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Georgian religious songs improve the cerebral blood circulation in unconscious critical patients and increase immunocompetent T - lymphocyte proliferation capacity in mono-directional mixed cultures

Abstract:

The impact of Georgian religious songs was studied in 30 critical patients and 21 Critical Care Medicine staff. The Transcranial Doppler screening showed that this music facilitated blood circulation in the brain. Findings show that this music also stimulates proliferation of immunocompetent T-lymphocytes in mono-directional mixed cultures.

Keywords: Transcranial Doppler, blood circulation, T-lymphocytes

Introduction:

There are many researches on therapeutic effect of music (M. Standley, Olivia Swedberg, 2008, Roy Kennedy, 2008, Ann J. Whitehead Houck, Ph.D., 2008). Music is used in treating of Alc-haimer disease, Schizophrenia, Cancer, Asthma and many different diseases and pathologic processes. It is described improvement of speech and coordination in patients contribution to music, also reduction of pain, releave of Depression, and many different therapeutic effects. (Andrea M. Cevasco and Carol A. Prickett 2008, *American Music Therapy Association 2009*, Indiana University Simon Cancer Center 2008). Against this background, the information about the use of music in critical care medicine is extremely poor, it is more poor in the unconscious patients, as they seem not to percept music. There is no information about the inlfuence of music at medical staff and Immunocompetent T – Lymphocyts. By researching this matter it is possible to reach certain success in treatment of critical patients.

Materials and methods:

Were examined 30 critical patients and 21 staff of critical care medicine. From critical patients were 16 male and 14 female. To the age of 60 were 2 patients and above the age of 60 were 28 patients. By diseases the patients were divided into 3 groups. With the diagnosis of hemorrhagic stroke were 10 patients, with ischemic stroke -7 patients, with other non-cerebral pathology (pneumonia, cardial failure and other) – 13patients. In the control group were examined the staff of Critical care medicine institute. Their age was 26-60 years.

All the patients in critical condition were unconscious (the degree of the coma by the Glasgow Coma scale was 3-7points). For every patient was performed artificial ventilation, correction of water and electrolytes balance, parenteral nutrition, antibacterial therapy and other standard treatment. Investigation of these patients was performed thrice: at the time of checking in, and at 24th and 48ht hour of music therapy.

At case of the staff, investigation was performed twice: with and without music. Before and after work. In the first case the staff were working without music, and in the second case, in the process of working there was the same music in the critical care medicine department, that in the headphones of the patients.

In all cases was investigated cerebral blood flow. The cerebral blood flow was examined by the transcranial Dopplerography (Transcranial Doppler System TCD-IIX2p). (A. Aslid 1982).
To perform transcranial Dopplerography is used a low-frequency-2mHz impulse probe.

In order to perform transcranial Dopplerography is provided two main bone windows: Temporal window, from where are investigated Front and Middle cerebral arteries (R MCA, L MCA, R ACA, L ACA) and the great occipital foramen window-is investigated Basilar artery (BA). Investigated parameters were blood flow velocity (cm/sec) and volumetric velocity (ml/min).

At the same time was studied the blood of 15 healthy people and 20 patients in critical condition. All the donors and the patients were adults. In 8 cases critical condition in these patients was caused by hemorrhagic stroke, in 6 cases – by ischemic stroke, in 2 cases – by sepsis, in 2 cases – by hepatic failure, and in 2 cases – by renal failure.

All the patients in critical condition were in coma, the degree of coma was 3-7 points by Glasgow Coma Scale. All the patients were on artificial ventilation, and was performed standard treatment. The blood was centrifuged with 900g speed, in fikol-verographin gradient, of which density was $1.079g/cm^{3.\ F}$ From the separated lymphocytes was put the one-direction mixed culture, for it were added 10^6 c/ml signaling lymphocyte culture, they were processed with mitomicin-c and the same number of responder cells culture. At 36-th hour in cultivate area was put H^3 –Timidine (Metil H^3-Timidine, specific activity 1.0 k/0.001ml). After 48 hour cultivate sediment was moved on the Milpor filters, diameter was 0.45mc, and was counted the sum of H^3-Timidine in responder cells. The index of stimulation (Z) was counted by the formula $Z= \frac{x-y}{}, 100\%$, where x is involvement of H^3 in mixed cultures, y- the same indicator in control cultures, which included only the responder cells. It is considerable, that breeding of both the sample and control culture was performing with the assistance of the same music, which was listened by the staff of critical care medicine and their patients.

