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Alzheimer's Disease Treatment through Chronic Antiorthostatic Sleeping in -4^0 to -50^0 and Periodic and Progressive Conditions, Simulated Microgravity and Blood Shift to the Head

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Abstract

Objectives: Chronic Antiorthostatic Sleeping (CAS) in -4^0 to -50^0 involves periodic and Progressive Conditions (PPC), Simulated Microgravity (SMG) and Blood Shift to the Head (BSH) that boost blood to the brain. We hypothesized that CAS could t treat Alzheimer's disease. We sought to determine the extent to which CAS treat Alzheimer's disease....

Methods: Studies have been performed on eighty male and female mild and moderate Alzheimer's disease patients. The patients who have been treated with CAS in -4^0 to -50^0 assigned to the 1st group and the patients who have been treated with prescribed drugs assigned to the 2nd group. They have been studied during the pre-experimental period of 4-years or more and the experimental period of 15 years or more.

Results: MRI scans of brains were normal in mild and moderate Alzheimer's disease patients. Patients of the 1st group with mild and to lesser extent moderate Alzheimer's disease were treated to fairly normal level compared to the 2nd group of patients. The patients of the 1st group benefited in all parts of the body. The patients of the 2nd group with mild and moderate Alzheimer's disease were not treated compared to the 1st group.

Conclusion: While cautious interpretation is appropriate given the small sample size, the findings provide clear evidence of treatment to fairly normal level of mild and to lesser extent moderate Alzheimer's disease patients through CAS and the involved conditions, suggesting potential prevention and clinical therapy for Alzheimer's disease patients.

***Keywords**:* Reduced brain's stress; Brain's relaxation; Brain's adaption ability; Brain's blood volume pull; Brain's blood flow increase and blood and brain communication.

Introduction

Chronic Antiorthostatic Sleeping (CAS) in -4^0 to -50^0 is a new technical method/ principle. CAS involves Periodic and Progressive Conditions (PPC), Simulated Microgravity (SMG) and blood shift to the head (BSH). CAS provides a novel approach for prevention and treatment of major diseases. Cardiovascular diseases prevented and/or reversed after patients undergoing treatment with CAS. Chronic obstructive pulmonary disease prevented and/or reversed after undergoing treatment with

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CAS. Optimal blood pressure attained after undertaking CAS treatment. Arthritis and osteoarthritis prevented and/or improved after humans undertaking CAS treatment. Cerebrovascular disease (strokes) prevented after patients undergoing CAS treatment. Osteopenia prevented or reversed after undertaking CAS treatment. Diabetes mellitus prevented and/or reversed after undertaken CAS therapy. Regenerative treatment of kidney diseases promoted after patients undergoing CAS. Tissues or organs regeneration promoted after undergoing CAS treatment. Longevity provided after undertaken CAS treatment. CAS in -4^0 to -50^0 through PPC, SMG and BSH has beneficial effects on the whole body.

Blood and other body fluids migrate to the lower parts of the body. Blood migration to the lower parts of the body creates more blood volume in the pelvic region and lowers half parts of the body. Retention of blood volume in the lower parts of the body contributes to lower blood volume and lower filling of blood in the central vascular bed [1]. Retention of blood volume in the lower parts of the body determines the severity of blood delivery to the brain. Reduced blood volume slows down blood flow to the brain which forced brain to work harder. Blood migration to the lower parts of the body contributes to the lower blood volume which is most detrimental to the human brain. CAS in -4^0 to -50^0 is the method which combating blood and other body fluids migration to the lower parts of the body and the best solution for boosting blood volume and blood flow to the brain [2-5].

For the treatment of Alzheimer's disease has been proposed several measures with little or no success. Studies on the effect of earth gravity in healthy and diseased humans [6], blood circulation in the body during hypokinesia (diminished muscular activity) [7-13] and blood boost to the head [2-5] had shed a new light. Some studies via CAS in -4^0 to -50^0 and the involved conditions [14,15] had shown Alzheimer's disease treatment. CAS in -4^0 to -50^0 and the involved conditions increases the ability of brain for more blood, oxygen and energy supply. Increase of blood volume and blood flow to the brain through CAS and the involved conditions is vital to the function of the brain. CAS in -4^0 to -50^0 is considered the best solution for extra blood volume and blood flow to the brain.

