synthesis, specifically serotonin-melatonin synthesis, achieved by being exposed to natural daylight conditions for at least two hours during the day, and then being exposed to red light [14,18].

### Hypothesis IX

The hypothesis is that regular use of the "reality checking" technique can help induce lucid dreaming. This technique involves regularly checking whether one is dreaming by performing a set of ten actions. For example, one can try to poke a finger through the hand or check the time, and then repeat this check during sleep.

### Hypothesis X

The hypothesis is that regular exposure to natural light combined with 10,000 steps forward-facing during daylight hours promotes the induction of lucid dreams, as empirically observed. A 20-year experience has shown that individuals who walked at least 10,000 steps per day had a more vivid perception of dreams and more lucid dreams than those who did not walk as much. The authors could not find direct research related to this fact. However, a study published in the "Journal of Physical Activity and Health in 2014" (examining the effect of a walking program on physical activity and health, particularly the brain of older adults with limited mobility) showed that older adults with moderate to high physical activity had better cognitive function and *higher gray matter volume in the brain* compared to those who were less physically active [19].

### Hypothesis XI

On the contrary, 10,000 steps backward. Backward walking is a special exercise in which the subject walks backwards. In this study, we hypothesize that performing a special exercise such as backward walking can not only improve the physical condition and metabolism of participants but also improve the quality of sleep by developing new, atypical connections in the brain. Scientific studies on the effect of physical exercise on sleep have shown that regular exercise promotes improved sleep quality, including reducing sleep latency, reducing nocturnal awakenings, and increasing the REM phase[20]. Thus, the methods proposed in this study may promote systemic changes in the body and significantly increase the duration of lucid dreaming in participants [21-28].

### Hypothesis XII

The final hypothesis states that regular systematic performance of actions described in all hypotheses form a certain algorithm named after its author "Algorithm-Banchenko", which leads to the induction of lucid dreams with a very high degree of probability. Conducted research and work with control and experimental groups over several months enable us to assert that each method contributes to systemic changes in the body and the cumulative effect is a significant increase in the frequency of *lucid dream* inductions in the presented sample of subjects. The data were mainly analyzed using nonparametric methods due to asymmetric distributions and outliers.

All experimental procedures complied with human research standards. All subjects gave consent for the processing of their data and publication of the experiment results.

### Results of the empirical study of the control group

For the study, a group of 18 volunteers (6 men and 12 women) of different ages (ranging from 20 to 60), professions, residing in different continents, climatic zones, countries, and time zones (Table 1) was formed.

The aim of this study was to confirm *the hypothesis of the possibility of universal application of the lucid dream induction technique for people with different physiological and psychological characteristics.*

All participants were required to undergo general blood and thyroid function tests, including TSH, free T3, free T4, and provide results. Some participants did not provide the necessary data.

As a specific example, data on the tests of Mikhail Kapustin can be provided, who took all the tests before the start of the course and for the second time on the same day after the recorded experience of entering a lucid dream on December 9, 2022. At the beginning of the course, he had four indicators of the general blood test that did not correspond to the norms, and for the second time, only one, and the other indicators stabilized. Based on the obtained data, it can be concluded that the technique of developing the REM phase has the potential to strengthen mental and physical health, although additional research is needed to clarify and confirm these results.

11 people dropped out of the experiment before reaching its midpoint. The reasons for dropping out included a lack of necessary analy-