The received data was processed with variation statistic method. The coefficient of religion was calculated with 95-99% probability.

Results and discussion

The results are given in table #1-2 and #1-7figs.

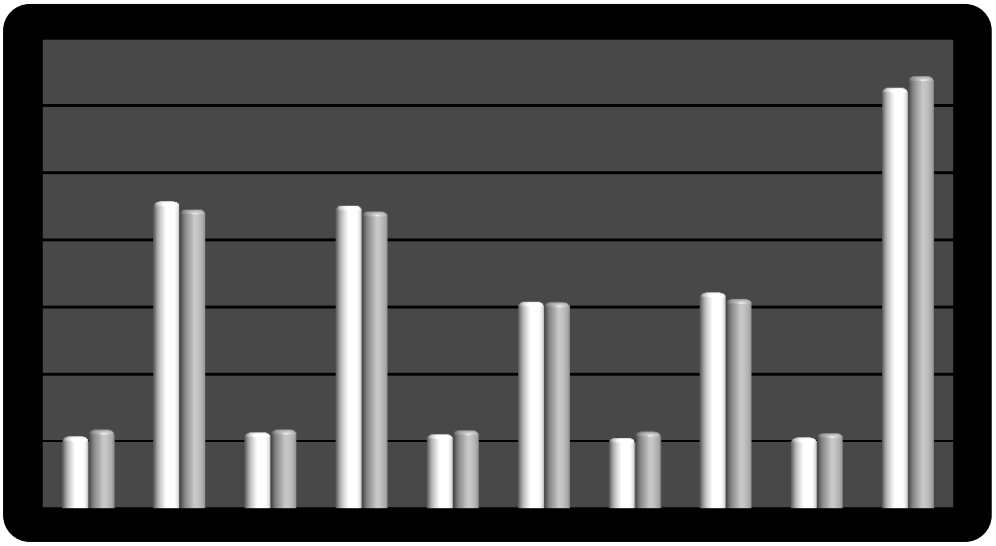
Table #1: Brain Blood Flow Indicators in Critical Patients

Patients		R MCA		L MCA		R ACA		L ACA		BA	
		velocity	volume	velocity	volume	velocity	Volume	velocity	volume	velocity	volume
All patients											
I investigation	X±m	ß53.4±0.6ß	228.7±2.8	56.4±0.7	225.7±2.1	55.1±0.5	153.9±2.1	52.4±0.5	160.7±2.2	52.6±2.6	313.4±11.3
II investigation	X±m	58.4±0.6	22.2.6±2	58.5±0.7	221.1±2	58±0.5	153.5±2	56.9±0.5	155.8±2.1	55.9±2.7	322±11.7
	N	30	30	30	30	30	30	30	30	11	11
	P	<0.001	>0.5	<0.001	<0.01	<0.001	>0.5	<0.001	>0.5	<0.01	<0.05
Iscemic stroke											
I investigation	X±m	40±4.2	190.2±7.5	46.8±3.1	190.7±7.9	46.6±3.2	142.2±7.1	46.1±3.8	142.4±7.8	43.7±4.1	280±9.2
II investigation	X±m	41.8±4.1	199±7.8	40.6±3.2	199.3±8.1	47.8±3.6	151.7±6.9	47.8±3.9	151.8±7.4	42.5±4.5	302±9.8
	N	7	7	7	7	7	7	7	7	4	4
	P	>0.5	<0.01	<0.01	<0.05	<0.05	<0.001	>0.5	<0.05	>0.5	<0.005
hemorrhagic stroke											
I investigation	X±m	69.6±3.2	281.6±8.1	70.2±3.4	276.5±8.1	70.9±3.7	190.5±8.4	70.7±3.2	191.4±8.1	-	-
II investigation	X±m	69.5±3.1	252.2±8.4	69±3.1	249.9±8.1	70.3±3.6	155.5±8.3	71.1±3.4	151.2±8.2	-	-
	N	10	10	10	10	10	10	10	10	-	-
	P	>0.5	<0.001	>0.5	<0.0014	>0.5	<0.001	>0.5	<0.001		
other diseases											
I investigation	X±m	50.3±3.1	194.7±7.2	43.7±3.1	200.6±7.2	46.6±3.1	131.8±6.2	45.4±3.1	126.6±6.2	61.6±2.8	302.4±6.2
II investigation	X±m	48.8±3.1	229.6±7.1	44.9±3	213.5±7.4	50.5±3.2	131.7±6.4	43.8±3.1	135.2±6.4	58.8±2.4	313±6.1
	N	13	13	13	13	13	13	13	13	5	5
	P	>0.5	<0.001	>0.5	<0.05	<0.01	>0.5	>0.5	<0.05	<0.05	<0.01