It is known that CAS in -4^0 to -50^0 which involves PPC, SMG and BSH safely boosts blood to the brain. We hypothesized that CAS in -4^0 to -50^0 and the involved conditions of CAS which boost blood to the brain could provide treatment for mild and moderate Alzheimer's disease patients.To provide evidence of treatment of mild and moderate Alzheimer's disease patients via CAS in -4^0 to -50^0 and the involved conditions and to establish a potential prevention and clinical therapy we sought to find out the extent to which CAS in -4^0 to -50^0 and PPC, SMG and BSH which boost blood to the brain could provide treatment for mild and moderate Alzheimer's disease patients.

Materials and methods

The experimental protocol reviewed and approved by the Committee for the Protection of Human Subjects of the Institutional Review Board. The investigation conformed to the principles of the Declaration of Helsinki. A caregiver (spouse, relative) received verbal and written explanations of experimental procedures and protocols before providing written informed consent. Among participants were no patients with other medical conditions, heart and eye disease, history of epilepsy, contraindication to CAS and MRI, systemic or psychiatric disease and other neurodegenerative diseases or those going therapy that could affect neuropsychological testing and involved in other clinical trials.

The Alzheimer's disease patients received their diagnoses from the Clinics of Dementia using the International Classification of Disease (ICD-10) of Alzheimer's disease and the Peterson (mild cognitive impairment) MCI criteria [16], which also have conducted most clinical assessments of the investigation. At the time of enrolment to the experimental studies Alzheimer's patients were undergoing treatment for Alzheimer's disease.

Patients with mild and moderate Alzheimer's disease were randomly assigned to either follow to CAS treatment (1^{st} group of patients) or drug treatment (2^{nd} group of patients).

Group 1: Forty patients with mild and moderate Alzheimer's disease have been treated with CAS in -4^0 to -50^0 which involved PPC, SMG and BSH that boost blood to the brain assigned to the 1^{st} group of patients and served as the experimental group of patients. The patients of the 1^{st} group were under hypokinetic conditions (diminished muscular activity), that is, they were not allowed to exercise or perform physical activities which required greater physical efforts and force blood and other body fluids to move to the lower body parts and working muscles.

Group 2: Forty patients with mild and moderate Alzheimer's disease were treated with prescribed drugs. They were assigned to 2^{nd} group of patients and served as the control group of patients. They were allowed to perform any physical activities as they pleased.

Protocol

Eighty patients with mild and moderate Alzheimer's disease aging 73.3±13.0 and 67.7±11.2 years for the 1^{st} group and the 2^{nd} group were assigned to Group 1 and Group 2, respectively. The study consisted of a pre-experimental period of four years or more and an experimental period of fifteen-years or more of CAS in -4^0 to -50^0. Patients enrolled to the experiment not later than one year after diagnosed with Alzheimer's disease. Before the enrolment to the experiment the brain and the heart of patients underwent thorough examination. Blood shifting to the head via CAS in -4^0 to -50^0 imposes severe stress and pressure on the brain and the heart which are forced to work very hard. Because of the potential of brain and heart adverse reactions care was taken and the patients were monitored closely. The patients wear a heart rate monitor. Because CAS in -4^0 to -50^0 is a booster of immunity immune system may overreact causing autoimmune disorders. During the treatment with CAS the patient's clinical signs and symptoms and behavioral reactions determined. The treatment of CAS in -4^0 to -50^0 administered at the patient's home by a caregiver (spouse or relative). The caregivers were instructed so to ensure that Alzheimer's patients were slept at the same degree of Antiorthostatic Position (AOP) each time the patients went to bed, so that the same degree of AOP was applied when the position of bed changed to a different degree. Nine of the patients of the 1^{st} group could not tolerate the treatment with CAS in -4^0 to -50^0 and these patients dropped-out.

Method of *chronic antiorthostatic sleeping position* in -4^0 to -50^0

This method of CAS involves PPC, SMG BSH that boost blood to the brain. Patients were slept without a pillow in an Antiorthostatic Position (AOP) in -4^0 to -50^0 for 10 hours at night and 2

hours at midday. The level of AOP increased by -2 degrees each time the patients' position changed. The actual tests at different degrees of AOP performed after adaptation of patients to that AOP level achieved. The degree of AOP increased after the ability of patients to adapt to a specific degree of AOP established. Adaption to each degree required many weeks before patients were able to adapt to that particular degree of AOP. At each level of AOP patients were kept for a necessary period of time in order to secure patients' adaptation to that level of AOP. The individual differences of patients and behavioral reactions to a particular AOP degree and their physical conditions and clinical responses were taken into consideration which helps adaptation of patients to that level of AOP. To ensure the patients comfort the level and duration of AOP changed as required each time AOP changed to a higher degree. To facilitate adaptation process to AOP (lower bed position) patients slept periodically in the higher position of the bed.