**Table 1.** Summary indications of blood analysis provided before the study

№ n/n	Name	General blood analysis		TTG		T3 free		T4 free		Note
		yes	no	yes	no	yes	no	yes	no	
1	Anastasiia Zelenkova	no		yes	01.11.2022	yes	01.11.2022	yes	01.11.2022	out
2	Igor Nehaev	yes	28.09.2022	yes	28.09.2022			yes		T3 T4
3	Olena Mutsalkhanova-Yushchenko	yes	11.11.2022	yes	11.11.2022			yes	11.11.2022	
4	Marina Rushenko	yes	11.11.2022	yes	11.11.2022	yes	11.11.2022	yes	11.11.2022	out
5	Dmytro Kapustin	yes	01.11.2022	yes	01.11.2022	yes	01.11.2022	yes	01.11.2022	
6	Mikhail Kapustin	yes	14.10.2022	yes	02.11.2022	yes	02.11.2022	yes	02.11.2022	
7	Olga Anikina	yes		yes	28.07.2022					out
8	Vladislav Semiletov	yes	08.11.2022	yes	08.11.2022	yes	08.11.2022	yes	08.11.2022	out
9	Stetsenko Alexandra	yes	15.06.2022	yes	19.05.2022	yes	19.05.2022			T3 T4, problematic to pass out
10	Elena Stezhkova	yes	24.05.2022	yes	01.11.2022	yes	01.11.2022	yes	01.11.2022	there is a truncated blood test from 01.11.2022
11	Olga Prokofefa	yes		yes						out
12	Anna Budanova	yes	09.11.2022	yes	09.11.2022	yes	09.11.2022	yes	09.11.2022	
13	Inna Shabayeva	no		yes	17.11.2022	yes	17.11.2022	yes	17.11.2022	
14	Mariia Kapustina	yes	29.10.2022	yes	29.10.2022	yes	29.10.2022	yes	29.10.2022	out
15	Nataliia Lipatova									out
16	Anton Lepesha									out
17	Tamara Dombayan	yes	26.09.2022	yes	27.09.2022					out
18	Elvira Kolodochkina									out

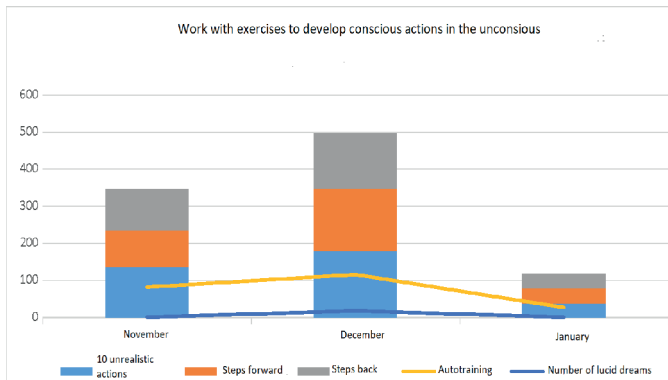


Figure 1. Passing testing to identify the state of participants

ses, missing control measures, refusal to perform recommended practices and follow the diet, inability to complete tasks, and a lack of entries in their diaries.

Thus, those who completed the experiment and had induced lucid dreams using the developed "Banchenko Algorithm" method are included in the main group, while those who dropped out are in the control group.

All participants were offered a personal wellbeing questionnaire (PWB), including 34 questions on "Psychological well-being in adults," 16 questions to test the degree of "Life satisfaction," and 18 questions from the "Significance and goals" section of life awareness.

Participants made daily diary entries, answering the given questions, for a period of 2 months. Based on three key dates of each month, analyses of changes in participants' consciousness were conducted (Figure 1).

It is important to note that the contents of the questionnaire are not described in this fragment, and information on how the obtained data was processed is not provided. Furthermore, there are inaccuracies in the description of the reasons for participants dropping out, which may require clarification.

In Figure 1, the test results reflect the participants' mood and readiness for lucid dream generation. The selected indicators reflect changes in mood as well as factors such as fatigue, stress, illness, etc.

Indicators that increase over time are associated not only with mood but also with sequential improvements in sleep quality, increased duration of rapid eye movement (REM) sleep, the appearance of paradoxical sleep, and lucid dreaming.

Of the remaining 11 participants, 7 completed the project with positive results: their self-confidence levels increased, they experienced lucid dreams, and the duration of their lucid dreams increased. The fact that 2 out of the 7 participants had a lucid dream shortly after the end of the course was recorded in video recordings, although no entries were made in their journals.