Table #2: Brain Blood Flow Indicators in Critical Care Medicine Staff.

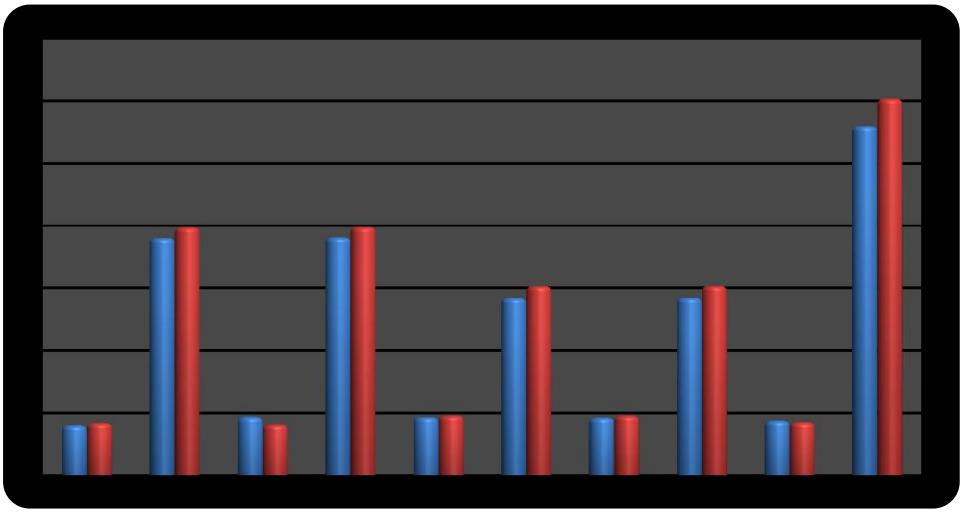
Staff		R MCA		L MCA		R ACA		L ACA		BA	
		velocity	volume	velocity	volume	velocity	Volume	velocity	volume	velocity	volume
Without music											
I investigation	X±m	53.4±0.5	240.8±2.5	56.1±0.5	246.6±2.3	54.9±0.6	140.1±2.4	55.1±0.6	139.8±2.2	59.2±0.6	330.2±3.3
II investigation	X±m	59.8±0.6	229.6±2.6	59.2±0.6	228.2±2	59.4±0.7	131.7±2.1	60.8±0.7	130.8±2.1	62.9±0.6	301.2±3.4
	N	21	21	21	21	21	21	21	21	21	21
	P	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.0015	<0.001	<0.002
with music											
I investigation	X±m	54±0.6	241.1±2.8	55.1±0.6	245.9±2.6	54.4±0.6	137.9±2.2	54.4±0.7	139.2±2	58.6±0.6	328.1±2.8
II investigation	X±m	57.5±0.6	232.7±2.7	58.9±0.6	229.3±2.4	57.8±0.6	136.1±2.2	58.5±0.6	133.1±2.1	61.3±0.7	309.4±3.1
	N	21	21	21	21	21	21	21	21	20	20
	P	<0.001	<0.005	<0.001	<0.001	<0.001	>0.05	<0.001	<0.002	<0.001	<0.001
	P1	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
	P2	<0.001	>0.05	>0.05	>0.05	<0.001	<0.05	<0.001	>0.05	>0.05	<0.001

At examining critical patients, significant change of brain blood flow linear velocity was not found, but was found statistically reliably change of volumetric velocity. From this point of view in some groups this indicator was increased, and in some groups – reduced. In common indicators only in Basilar artery was bound increase of volumetric blood flow velocity.