Imaging

A Magnetic Resonance Imaging (MRI) performed with a Skyra 3T system (Siemens Erlangen, Germany) during the pre-experimental period and the experimental period to determine changes in the brain and skull. MRI brain scans on patients were performed once in the preexperimental period and every two years during the experimental period.

Statistical analysis

Results were analyzed using STATA version 14.2 (StataCorp, LP, Texas, USA). Paired t-tests were used to test preexperimental and post experimental changes. The degree of significance was set to <0.05. Results presented as mean ± Standard Deviation (SD).

Results

All parts of the body affected from CAS in -4^0 to -50^0. Myriad signs and symptoms have been shown and weird things have been found in the body. The patients of the1st group have shown puffiness in the face, tachycardia, arrhythmias and extrasystoles. Different signs and symptoms (Table 1) have shown first in the right side and then in the left side of the body. Most signs and symptoms have been found first in upper part and then in the lower part of the body. As the degree of CAS increased more signs and symptoms have shown in all parts of the body. Digestive capacity of intestinal tract reduced and the emptying ability increased. In -40^0 to -50^0 of CAS the upper part of the body of the 1st group of patients tended to lean to left and the patients felt a pull down in their back and had trouble of walking and balancing. In -40^0 to -50^0 of CAS the height of the body increased in the 1st group of patients. In -40^0 to -50^0 of CAS five-patients of 1st group diagnosed with myasthenia gravis. Most patients of the 1st group had runny nose and few patients shown lower grade fever of 37.1 to 38.1^{0}C for two to three days. All of the diseases and symptoms of diseases of CAS in -4^0 to -50^0 disappeared spontaneously.

During the pre-experimental period of four years or more MRI scans of brains of patients of mild and moderate Alzheimer's disease were normal. The 1st group of patients of mild and moderate Alzheimer's disease who have been treated with CAS had shown some signs of adjustment and some signs of improvement as they became adapted to CAS in -4^0 to -50^0. The 2nd group of patients of mild and moderate Alzheimer's disease who have been treated with prescribed medication had not shown any changes.

During the experimental period of 15-years or more MRI scans of patients with mild and moderate Alzheimer's disease were not detected brain tissue microscopic changes and MRI scans of brains were normal in patients of mild and moderate Alzheimer's disease. Patients of the 1st group with mild and to lesser extent moderate Alzheimer's disease were treated to fairly normal level compared to the 2nd group of patients. Brain's volume, gray matter and cranial size were increased and cranial and brain shapes were changed in the 1st group of patients compared to the 2nd group of patients. The patients of the 1st group benefited in all parts of the body from CAS in -4^0 to -50^0. The 2nd group of patients with mild and moderate Alzheimer's disease was not treated compared to the 1st group.

Table 1: Signs and symptoms of chronic antiorthostatic sleeping position in -4^0 to -50^0 and periodic and progressive conditions, blood shift to the head and simulated microgravity.

Puffiness in the face
Tachycardia
Ventricular extrasystoles
Arrhythmias
Vertigo symptoms
Heart sound in the right ear
Tinnitus in the right ear
Diuresis
Gastrocolic reflex
Feeling of fullness (pressure) or stuffiness in the right ear
Blepharoptosis
Eyes watering
Blurred vision
Retinal hemorrhage
Muscle spasms in the right leg and hand
Deep vein thrombosis symptoms in the right leg
Left knee and right knee pain
Left hand and right-hand pain
Left foot and right foot pain
Skin lesions in the left arm and hand
Urticaria on upper back and hip
Urticaria on upper right arm and leg
Upper body back discoloration
Upper body back pruritus
Arms and legs pruritus

Discussion

Myriad signs and symptoms and complex reactions and weird things in all parts of the body represent compensatory phenomena. As the body became adapted to CAS beneficial effects occur in all parts of the body. It is not known why signs and symptoms have been shown first in the right side of the body and it is not clear why most signs and symptoms have been shown in the upper parts of the body. The different heart rhythms normalize after five to seven years. The lean to the left of the upper part of the body, the feeling of a pull down in their back and the trouble of walking or balancing were due to reduced size and density of paraspinal muscle the symptoms

of which disappeared after 5 to 6 years. Body height increased because of the growth of spinal cord. The growth of spinal cord occurs in -40^0 to -50^0 of CAS allowing the squishy spinal discs between vertebra freedoms relax and expand — almost like the relieving pressure on a spring. Symptoms of the gastrointestinal tract may be attributable to intestinal disease-causing ability of food borne bacteria the symptoms of which reversed after 5 to 6 years. Runny nose could have been caused due to immune system's action. Myasthenia gravis may be due to immune system overreaction. The symptoms reversed after five to six years.