In the graph below (Figure 2), the change in PWB indicators for five students over the entire course period is reflected, and it is visually demonstrated how lucid dreams influenced their changes. The markers on the graphs indicate recorded lucid dreams, and linear trends (average line) are also plotted for each graph. From the graphs, it can be inferred that lucid dream states statistically significantly coincide with moments of above-average self-assessment of PWB in the vast majority of cases.

According to the hypotheses put forward, the key practices of the technique were as follows:

1. consumption of raw chocolate, which is believed to influence the decalcification of the pineal gland and may contribute to the emergence of vivid lucid dreams, but questions about their perception require further study
2. exposure to red lamps in the evening before sleep and natural lighting during the day, which are assumed to optimize serotonin synthesis for successful induction of lucid dreams
3. visualization and related activities based on the activation of certain areas of the brain
4. breathing practices and handwork, which can make dream perception clearer and preserve memory of them after awakening
5. diet including replacing sugar with fruits and adding single-celled algae such as chlorella and spirulina, which can help remove methylmercury from human tissues, including brain tissues, which should improve sleep and dream quality. (Table 2)

All procedures were recorded by the participants in their journals and allowed to identify the following trend: after the subject implemented the proposed complex of measures - lucid dreams occurred (Table 2).

From Table 2, a connection can be traced between the implementation of the technique, the systematic execution of the proposed practices, and the number of lucid dreams.

As is known, the human brain is a complex mechanism that performs certain programs both during wakefulness and during rest, so paradoxical sleep is attributed to periods of rest, but at the same time,

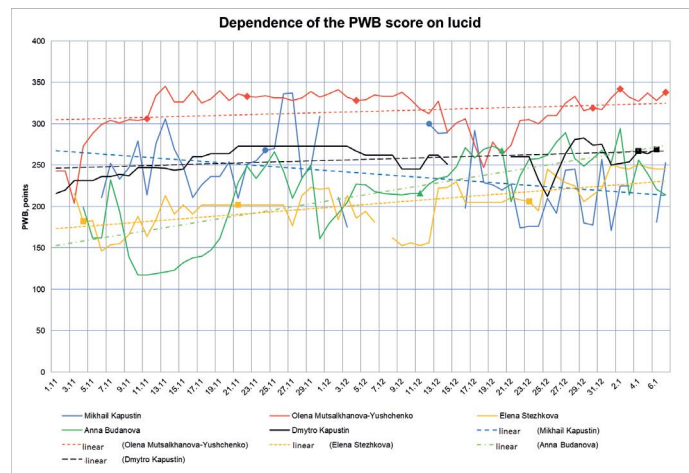


Figure 2. Dynamics of PWB questionnaire indicators

Table 2. The connection of the implemented practices with paradoxical sleep

Test subject	Diet	Red light	Raw Chocolate	Breathing practices	Visualization	LD
Igor Nehaev	62/68	Daily	58/68	43/68	46/68	1*
Olena Mutsalkhanova-Yushchenko	62/68	63/68	56/68	35/68	59/68	6
Dmytro Kapustin	39/68	15/69	26/68	37/68	27/68	3
Mikhail Kapustin	67/68	55/68	22/68	33/68	26/68	3
Elena Stezhkova	66/68	60/68	64/68	32/68	39/68	3
Anna Budanova	68	C 18 days daily	49/68	32/68	36/68	2
Inna Shabaeva	-	-	22/68	40/68	58/58	1*

Approx. \* Conscious sleep recorded in the near future after the end of the course 68 - duration of the experiment in days

