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Serotonin in critical patients
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The objective of our research was to study serotonin profile in critical patients, their participation in death process and their probable use in forecasting of disease progress and its outcome. In Ischemic stroke patients the lethal outcome had the cases were serotonin concentration was decreased to the minimal index. In cases of apoplectic shock, the initial concentration of serotonin almost in all cases was at the lower level/limit and it was drastically decreased in lethal cases. The reason for such low concentration of serotonin is likely neuroregulationdisorder. In patients with respiratory distress and pneumonia, the lethal outcome was detected at the backround of drammatical decrease of serotonin. Although in such case the connection between the outcome and the minimal concentration is less probable.The connection between minimal concentrations of serotonin and lethal outcome in case of sepsis is more expressed that is caused by intestinal involvement together with neuroregulation disorder in pathologic processThe studies have shown that strong decrease of serotonin concentration is a prove of negative forecast, especially in cases of apoplexies

Key Words: Srerotonin,Critical patients,Ishemic insult,Apoplectic shock,Severe Sepsis.

Introduction: Serotonin is one of the principal neurotransmitters. According to chemical structure it belongs to biogenic amines of tryptamine class. Serotonin is produced by amino acid tryptophan in serotonergic neurons by means of hydroxylation under the influence or iron ions and cofactor pteridine.(DL Nelson 2004).The physiological function of serotonin is very different. Serotonin "guides" various functions of the body. In case of serotonin decrease the pain sensitivity is increased. Serotonin improves motion activity by acting on ionotropic and metabolic receptors of sensory neurons. (G. K. Isbister and other 2004))Together with dopamine serotonin plays a significant role in regulation of pituitary hormones function. It also participates in regulation of vasomotor tone. [I.P Ashmarin and other,2007).Serotonin increases functional activity of thrombocytes and their inclination to aggregation and thromb generation. Besides it participates in allergic and inflammatory processes, in regulation of intestinal and uterine motility and so on.(B. M. Twarog and I. H. Page.2003).The lack of serotonin causes the depressive and obsessive condition. The objective of our research was to study serotonin profile in critical patients, their participation in death process and their probable use in forecasting of disease progress and its outcome.

Materials and Methods: 65 patients undergoing treatment course in Critical Care Medicine Institute have been examined. Their age varied from 58 to 82 years.Among them: Ischemic stroke – 18,Apoplectic shock – 14,Respiratory distress and pneumonia -15,Severe Sepsis – 8**,**Various – 5.In all patients multiple organ failure and concomitant diseases – diabetes, atherosclerosis, chronic heart failure were detected. All patients were treated according to standard method. 34 of them were on artificial ventilation and parenteral feeding. Medication has been performing according to symptoms. The patients have been examined on first, second and fifth day after getting in the hospital. It should be mentioned, that the examination of serotonin concentration in blood is not performed, especially in critical patients. In addition, 2 patients were examined on multiple basis, in one of them viral encephalitis was revealed and in another one polyneuropathy and Guillain-Barre syndrome.Serotonin was defined according to immunoenzyme method. The results were registered by means of immunoenzyme reader RAITO 2100. During the studies immunoenzyme test-systems of „Immunodiagnostics "(Germany) were used: normal values based on these test-systems.According to normal values 53 – 397ng/mlImmunoenzyme analysis has been performed based on common "Sandwich –ELISA" in accordance with the guidelines attached to the test-systems.

Results and Discussion: The results are given in the table below

Table 1

Serotonin concentration in patients suffering with ischemic stroke.

Patient	At the moment of getting in the hospital	The fifth-sixth day	Outcome
1	55	37	mors
2	65	32	mors
3	125	100	
4	170	98	
5	38	35	mors
6	250	190	
5	132	65	
6	62	38	mors
7	200	36	mors
8	61	65	
9	54	59	
10	147	145	
11	100	97	
12	98	38	mors
13	65	51	
14	69	38	
15	87	90	
16	210	62	
17	125	31	mors
18	62	66	
Average	108.75	68.65	

Result t_{cr} = 2.5

Critical value	
T_{cr}	
$p \leq 0.05$	$p \leq 0.01$
2.02	**2.71**

As it is shown in the table above, in the major part of the patients concomitant diseases were revealed, eight of them were on artificial ventilation. The lethal outcome had the cases were serotonin concentration was decreased to the minimal index.

Table 2

Apoplectic shock

Patient	At the moment of getting in the hospital	The fifth-sixth day	Outcome
1	52	50	
2	53	49	
3	65	51	
4	49	34	mors
5	53	50	
6	57	53	
5	69	39	mors
6	62	53	
7	100	55	
8	62	60	
9	64	58	
10	55	52	
11	53	48	
12	121	39	mors
13	111	40	mors
14	57	52	
Average	67.69	48.94	

Result t_{cr} = 3.2

Critical values

t_{cr}

p≤0.05	p≤0.01
2.04	**2.75**

In cases of apoplectic shock, the initial concentration of serotonin almost in allcases was at the lower level/limit and it was drastically decreased in lethal cases.The reason for such low concentration of serotonin is likely neuroregulation disorder.

Table 3

Respiratory distress, pneumonia

Patient	At the moment of getting in the hospital	The fifth-sixth day	Comment
1	110	98	
2	69	60	

3	87	99	
4	120	59	mors
5	98	120	
6	125	120	
5	251	110	
6	158	140	
7	269	250	
8	127	115	
9	169	170	
10	79	98	
11	87	98	
12	99	38	mors
13	125	68	
14	198	95	
15	218	110	mors
16	106	56	mors
17	184	110	
18	189	99	
Average	143.4	105.65	

Result t_{emp} = 2.3

t_{cr}	
p≤0.05	p≤0.01
2.02	**2.71**

In patients with respiratory distress and pneumonia, the lethal outcome wasdetected at the backround of drammatical decrease of serotonin. Although in such case the connection between the outcome and the minimal concentration is less probable.

