

INDIVIDUAL PROTEINS – STUDY OF ALPHA₂-MACROGLOBULIN AND ITS CHANGES IN PATIENTS WITH ACUTE CLOSED CRANIOCEREBRAL TRAUMA (ACCCT)

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The improvement of immunochemical methods enabled the quantitative determination of individual proteins, especially in non-concentrated cerebrospinal fluid that is very useful in clinical practice. In previous studies authors' attention was mainly directed to immunoglobulins. The rest individual proteins were scantily investigated, and particularly in patients with an acute closed craniocerebral trauma (ACCCT). In our country, first Drenski had studied transferrin, albumin, and prealbumin in ACCCT patients (1).

The aim of the present work is to study alpha₂-macroglobulin concentration and to evaluate its information significance in the diagnosis and differential diagnosis of the different stages and degrees of ACCCT.

Material and Methods

Alpha₂-macroglobulin was determined in lumbar cerebrospinal fluid during the first two days after trauma accident in 35 patients with cerebral commotion, 39 ones with cerebral contusion as well as in 31 control patients. All the "control" persons had been hospitalized in the Neurological Clinic of the Higher Institute of Medicine, Varna, during the same period. Lumbar puncture was performed as indicated in order to exclude some organic diseases of the nervous system in these control patients. As these suspicions were not confirmed because the values of the cerebrospinal fluid were normal, we decided to use their data as controls.

Radial immunodiffusion and electroimmunodiffusion both are preferable immunochemical methods for investigation of individual proteins. Most eminent authors in the world consider electroimmunodiffusion more advantageous and valuable (2, 3, 5, 6, 7 a. oth.). We used electroimmunodiffusion technique after Laurell's method in Tzvetanova's modification. Alpha₂-macroglobulin concentration was presented in mg/l.

Results and Discussion

Alpha₂-macroglobulin presents a normal component of the cerebrospinal fluid (normal level between 0.0 and 3.7 mg/l). Its molecular weight is 820 000. Its synonyms are as follows: alpha₂-seromucoid, alpha₂-glycoprotein, thermolabile alpha₂-glycoprotein.

It is a basic component of alpha₂-fraction – globulins. Immuno-electrophoretically, it seems like a dense arc in this zone, parallelly to the arcs of haptoglobin and of ceruloplasmin. Its serum concentration is between 2.2. and 3.8 g/l. It is related to physical development and that is why its concentration is higher in children. It inhibits both plasmin and trypsin and can bind insulin and other low-molecular substances. Its level increases mainly in cases of meningites and neoplasms. Certain changes of its concentration occur also in renal diseases. There are a few investigations of it in neurological diseases.

The results from our study are demonstrated on table 1.

It is evident that our control values are 1.16 ± 1.25 mg/l. Alpha₂-macroglobulin concentrations are in normal limits in patients with cerebral commotion (2.40 ± 1.52 mg/l). However, its levels are significantly higher than the normal ones in all the degrees of cerebral contusion. Alpha₂-macroglobulin level is elevated more than 5 times in comparison with the normal one when the severe degree of cerebral contusion is concerned (21.43 ± 12.68 mg/l).

Table 1
Alpha₂-macroglobulin levels in the cerebrospinal fluid

Degree of ACCCT	$X \pm \sigma$	n	method
brain commotion	2.40 ± 1.52	35	electro-immunodiffusion
brain contusion light degree	5.17 ± 7.45	16	--
brain contusion intermediate degree	10.35 ± 6.77	13	--
brain contusion severe degree	21.43 ± 12.68	10	--
controls	1.16 ± 1.25	31	--

Table 2 demonstrates reference values of alpha₂-macroglobulin according to other authors and our own study. It can be seen that our data are in unison with these of the authors cited. One should have in mind that these reference values have been obtained in inequal conditions,

Table 2
Reference values of alpha₂-macroglobulin in the cerebrospinal fluid according to some authors and to our study

Author	X	R	n	method
E. Bock (1975)	0.8	0.0 ± 1.8	22	electroimmunodiffusion
Lamoureux et al.	4.6	—	174	immunodiffusion
I. Chankov (1982)	1.1	0.0 ± 3.7	58	electroimmunodiffusion
V. Drenski (1987)	1.16	—	31	--

in various laboratories and from various control persons studied to this purpose.

We can draw the conclusion that alpha₂-macroglobulin level increases in ACCCT patients parallelly to the severity of the craniocerebral injury. That is why we confirm the concept suggested by other authors (2, 3, a. oth.) that alpha₂-macroglobulin alone or in combination with other individual proteins (albumins, transferrin, etc.) provides very valuable information for evaluation of blood-liquor barrier. Therefore, alpha₂-macroglobulin is an important parameter indicating any lesions of the blood-liquor barrier in patients with cerebral contusion. Its elevation is mainly of plasmic origin.

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ИНДИВИДУАЛЬНЫЕ БЕЛКИ – ИССЛЕДОВАНИЕ АЛЬФА 2 МАКРОГЛОБУЛИНА И ЕГО ИЗМЕНЕНИЙ У БОЛЬНЫХ С ОСТРОЙ ЗАКРЫТОЙ ЧЕРЕПНО-МОЗГОВОЙ ТРАВМОЙ

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РЕЗЮМЕ

Автором исследован альфа 2 макроглобулин в люмбальном ликворе в течение первых 1 – 2 суток после получения травмы. Исследовано также 31 контрольный больной, которые страдали преимущественно функциональными заболеваниями нервной системы, 35 больных с сотрясением головного мозга и 39 больных с мозговой контузией. Был использован метод ЭИД по Лаурель в модификации Цветановой. Концентрация выражена в мг/л.

Делается заключение, что у больных с острой закрытой черепно-мозговой травмой альфа 2 макроглобулин увеличивается параллельно с тяжестью черепно-мозговой травмы. Контрольная группа показывает стоимости 1.16 ± 1.25 мг/л, а при тяжелой степени мозговой контузии устанавливаются стоимости, превышающие контрольные более чем в 5 раз – 21.43 ± 12.68 мг/л (при норме 0 – 3.7 мг/л). Стоимости альфа 2 макроглобулина имеют важную информативную ценность и являются важным показателем нарушения кровяно-ликворного барьера у больных с мозговой контузией. Увеличение альфа 2 макроглобулина имеет характер преимущественно плазменного происхождения.