Biomedical Research 2017; 28 (20): 9135-9138 *ISSN 0970-938X*
www.biomedres.info

Study on changes of serum CXCL12 in patients with acute cerebral infarction and its clinical significance.

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Abstract

Objective: To study and analyse changes of serum CXCL12 in patients with acute cerebral infarction and its clinical significance.

Methods: According to diagnosis criteria and exclusive conditions, 60 patients with acute cerebral infarction first had been diagnosed by clinic were recruited as experimental group. 60 healthy physical examination whose clinical indexes had no statistical differences compared with experimental group as the control group. ELISA used to detect concentration of CXCL12 in serum for subjects in two groups. Color Doppler ultrasound used to detect CIMT thickening of cervical vessels and quality of plaque.

Results: Concentration of serum CXCL 12 in experimental group higher than the control group, differences had statistical significance (P<0.05). Concentration of serum CXCL 12 of CIMT thickening in the experimental group and the control group all not obviously higher than CIMT normal group, differences had no statistical significance (P>0.05). Concentration of serum CXCL 12 of unstable plaque group in the experimental group obviously higher than non-plaque group and stable plaque group, differences had no statistical significance (P>0.05). Concentration of serum CXCL 12 of stable plaque group not obviously higher than non-plaque group, differences had no statistical significance (P>0.05). Concentration of serum CXCL 12 concentration of unstable plaque group in the control group obviously higher than non-plaque group and stable plaque group, differences had no statistical significance (P>0.05). Concentration of serum CXCL 12 of stable plaque group not higher than non-plaque group, differences had no statistical significance (P>0.05).

Conclusion: Results of this study show that serum CXCL12 participates in ischemic injury process of acute cerebral infarction, also involves in unstable plaque of cerebral infarction patients. But it has no relations with tunica media thickness in artery. Serum CXCL12 level can be an important biological index for evaluating prognosis of acute cerebral infarction, it will be benefit for giving early pathogenesis types for clinical doctors on cerebral infarction patients, confirming pathogenesis to guide clinical treatment, judging prognosis and giving proper prevention in the second level.

Keywords: Serum CXCL12, Acute cerebral infarction, Clinical significance.

Accepted on January 22, 2018

Introduction

Cerebrovascular disease is a cerebrovascular injury caused by many reasons. It is a kind of disease that hypoxic-ischemia of cerebral tissue producing cerebral neurological function injury. It is a common disease and multiple onset disease in nerve system. Its lethality and disability are high, threatening health and life safety of people severely. Ischemic stroke also called Cerebral Infarction (CI), it is a common cerebrovascular disease. Its increasing incidence rate, disability rate and lethality have become a great disease that is threatening health of people. At present, it has become the third leading cause of death after tumor and cardiovascular disease, also the first cause of disability [1]. With the rapid development of economy in our country, life level of people improves significantly. The age of cerebral infarction is ahead of [2], it has become main reasons for threatening health and life in middle and old people in our country. Therefore, early prevention and early prevention for cerebral infarction will promote early tissue function recovery after infarction, improve survival quality of patients. It has an important clinical and social significance.

CXCL12 (Chemokine C-X-C motif ligand 12) also called Stromal Cell-Derived Factor-1 (SDF-1), it is one of CXC subfamily of CF, is closely linked with neurological occurrence, neurological endocrine and neurological degeneration. CXCL12 can induce inflammatory factors into cerebral local ischemia after cerebral infarction, thus aggravating injury, [3] also make NPCs, bone marrow stem cell, EPC gathering in injury location, thus promoting regeneration of nerve and vessels, cerebral function recovery [4]. It can be referred that CXCL12 level is linked with prognosis of cerebral infarction patients. There are animal experiments shows that CXCL12 exerts an important role in

recovery of cerebral recovery [5]. This study explores changes of CXCL12 in acute cerebral infarction patients, providing new pathway for clinic evaluating ischemic cerebrovascular diseases.