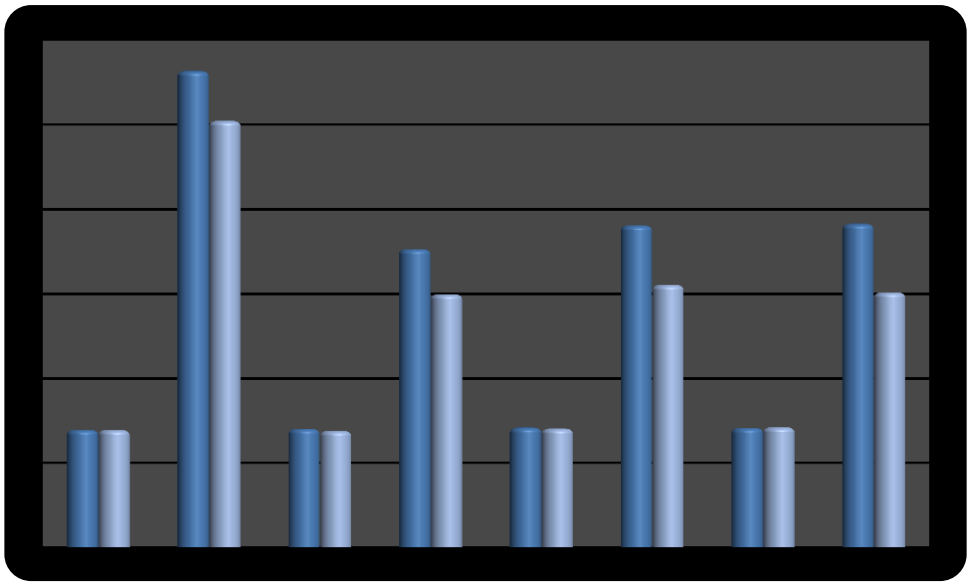
Fig#1 Brain blood flow indicators in critical patients.

At ischemic stroke significant change of blood flow linear velocity was not found. Blood flow volumetric velocity was statistically reliably (P<0.05-0.001) increased in all examined arteries. That indicates that the quantity of blood supply was growing by influence of music



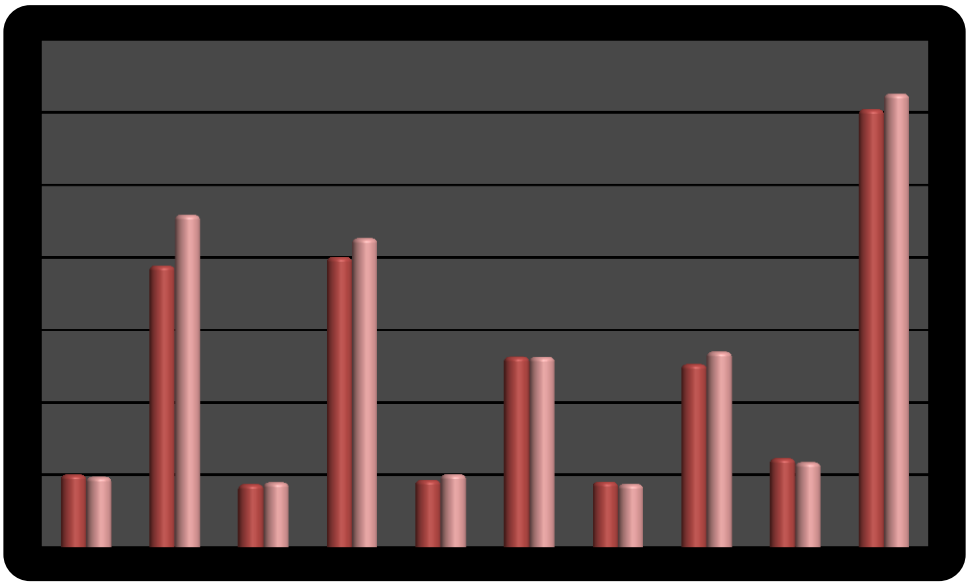
Fig#2 Brain blood flow indicators at ischemic stroke.