**Table 3.** The results of the use of serotonergic system

Test subject	1.11	30.11	1.12	31.12	1.01	07.01
<b>"Subjective minute"</b>						
Igor Nehaev	+30	-10	+30	-10	-5	-5
Olena Mutsalkhanova-Yushchenko	+2	-5	0	-20	+20	+27
Dmytro Kapustin	+37	+16	+16	-19	-28	
Mikhail Kapustin	-8	-50	-40	-30	-10	
Elena Stezhkova	+7	+1	+8	+1		
Anna Budanova	+37	-26	-22	-18	-24	-15
Inna Shabaeva	+20	+14	-20	+16	-16	-2
<b>"Subjective decimeter"</b>						
Igor Nehaev	+30	+5	+3	+2	+3	+3
Olena Mutsalkhanova-Yushchenko	-30	-140	+14	+3	+2	-1
Dmytro Kapustin	-3	-5	+2			
Mikhail Kapustin	85	200	3	100	150	
Elena Stezhkova	+77	-2	-6	-5		
Anna Budanova	-22	+11	+6			
Inna Shabaeva "Heart rate/hd"	-240	-17,5	-35	-75	+5	+2
<b>"Heart rate/hd"</b>						
Igor Nehaev	2,22	3,18	2,90	3,40	2,70	2,70
Olena Mutsalkhanova-Yushchenko	9,4	7	7,6	11,1	12	12,1
Dmytro Kapustin	5,1	5,0	5,6	6,2	6,2	7,1
Mikhail Kapustin	3,3	3	4,3	3		
Elena Stezhkova	4,5	5,4	5,2	5,14		
Anna Budanova	6,09	5,58	5,31	6,27	5,75	5,55
Inna Shabaeva	4,06	4,13	4,27	7,27	7,20	8,50

certain rhythms associated with the pineal gland are recorded. However, for the synchronization of brain activity and the achievement of the necessary results, it is necessary to consolidate in subjects a series of time-delayed signals that within the serotonergic system contribute to inhibition, and when using the adrenergic system, on the contrary, lead to excitation.

The use of techniques such as "subjective minute", "subjective decimeter" and "HRV/HR" allowed in this experiment to study the ability of subjects to receive and reproduce data, relying on brain signals, body, and their own sensations. These techniques were used daily throughout the experiment. The concept of this approach is justified by the biorhythmic theory, which asserts that a person builds his sleep and receives dreams from the brain in accordance with the perception of time, place, and space.

The technique of "subjective minute" involves the participant starting a stopwatch and then counting three minutes internally. After the internal count reaches three minutes, the participant stops the stopwatch, records the time, and writes it down in a table. The technique of "subjective decimeter" involves the participant drawing a 10 cm line on a white piece of paper as a reference, looking at it for 3-7 seconds, then drawing 20 lines without the reference and measuring their lengths. The participant calculates the average length and records it in a table. The "HR/BR" technique allows the participant to determine the ratio of heart rate to respiratory rate per minute and record these data in a table.

As a result of the experiment, participants became more aware of time, space, their own sensations and rhythms. Thus, the use of these techniques in the experiment proved to be an effective means of studying the ability of participants to receive and reproduce data based on signals from the brain, body, and their own sensations. (Table 3)

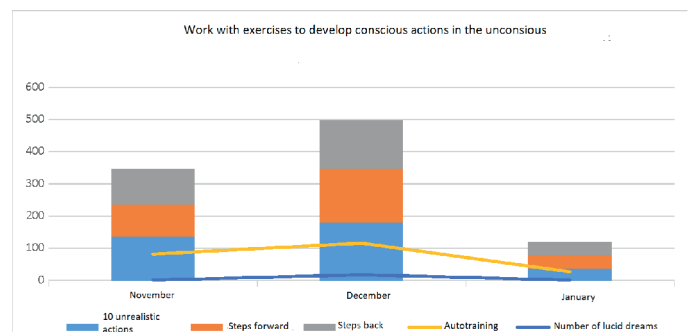
To consolidate the results and confirm hypotheses 9, 10, and 11, the subjects performed a daily "reality check in reality, which, with a large number of daily repetitions over a prolonged period (three weeks or more), turns into a dream."

Its essence is that the subjects list 10 actions and perform them regularly, every hour from waking to going to bed, for the first two days, excluding sleep time.