Subjects and Methods

Study subjects

60 cases with acute cerebral infarction patients in our hospital from 2014 to 2016 were recruited as experimental group, consisting of 32 males and 28 females. Ages were from 50 to 80 y. Mean age was 65.4 ± 7.5 y. 60 healthy physical examination people who had comparability in sex and age etc. of visitation at the same time as the control group, consisting of 31 males and 29 females. Ages were from 50 to 82 y. Mean age was 64.8 ± 7.8 y. All study subject met diagnosis criteria formulated by the fourth academy of cerebrovascular disease [5], namely cervical artery system or first onset of cerebral infarction of vertebrobasilar artery. It had been demonstrated that there were corresponding new focuses by CT and MRI. Cerebral hemorrhage was excluded. Onset time was within 72 h. All study subjects had no cardiogenic cerebral infarction, lacunar cerebral infarction, they had cerebral hemorrhage history, severe cardiovascular system diseases, severe incomplete liver and kidney function, chronic lung diseases, thyroid diseases, autoimmune diseases and malignant tumor etc. before. Judging better and recurrence in experimental group, symptoms and signs of patients in experimental group had relieved even recovery and no cerebral infarction within two months after the first onset. It had been demonstrated that there were new focuses by CT and MRI. Patients in the experimental group had cerebral infarction again within two months after the first onset. It had been demonstrated that there were corresponding new responsible focuses by CT and MRI.

Study methods

Detection of serum CXCL12 level: All study subjects needed to fasting over 8 h. 3 ml venous blood under empty stomach in the morning of the second day were collected into EDTA anticoagulant tube. Samples after collection within 30 min were given centrifugation at the rate of 3000 r/min for 20 min, 1 ml supernatant blood serum was absorbed, then it stored in fridge under minus 20°C. ELISA method was used to measure level of CXCL12 in serum. ELISA kits bought from America R&D Company. ELISA multiple function analyzer from America Bacon company.

Detection of cervical vessel ultrasound: All study subjects were given cervical vascular examination by using iE33 color Doppler ultrasound diagnostic apparatus (from Philip (China) investment CO., LTD). Frequency of probe was from 5.0 to 10.0 MHz. Supine position was selected. The head slightly tilted to contralateral side of examination, exposing cervix completely. Probe was placed in anterior border of 8sterno mastoid muscle. Bilateral cervical artery including common carotid artery, bulb of cervical artery, extracranial internal carotid artery, external carotid artery, bilateral vertebral artery and subclavian artery given examination. Vertical distance from arterial lumen to endometrial interface and from middle membrane to outer membrane, namely CIMT. CIMT in this study was larger value of CIMT of bilateral common carotid artery at the left and right sides and bulb of common carotid artery. CIMT less than 1.0 mm was normal. CIMT was 1.0mm or more than 1.0 mm, it was CIMT. Limitation CIMT was 1.5 mm or more than 1.5 mm was plaque. The evaluation methods of plaque referred to AHA criteria [6], according to acoustic feature of plaque, it had been evaluated as first, homogeneous echo plaque: it can be divided into low-echo, equal echo and strong-echo plaque; second, heterogeneity echo plaque: plaque included strong, medium and low echo. Strong-echo and equal echo is the echo in plaque. It was near to or stronger than echo of canal echo accompanied with obvious sound shadow in the posterior part, it was stable plaque; low-echo plaque was echo on plaque lower than echo on wall, it was soft plaque; heterogeneity echo plaque was uneven intensity of echo in plaque, it was mixed plaque. Soft plaque and mixed plaque all were unstable plaque. Ultrasound examination each time needed strict measurement and accurate record.

Statistical management

SPSS 19.0 statistical software used to do arrangement and statistical analysis in this study. All measured data and descriptive data were represented as mean ± SD. Comparison between two groups with normal distribution and equal variance were done with t-test. Comparison between multiple groups with normal distribution and equal variance were done with ANOVA analysis, and with abnormal distribution or heterogeneity of variance done with χ^2 test. Statistical significance was assumed at $P<0.05$.

Results

Comparison of serum CXCL 12 in the experimental group and the control group

Concentration of serum CXCL12 in the experimental group significantly higher than the control group, differences had statistical significance ($P<0.05$). It is shown in the Table 1.

Table 1. *Comparison of serum CXCL 12 in the experimental group and the control group.*

Group	CXCL12 (ng/ml)	F	P
The experimental group	17.96 ± 2.85	93.76	0.001
The control group	6.23 ± 1.12		

Comparison of serum CXCL 12 in the experimental group and CIMT normal group and IMT group in the control group

Concentration of serum CXCL 12 in the experimental group and CIMT normal group and IMT group in the control group

not obviously higher than CIMT normal group, differences had no statistical significance (P>0.05). It is shown in the Table 2.