At hemorrhagic stroke significant change of blood flow linear velocity also was not found. Blood flow volumetric velocity was statistically reliably (P<0.05-0.001) decreased in all examined arteries. That indicates that the quantity of blood supply was declining by influence of music.



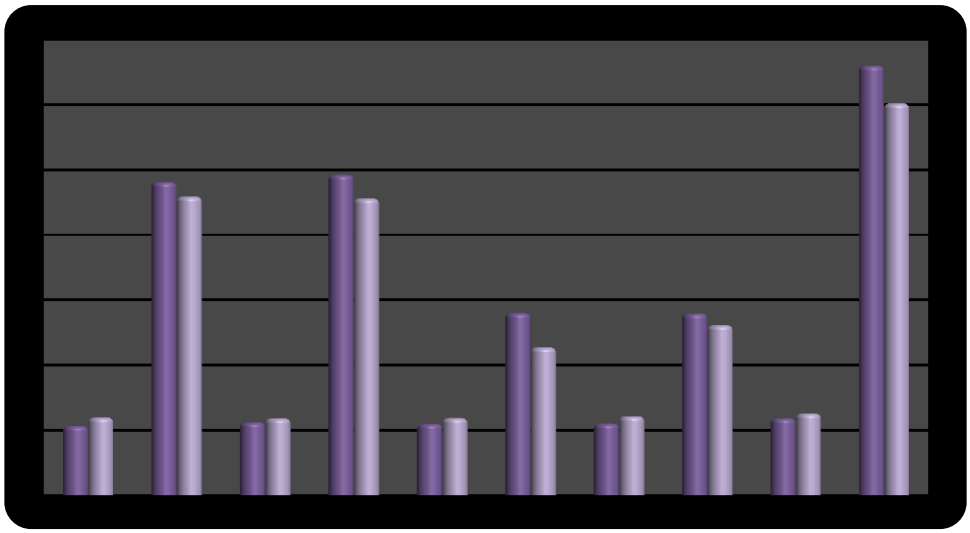
Fig#3 Brain blood flow indicators at hemorrhagic stroke.

At critical condition, caused by non-cerebral pathology at second examination blood flow volumetric velocity was statistically reliably increased in all examined arteries, except of right front cerebral artery

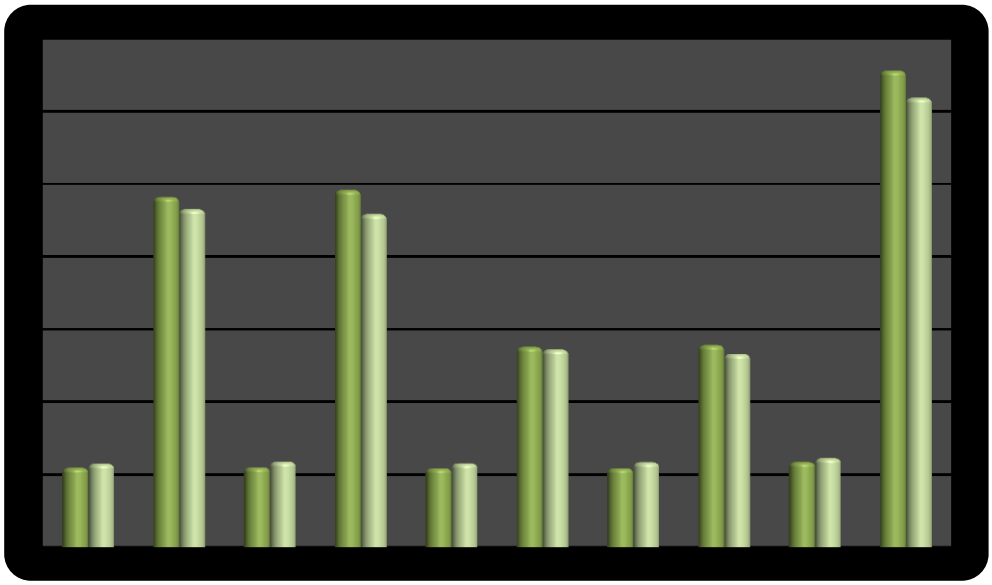


Fig#4 Brain blood flow indicators at critical condition, caused by non-cerebral pathology.