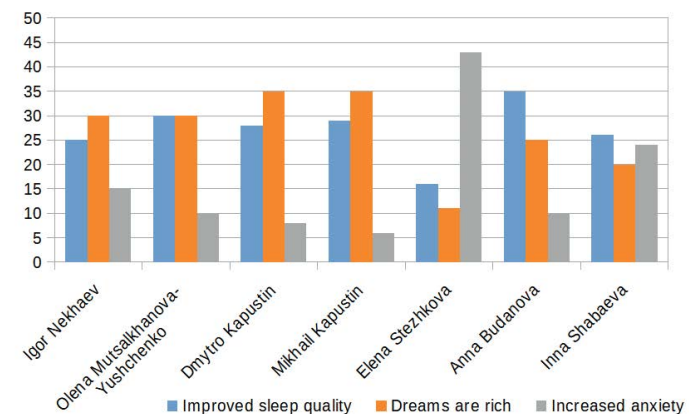
On the third and fourth days, every two and three hours, respectively, but daily, until stable lucid dreaming occurs. The actions are chosen as unrealizable in a waking state, but possible in a dream state, such as flying or passing through walls.

At the same time, it is important to emphasize that the data entered in the diaries are also confirmed by the psychosomatic state of the subjects, who became more collected, were able to resolve a number of their personal problems, and also experienced difficult times in their lives, maintaining clarity of future goals in life. In the conducted experiment, the participants who performed the exercises more often, working out 10 unreal actions, and counted 10,000 steps forward and backward per day, recorded lucid dreaming (Figure 3).

In addition, this practice allowed participants to partially control, record, and reflect on their dreams. For example, participants were asked to perform the following exercises: entering a mirror within a dream, folding their hands like a sail near their mouth and filling them with air by blowing into them, as if inflating a sail. The results of these practices demonstrated the significance of regular exercises and self-improvement (Figure 4).



**Figure 3.** The results of the practices of working with the unconscious



**Figure 4.** The result of the technique for monitoring paradoxical sleep

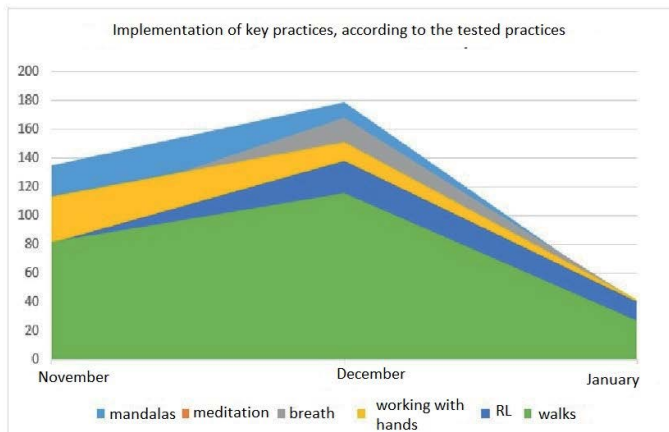


Figure 5. The influence of practices on the dream of subjects

Figure 4 shows the following trend: 90% of the participants experienced an improvement in sleep quality and more vivid dreams.

However, 10% experienced increased anxiety, which was found to be related to external factors such as work, moving, legal issues, etc., as recorded in their dream journals.

It is important to note that the participants themselves highlighted the significance of the following techniques:

1. Recording the state of sleep upon awakening with mandalas and using the left hand to stimulate dream recall
2. Meditation
3. Breathing practices
4. Hand exercises aimed at synchronizing the hemispheres (e.g., finger sequencing technique, stone technique)
5. Using red lighting in the evening
6. Outdoor walks
7. Walking backwards

As shown in Figure 5, the peak of activity occurred in December, when the participants realized the significance of the proposed techniques, noticed positive changes in their sleep patterns, and experienced their first lucid dreams. The January decline is attributed to the limited number of days in the month. In fact, by this time, positive progress had been made in all practices, and it is possible that with longer implementation of the "Banchenko Algorithm" proposed by the participants, a regular practice of recording lucid dreams would have developed.

As seen in Figure 5, the highest peak of activity is in December when the participants realized the significance of practicing the suggested techniques, noticed positive changes in their sleep dynamics and quality, and experienced their first lucid dreams. The January decline is due to the limited number of days involved in the study, as by this time, a positive trend in performing all practices had emerged. It can be assumed that with prolonged use of the "Banchenko Algorithm" proposed by the participants, a regular practice of recording lucid dreams would have been established.