Table 2. Comparison of serum CXCL 12 in the experimental group and CIMT normal group and IMT group in the control group.

Group	CXCL12 (ng/ml)		t	P
	CIMT normal group	CIMT thickening group		
The experimental group	16.78 ± 3.82	20.07 ± 4.21	-1.421	0.203
The control group	5.86 ± 0.92	6.74 ± 1.41	1.652	0.087

Comparison of serum CXCL 12 level of cervical vascular plaque between different groups in the experimental group and the control group

Concentration of serum CXCL12 of unstable plaque group in the experimental group obviously higher than non-plaque group and stable plaque group, differences had statistical significance (P<0.05). Concentration of serum CXCL12 of stable plaque group not obviously higher than non-plaque group, differences had no statistical significance (P>0.05). Concentration of serum CXCL12 of unstable plaque group in the control group obviously higher than non-plaque group and stable plaque group, differences had statistical significance (P<0.05). Concentration of serum CXCL12 of stable plaque group not obviously higher than non-plaque group, differences had no statistical significance (P>0.05, Table 3).

Table 3. Comparison of serum CXCL 12 level of cervical vascular plaque between different groups in the experimental group and the control group.

Group	CXCL12 (ng/ml)		
	Non-plaque group	Stable-plaque group	Unstable plaque group
The experimental group	13.24 ± 2.85	17.58 ± 1.79	22.13 ± 3.14
The control group	5.57 ± 0.72	5.82 ± 0.83	7.74 ± 0.68

Discussion

Acute cerebral infarction is a common disease in neurological internal department. It has ischemia with microcirculation, thus starting multiple injury mechanism, influencing each other and jointly promoting cascade reaction of ischemia, finally causing injury of neurological cells. It is linked with corresponding cerebral injury vessels and collateral circulation of injury region. Comparing with Western developed countries, the incidence rate and death rate of cerebrovascular diseases higher than cardiovascular diseases [7]. Astrocyte and vascular endothelial cells of injury region in 24 h after cerebral ischemia begins to synthesize and release CXCL12 [8]. CXCL12 can drive monocyte entering into vascular wall to stimulate monocyte, thus inducing sudden calcium influx. Because insufficiency supply of triphosadenine and lactic acidosis in cells, combined calcium in cells release greatly. Calcium overload in cell happens. Increased calcium ion can increase the injury of oxidized low density lipoprotein cholesterol (ox-LDL) on vascular endothelial cells. In addition, oxidized low density lipoprotein can induce monocyte to up-regulate CXCR4 mRNA expression. It means CXCL 12 has participated in inflammatory reaction of cerebral ischemia after injury.

Results of this study show that concentration of concentration of serum CXCL 12 in experimental group higher than the control group, differences have statistical significance (P<0.05). Concentration of serum CXCL 12 of CIMT thickening group in the experimental group and the control group all not obviously higher than CIMT normal group, differences have no statistical significance (P>0.05). Concentration of serum CXCL 12 of unstable plaque group in the experimental group obviously higher than non-plaque group and stable plaque group, differences have statistical significance (P<0.05). Concentration of serum CXCL 12 of stable plaque group not obviously higher than non-plaque group, differences have no statistical significance (P>0.05). Concentration of serum CXCL 12 concentration of unstable plaque [9] group in the control group obviously higher than non-plaque group and stable plaque group, differences have no statistical significance (P>0.05). Concentration of serum CXCL 12 of stable plaque group not higher than non-plaque group, differences have no statistical significance (P>0.05). In conclusion, serum CXCL12 participates in ischemic injury process of acute cerebral infarction, also involves in unstable plaque of cerebral infarction patients. But it has no relations with tunica media thickness in artery. Serum CXCL12 level can be an important biological index for evaluating prognosis of acute cerebral infarction, it will be benefit for giving early pathogenesis types for clinical doctors on cerebral infarction patients, confirming pathogenesis to guide clinical treatment, judging prognosis and giving proper prevention in the second level.

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