At the time of investigation of critical care medicine staff, after work without music, blood flow linear velocity was statistically reliably increased in all examined arteries. This change indicates to the increase of spasm in these arteries. In addition, blood flow volumetric velocity was statistically reliably decreased in all arteries, except of right front cerebral artery. That indicates that without music the quantity of blood supply in critical medicine staff was declining.

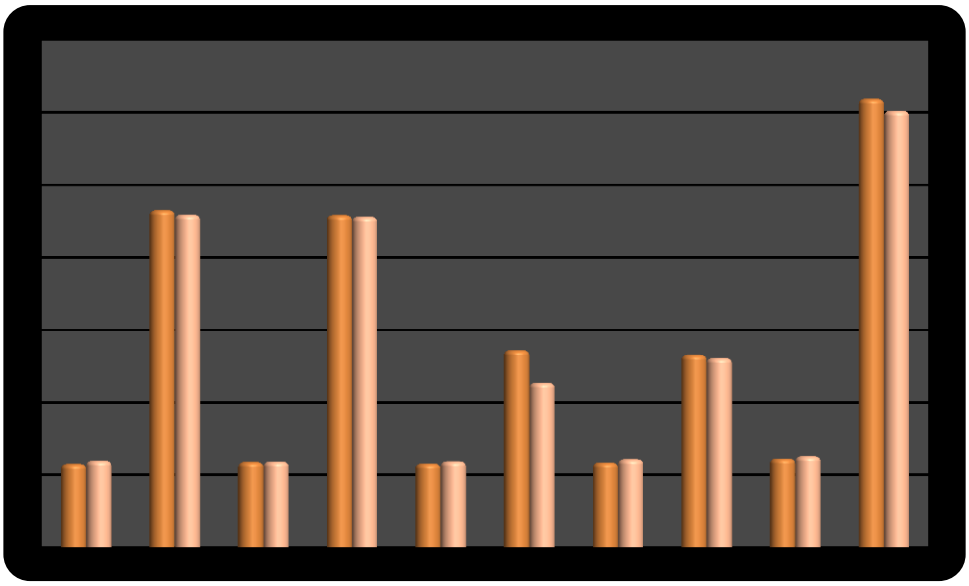


Fig#5 Brain blood flow indicators in the staff of critical care medicine after working without music.
It is noteworthy that similar changes have been found at examining of staff study while working in the background of music. But these changes were much less intense, then in the same staff while working without music.



Fig#6 Brain blood flow indicators in the staff of critical care medicine after working with music.

Comparing the data, which was found in a group of staff after work, it turned out that without music the blood flow linear velocity was high, the volumetric velocity is low. These changes were statistically reliably all arteries, except of left middle cerebral artery. This indicates to the increase of spasm while working without music.



Fig#7 Brain blood flow indicators in the staff of critical care medicine after working with and without music.

The results, received from studying the lymphocyte cultures indicate, that in control cultures of healthy people, which cultivate was going without music, the stimulate index was 40.2±2.1%, when in experimental cultures of the same people, which cultivate was going with music, the stimulate index was 53.4±2.2%, which is statistically reliably high rate. The similar results were got in studying the mixed lymphocyte cultures of critical patients. In the cultures, cultivated without music the stimulate index was 34.1±1.7%, then in cultures of the same people, which cultivate was going with music, the stimulate index was 53.7±1.8%, which is statistically reliably high rate.

From all above mentioned it can be concluded, that music has an important impact on blood supply of brain in critical patients. These changes are not similar and partly depend on the type of pathological process, for example this can be improving of blood supplying (ischemic stroke, critical condition, caused by non-cerebral pathology) and reducing (hemorrhagic stroke). This lays out an important perspective for using music as a therapy in practice in critical care medicine. At the same time music improves the parameters of brain blood supplying of critical care medicine staff, as they have a very heavy working schedule. Also it is very important the fact, that music has a stimulating influence on growing the lymphocyte cultures, of critical patients and healthy donors. This shows that the influence of music on the human body is enforcing not only through the auditory analyzer of the brain, but also by the immediate impacting on the live cells.