## Discussion of results

The following results were obtained during the study, which was based on numerous scientific works and practices of using techniques for inducing lucid dreaming and activating the serotonergic system:

1. When the pineal gland is activated, neighboring large glutamatergic neurons of the oral pontine reticular formation are released from inhibition and are likely simultaneously excited. In tandem with cholinergic neurons, these glutamatergic reticular neurons transmit paradoxical activation of the forebrain and peripheral inactivation, which characterizes the phase of paradoxical sleep.
2. Blood tests for hormone levels and general analysis did not reflect subsequent research results. However, the appearance of regular rhythmic activity during rehydration (after dehydration) only during lucid dreaming indicates a close relationship between the electrical activity of the brainstem during lucid dreaming and blood osmolality. During the study, participants followed dietary and drinking recommendations, which yielded positive results.

However, it should be noted that no matter how intense the activity of cortical, reticular, or pyramidal neurons during the REM phase of sleep, it cannot be expressed (except for rapid eye movements) in the corresponding tonic motor phenomena of the inhibitory reticular formation induced by the brainstem.

The exercises proposed to the subjects, *such as entering a mirror in a dream, folding their hands into a sail near their mouth and filling them with air, led to a subjective increase in the duration of the REM phase relative to its normal course.* This emphasizes the variability of the application of this technique. However, further detailed research is necessary to confirm the effectiveness of these exercises, as well as to clarify the mechanisms of their action on the phases of sleep. Overall, the study results confirm the importance of the pineal gland and the serotonergic system for normal sleep, and also show the potential use of special techniques and exercises to change the duration and quality of *lucid dreams*. This can be useful both in medical practice and in research in the field of sleep and brain activity.

## Conclusions

The paradoxical sleep phase, as noted earlier, is registered exclusively by encephalography. In the conducted study, the subjects had conscious dreams on the seven control criteria described in [1], and the conscious dreams were induced within the "Banchenko algorithm". However, to confirm and fix the received results it is supposed to carry out the further work and more expanded research with application of the necessary equipment including EEG.

The following conclusions can be made in the course of this research:

1. Diet, daily routine, systematic exercises and practices within the "Banchenko algorithm" have a beneficial effect on the overall sleep of individuals.
2. The hypothesis that the alkaloid theobromine, which is able to penetrate the blood-brain barrier, can remove excess calcium and this leads to a more active pineal gland function, reflected in brighter dreams and stabilization of brain function, as well as positively affecting sleep, was partially proven indirectly, but requires further research in laboratory conditions.
3. Indirect confirmation of hypotheses 2-7 was obtained, but more precise results require careful laboratory research.
4. The complex of selected working methods, practices and systems of interaction with the subjects within the "Banchenko algorithm" showed high efficiency and produced positive results, but they can also be considered subjective.

5. The "Banchenko algorithm" itself can be applied with a high degree of efficiency in advanced scientific research aimed at preparing subjects to work with equipment. This can be particularly useful in cases where individuals capable of inducing lucid dreams are required, as this is a primary challenge in any such scientific investigation.
6. Practices such as working with negative imagery within the "Banchenko algorithm" have indeed shown increases in the brightness, clarity, and depth of lucid dreams, and in individual cases, improvements in vision for subjects, which is likely associated with increased acetylcholine synthesis, as indirectly suggested by studies on rats [10].
7. Virtually all subjects confirmed the high effectiveness of the breathing practices in the "Banchenko algorithm" and their influence on the frequency and brightness of lucid dreams
8. Hypotheses 8-11 also received partial confirmation and allow for discussion of the beneficial qualities of regular training of memory, the vestibular apparatus, and the circulatory system, which have a positive effect on inducing lucid dreaming.
9. The complex of selected work methods, practices, and systems of interaction with subjects yielded positive results.

Therefore, this topic provides an opportunity for further, more extensive research.

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