MRI scans of the brains were normal in patients of the 1st group with mild and moderate Alzheimer's disease. That MRI scans of brains were normal in patients of the 1st group with mild and moderate Alzheimer's disease could be the changes were there, and we just could not be seen them yet. Or maybe the functional connections altered earlier in the process. However, we found clear evidence of Alzheimer's disease treatment in mild and to lesser extent moderate Alzheimer's disease patients through CAS in -4^0 to -50^0 and PPC, SMG and BSH, which boost blood to the brain. This suggests brain's ability to respond to CAS in -4^0 to -50^0 and the involved conditions that boost blood to the brain.

Counteracting excessive blood volume on the brain periodic and progressive conditions of CAS in -4^0 to -50^0 reduced the severity of blood volume on the brain. Reduced blood volume stress on the brain via PPC of CAS enables adaptation of brain to extra blood volume. Extra blood volume to the brain via PPC of CAS is not sensed as excessive blood volume but as blood volume redistribution which helps adaptation of brain to extra blood volume. Some studies [7-13] have shown that extra blood volume to the head through reduced blood volume stress on the head is not sensed as excessive blood volume but as simple blood volume redistribution and the excretion mechanisms are not activated contributing to blood volume. The reduction of blood volume stress on the brain through PPC of CAS behaved more as stimulus [17-19] than as stressor. It is believed that reduced blood volume stress on the brain via PPC of CAS triggers a chain of events which helps adaptation of brain to extra blood volume. This shows that PPC of CAS pays a significant part in the safety adaptation of brain to excessive blood volume.

Simulated microgravity of CAS places brain under mechanical unloading which enables brain adapt to extra blood volume and the ability of blood to flow freely to the brain. It is adaptation of brain to extra blood volume and ability of blood to flow freely to the brain through SMG of CAS which plays vital part in blood flow to the brain and circulation. Adaptation of brain to extra blood volume and ability of blood to flow freely to the brain via SMG of CAS has a profound effect on blood flow to the brain and circulation. SMG of CAS promotes arterial elasticity which determines arteries and veins widening thereby increasing blood flow to the brain and circulation. SMG of CAS promotes relaxation of arteries supplying blood to the brain as they no longer fighting the familiar pull of earth gravity so they widening allowing blood to move freely to the brain. Thus SMG of CAS in -4^0 to -50^0 enables blood to move freely to the brain thereby increasing blood flow to the brain and circulation that is critical to blood flow to the brain and circulation. This shows that SMG of CAS in -4^0 to -50^0 plays a significant part in blood flow to the brain and circulation. Hence, SMG of CAS enables blood flow to the brain and circulation which is vital to long-term adaptation of brain to extra blood volume.

Periodic and progressive conditions, simulated microgravity and blood shift to the head of CAS in -4^0 to -50^0 involve blood volume pull on the brain and blood flow increase in the brain. Blood volume pull on the brain and blood flow increase in the brain through CAS and the involved conditions helps adaptation of brain to extra blood volume. Blood volume pull on the brain and blood flow increase in the brain via CAS in -4^0 to -50^0 and PPC, SMG and BSH exerts a powerful effect on the `ability of brain to adapt to extra blood volume. CAS in -4^0 to -50^0 and PPC, SMG and BSH via blood volume pull on the brain and blood flow increase in the brain enables brain to combat Alzheimer's disease. Blood volume pull on the brain and blood flow increase in the brain via CAS and the involved conditions determines brain's ability to combat Alzheimer's disease. Some studies have found that CAS in -4^0 to -50^0 and the involved conditions may treat Alzheimer's disease [14,15]. It is blood volume pull on the brain and blood flow increase in the brain through CAS and PPC, SMG and BSH that determines the ability of brain to combat Alzheimer's disease. Ability of brain to combat Alzheimer's disease determined via the ability of brain to respond to blood volume pull on the brain and blood flow increase in the brain through CAS and PPC, SMG and BSH. This shows that CAS in -4^0 to -50^0 and PPC, SMG and BSH and blood volume pull on the brain and blood flow increase in the brain is vital to the ability of brain to combat Alzheimer's disease. It is clear that CAS and PPC, SMG and BSH, and blood volume pull on the brain and blood flow increase in the brain determines the ability brain to combat Alzheimer's disease.