Table 4

Sepsis (positive procalcitonin test)

Patient	At the moment of getting in the hospital	The fifth-sixth day	Outcome
1	69	38	mors
2	158	45	
3	160	59	
4	101	39	mors

5	126	62	
6	87	67	
5	65	65	
6	55	31	mors

Result t_{emp} = 3.4

Critical values

T_{cr}	
p≤0.05	p≤0.01
2.14	**2.98**

The received empiric value t (3.4) is in the important area.

The connection between minimal concentrations of serotonin and lethal outcome in case of sepsis is more expressed that is caused by intestinal involvement together with neuroregulation disorder in pathologic process.

Table 5 outpatients (practically healthy persons)

Patient	At the moment of getting in the hospital	After 2-3 weeks
1	200	210
2	250	260
3	320	300
4	59	69
5	79	100
Average	181,5	187,0

Result t_{emp} = 2.3

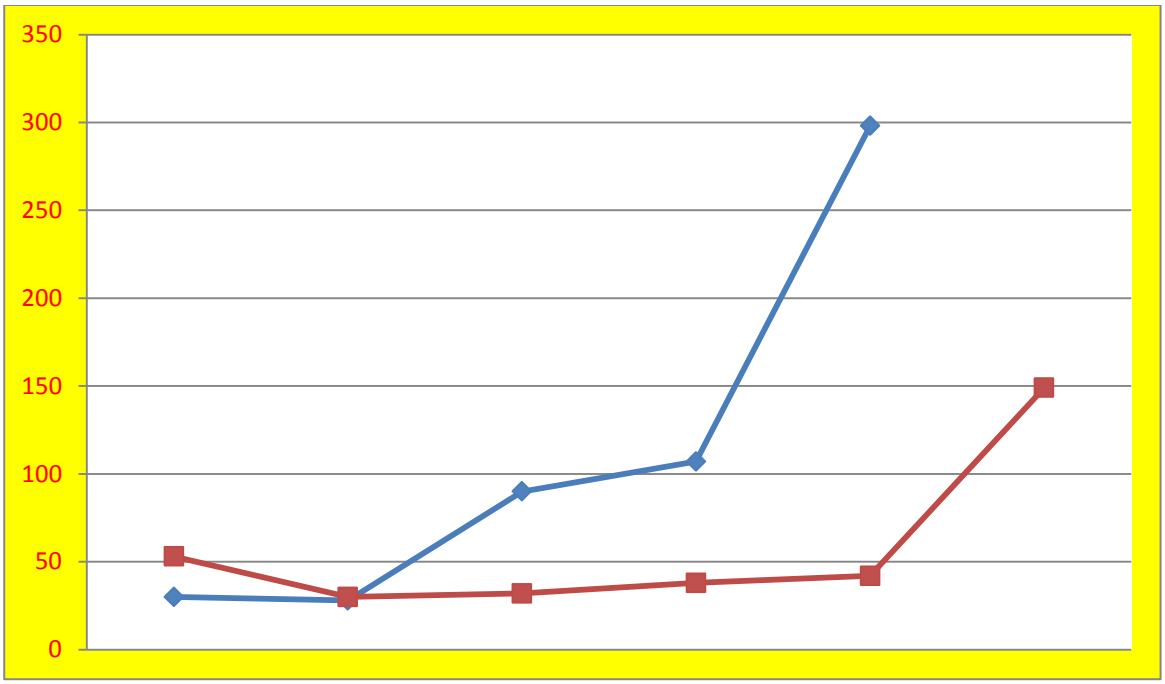
The result is not change

Table 6

Two different patients – one with viral encephalitis, another with **Guillain-Barre syndrome**

Patient 1	Serotonin values	Comment	Patient 2	Serotonin values
Days of illness	Viral encephalitis	Diabetes	Days of illness	Guillain-Barre syndrome
1	30		1	53
7	28		7	30
14	90		14	32
21	107		21	38
28	298		28	42
			35	149

In the chart there are changes of serotonin in cases of the above mentioned two pathologies.



_____ Patient 1

----------Patient 2

In both cases the low values of serotonin have been detected that was especiallyexpressed in case of polyneuropathy, although alongside with the recoveryprocess, the concentration has been increasing all the time that was especially expressedtogether with the decreease of inflammation process. This is explained byrestoration of neuroregulation.

Conclusion: Thus, it was one of them first attempt to use the study of serotonin concentration changesin critical patients. The studies have shown that strong decrease of serotonin concentration is a prove of negative forecast, especially in cases of apoplexies.

References:

B. M. Twarog and I. H. Page, “Serotonin content of some mammaliantissues and urine and a method for its determination”,.Am J Physiol, 2003,175(1):157-

161.
DL Nelson “5-HT$_5$ receptors». Current drug targets. CNS and neurological disorders,2004, 3 (1): 53–58.
G. K. Isbister; S. J.; Bowe, A.S.Dawson, I.M. Whyte, I. M. -. “Relative toxicity of selective serotonin reuptake inhibitors (SSRIs) in overdose”. J. Toxicol. Clin. Toxicol.2004, 42 (3): 277–285.
I.P.Ashmarin ,.N.D. Yeshenko N.D., E.P.Karazeeva – “Neurochemistry in tables an charts” – M: “Exam”, 2007,-234pp

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