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ქართული საეკლესიო საგალობლები აუმჯობესებენ უგონო მდგომარეობაში მყოფ კრიტიკულ ავადმყოფთა თავის ტვინში სისხლის მიმოქცევას და ზრდიან იმუნოკომპეტენტურ T - ლიმფოციტთა პროლიფერაციის უნარს ერთმიმართულებიან შერეულ კულტურებში

ცერებრულ სისხლძარღვებში სისხლის მიმოქცევა გამოკვლეული იყო ტრანსკრანიული დიპლეროგრაფიის საშუალებით.

გამოკვლეული იყო 30 ავადმყოფი და 21 პრაქტიკულად ჯანმრთელი პირი, კრიტიკული ავადმყოფებიდან კაცი იყო 16, ქალი-14, 60 წლამდე ასაკის იყო 2 ავადმყოფი, ხოლო 60 წელზე მეტის - 28 ავადმყოფი. გამოკვლეული იყო კრიტიკული მედიცინის 21 თანამშრომელი, თანამშრომლებს აღნიშნული კვლევა ჩაუტარდათ ორჯერ: მუსიკის გარეშე და მუსიკის ფონზე. მათ შორის მუშაობის დაწყებამდე და შემდეგ, პირველ შემთხვევაში პერსონალი მუსიკის ფონის გარეშე მუშაობდა მეორე შემთხვევაში კი მუშაობის პროცესის დროს კრიტიკული მედიცინის კლინიკაში ჩართული იყო იგივე მუსიკა, რაც ავადმყოფებს ყურსასმენებში ესმოდათ. როგორც თანამშრომლებს, ისე პაციენტებს კვლევის პროცესში უტარდებოდათ თავის ტვინში სისხლის მიმოქცევის შესწავლა.

პარალელურად გამოკვლეული იყო 15 ჯანმრთელი და 20 კრიტიკულ მდგომარეობაში მყოფი ავადმყოფის სისხლი. როგორც საცდელი, ისე საკონტროლო კულტურების "მოშენება" მიმდინარეობდა იმავე მუსიკის ფონზე, რასაც ისმენდნენ კრიტიკული მედიცინის თანამშრომლები და მათი პაციენტები.

მონაცემები დამუშავდა ვარიაციული სტატისტიკის მეთოდით. სარწმუნოების კოეფიციენტი გამოთვლილი იყო 95-99%-ის ალბათობით.

მუსიკა მნიშვნელოვან ზეგავლენას ახდენს უგონო მდგომარეობაში მყოფ ავადმყოფთა თავის ტვინის სისხლით მომარაგებაზე. ამასთან ეს ცვლილებები არ არის ცალსახად ერთნაირი და გარკვეულწილად დამოკიდებულია პათოლოგიური პროცესის სახეზე, სახელდობრ ეს გამოიხატება თავის ტვინის სისხლით მომარაგების როგორც გაძლიერებაში (იშემიური ინსულტი, არაცერებრული გენეზის კრიტიკული მდგომარეობები) ისე შემცირებაში (ჰემორაგიული ინსულტი).

მუსიკის თანხლებით გამოკვლეული ლიმფოციტების კულტურების სტიმულაციის ინდექსი მნიშვნელოვნად გაიზარდა. ჯანმრთელი პირების იმ საკონტროლო კულტურებში, რომელთა "მოშენება" მიმდინარეობდა მუსიკის თანხლების გარეშე სტიმულაციის ინდექსი შეადგენდა 40.2 2.1%, მაშინ როდესაც იმავე პირების საცდელი კულტურების სტიმულაციის ინდექსი მუსიკის ფონის მუდმივად თანხლების დროს შეადგენდა 53.4 2.2%, რაც სტატისტიკურად სარწმუნოდ მაღალია. მსგავსი შედეგები იქნა ნანახი კრიტიკულ ავადმყოფთა ლიმფოციტების შერეული კულტურების "მოშენებისას", მუსიკის გარეშე გაზრდილ შერეულ კულტურებში სტიმულაციის

ინდექსი 34.1 1.7% იყო. მაშინ როდესაც მუსიკის თანხლებით გამოზრდილ კულტურებში ეს მონაცემები 53.7 1.8% შეადგენდა.

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