Blood volume pull on the brain and blood flow increase in the brain via CAS and PPC, SMG and BSH enables brain respond to extra blood volume. This suggests blood and brain communication. CAS and PPC, SMG and BSH via blood volume pull on the brain and blood flow increase in the brain achieve blood and brain communication. Blood and brain communication via CAS and the involved conditions enables brain respond to this physical pull. This shows that CAS and the involved conditions and blood and brain communication determines the ability of brain to respond to extra blood volume. CAS and the involved conditions and blood and brain communication may add a contribution to the ability of brain to combat Alzheimer's disease. Blood and brain communication via CAS in -4^0 to -50^0 and the involved conditions determines ability of brain to combat Alzheimer's disease. The ability of brain to combat Alzheimer's disease determined via CAS and involved conditions and blood and brain communication. Blood and brain communication through CAS in -4^0 to -50^0 and the involved conditions is a powerful stimulus of ability of brain to combat Alzheimer's disease. CAS in -4^0 to -50^0 and PPC, SMG and BSH and blood and brain communication is more powerful than any other treatments and/or prevention strategies which have been assed so far for the prevention and treatment of Alzheimer's disease. That CAS and the involved conditions may be one of the mechanisms that determine brain's ability to combat Alzheimer's disease.

CAS in -4^0 to -50^0 and the involved conditions through blood volume pull on the brain and blood flow increase in the brain determines the ability of brain to respond to extra blood volume. Brain's ability to respond to extra blood volume via CAS and involved conditions which pull blood volume on the brain and blood flow increase in the brain determines the ability of brain to combat Alzheimer's disease. Or maybe something in blood transduced. That led to a critical question: what is in blood transduced? The ability of brain to combat Alzheimer's disease through CAS and the involved conditions is a sign of

great achievement that human brain has ever before achieved. The ability of brain to combat Alzheimer's disease through CAS and the involved conditions achieved Alzheimer's disease treatment in mild and to lesser extend moderate Alzheimer's disease patients. Alzheimer's disease therapy achieved after brain's ability to respond to extra blood volume has reached a new norm analogous to that of CAS and involved conditions. It is the new norm of the ability of brain to respond to blood volume via CAS and involved conditions that determines Alzheimer's disease treatment. This shows that brain's ability to function in Alzheimer's disease- through CAS and PPC, SMG and BSH provide clear evidence of treatment to fairly normal level in mild and to lesser extent moderate Alzheimer's disease patients.

Conclusion

In the context of cautious interpretation of results, we found clear evidence of Alzheimer's disease treatment of mild and to a lesser extent moderate Alzheimer's disease via CAS and the involve conditions that boost blood to the brain, reduced brain's stress, brain's relaxation, brain's adaptation ability, blood volume pull on the brain, blood flow increase in the brain and blood and brain communication. In conclusion patients with mild and to lesser extent moderate Alzheimer's disease were reared to fairly normal level through CAS in -4^0 to -50^0 and the involved conditions which boost blood to brain. The treatment of Alzheimer's disease through CAS and the involve conditions suggests a potential prevention and clinical therapy of patients with mild and moderate Alzheimer's disease.

Over 40 years have studied the effect of CAS in -4^0 to -50^0 and PPC, SMG and BSH on healthy and diseased humans and they have found that this technical method provides prevention and treatment of major diseases and longevity. Utilizing CAS in -4^0 to -50^0 organs and organ systems homeostasis maintained; resistance to a disease or infection promoted; arthritis and osteoarthritis prevented and/or improved; lower back pain prevented or reversed; immune system rejuvenated, become permanently active and recognition mechanisms become efficient and the ability of the body to defend itself against autoimmune diseases, infections and cancer become stronger and provokes stronger immune response to viruses; damaged kidney cells regeneration reversing impaired kidney function due to a disease or injury promoted, the heart muscle and heart size increased; cardiac insufficiency recovered; myocardial infarction prevented, venous return, cardiac output and left ventricular volume increased; size of coronary artery increased; optimal arterial blood pressure maintained; arterial elasticity promoted, cerebrovascular disease (strokes) and dementia prevented; viral and bacterial infections in the lung reduced; gas exchange in the lung increased; chronic obstructive pulmonary disease prevented or improved, diabetes mellitus prevented or reversed, regeneration of tissues or some organs lost by a disease or injury or partial regeneration which involve closing up injury site with some degradation of tissue scar or scar tissue disappearance promoted, a new set point body weight established, a low body temperature created, metabolic efficiency promoted and longevity reached 140 years or more.

Highlights

1. Chronic Antiorthostatic Sleeping (CAS) in -4^0 to -50^0 is a new technical method/ principle. CAS in -4^0 to -50^0 involves Periodic and Progressive Conditions (PPC), Simulated Microgravity (SMG) and Blood Shift to the Head (BSH)
2. We sought to find out the extent to which CAS in -4^0 to -50^0 and the involved conditions could achieve a treatment of mild and moderate Alzheimer disease. The studies performed during the pre-experimental period of 4-years or more and the experimental period of 15 years or more.
3. Effect sizes differences were significant between the 1st group of mild and moderate Alzheimer's disease patients who have been treated with CAS in -4^0 to -50^0 and the 2nd group of mild and moderate Alzheimer's disease patients who have been treated with the prescribed drugs.
4. Findings provide clear evidence of response to CAS in -4^0 to -50^0 and the involved conditions of mild and to lesser extend moderate Alzheimer's disease patients of the 1st group.
5. Findings provide clear evidence of treatment with CAS in -4^0 to -50^0 and the involved conditions of mild and to lesser extent moderate Alzheimer's disease patterns of the 1st group.
6. Effect sizes differences were detected between mild and moderate Alzheimer's disease patients of the 1st group
7. A review presents some benefits of the method of CAS in -4^0 to -50^0 and PPC, SMG and BSH

Declarations

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Conflict of interest statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

1. Smith JJ. A review volume, CRC Press, Boca Raton, Florida. 1990.
2. Zorbas YG, Yaroshenko YY, Kuznetsov NK, Andreyev VG, Federenko YF. Panminerva Medica. 1997; 39: 265.
3. Zorbas YG, Deogenov VA, Merkov PL, Federenko YF. Journal of Physiological Sciences. 2012; 62: 233.
4. Federenko YF, Charapakhin KP, Yaroshenko YN, Denogratov SK. Indian J Physiol Pharmacol. 2015; 59: 100
5. Kakuris KK, Yaroshenko YN, Charapakhin KP, Neofitov NH. Clinical Physiology and Functional Imaging. 2015; 40: 222.
6. Pana RC, M-Du, Bonoit R, Girardier L. Swiss Med Wkly. 2004; 134: 543.
7. Zorbas YG, Federenko YF, Naexu KA. Acta Astronautica. 1988; 17: 1123.
8. Zorbas YG, Naexu KA, Federenko YF. Acta Astronautica. 1994; 32: 393.
9. Zorbas YG, Federenko YF, Charapakhin KP, Kuznetsov NA, Yarullin VL, Federov MA. J Physiol Biochem. 1998; 54: 33.
10. Zorbas YG, Kakurin VJ, Kuznetsov NA, Yarullin VL, Andreyev ID, Charapakhin KP. Biological Trace Element Research. 2002; 85: 1.
11. Zorbas YG, Yarullin VL, Denogradov SD, Afonin VB, Kakurin VK. P Biological Trace Element Research. 2002; 88: 125.

12. Deogenov VA, Luzhkov AG, Kakuris KK, Federenko YF. Biological Trace Element Research. 2010; 138: 116.

13. Federenko YF, Deogenov VA, Kakuris KK, Yerullis KB. Biological. Trace Element Research. 2011; 143: 668

14. Zorbas YG, Deogenov VA, Fedorov AK, Luzhkov YS. Proceedings of Regional Conference of Neurologists, Yekaterinburg, Meditsina Publisher, Moscow, USSR. 1983: 231-239.

15. Neofitov NC, Neonov YS, Denogratov SK, Merkov PL. Current Trend in Neurology. 2019; 13: 1-8.

16. Peterson R. J Inter Med. 2004; 22: 224.

17. Huiskes R, Ronald R, Van Lenthe GH, Janssen JD. Nature. 2000; 405: 6787.

18. Lekszycki T, Dell'Isola F. ZAMM-Journal of Applied Mathematics and Mechanics/Zeitschrift für Angewandte Mathematik und Mechanik. 2012; 92: 426.

19. Giorgio I, Andreaus U, Scerrato D, Dell'Isola F. Biomechanics and modeling in mechanobiology. 2016; 15: 1325.