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Correlation between Extracellular Matrix Metalloproteinase Inducer in Peripheral Blood and Serum MMPs in patients with Acute Coronary Syndrome

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ABSTRACT

This research aimed to investigate the expression level of Extracellular matrix metalloproteinase inducer (EMMPRIN) in peripheral blood and matrix metalloproteinases (MMPs) in the serum of patients with acute coronary syndrome, and to clarify the relationship between them, so as to analyze the pathogenesis of the coronary syndrome. For this purpose, 232 patients (patient group) with the acute coronary syndrome (ACS) diagnosed in the cardiology department of our hospital from May 2020 to March 2021 were collected, and the coronary angiography results of 76 healthy people (healthy group) were collected at the same time, and the index differences between the two groups were compared. First, compare the EMMPRIN expression level of the two groups of subjects, including EMMPRIN on the surface of platelets and monocytes. Second, analyze the difference in MMPs expression level between the two groups, and compare the difference of EMMPRIN and MMPs expression levels in different types of patients according to the disease type. Finally, correlation analysis was used to evaluate the correlation between EMMPRIN and MMPs expression levels in patients, and the ability of mutual regulation between them was analyzed. Results showed that The expression levels of EMMPRIN and MMPs in patients were significantly different from those in healthy patients ($P<0.05$), and the expression levels of EMMPRIN and MMPs in different types of patients were significantly different ($P<0.05$). The distribution of coronary plaque in different types of patients was significantly different, and the expression levels of EMMPRIN and MMPs in patients with a different coronary plaque were significantly different ($P<0.05$). There was a positive correlation between EMMPRIN on the platelet surface and MMPs expression in serum, and a positive correlation between EMMPRIN on the monocyte surface and MMPs expression in serum. In conclusion, the peripheral blood EMMPRIN and serum MMPs in patients with acute coronary syndrome were significantly higher than those in healthy people, and the expression of EMMPRIN in patients with the acute coronary syndrome was positively correlated with serum MMPs.

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Introduction

Cardiovascular disease is still the main clinical disease in China at present, and with the development of society, the morbidity and mortality of cardiovascular disease continue to rise. At present, the number of cardiovascular disease patients in China has exceeded 300 million, including more than 11 million patients with coronary heart disease, and the mortality from coronary heart disease is significantly higher than other cardiovascular diseases such as hypertension and stroke (1,2). In coronary heart disease, the more common disease with a high mortality rate is an acute coronary syndrome. In a large number of clinical practices, it is found that the main cause of death is the rupture of a vulnerable plaque fiber cap, which leads to local thrombosis, leading to coronary artery obstruction (3,4). The rupture of the fibrous cap of vulnerable plaque is caused by its instability. The reason for its instability is that the surrounding inflammatory cells infiltrate, thus promoting the high expression of Extracellular matrix metalloproteinase inducer (EMMPRIN) in tumor cells, causing the fibrous cells to secrete matrix metalloproteinases (MMPs), speeding up the invasion process of tumor cells (5,6). With in-depth research, it has been found in recent years that MMP14 in MMPs affects all aspects of coronary heart disease and promotes the occurrence and development of inflammatory reactions (7). In addition, some studies have found that EMMPRIN can change the expression of MMP14 in some ways. Subsequently, studies have found that MMP15 in the MMPs family also participates in the invasion and metastasis of tumor cells, and its expression is more than 70% similar to MMP14 (8,9). However, from the current research, it can be found that although it is pointed out that MMP15 is related to inflammation, there are still few reports on MMP15, and its mechanism in the pathogenesis of coronary syndrome cannot be determined (10). Therefore, the study explored the expression level of EMMPRIN and MMPs in the peripheral blood of patients with acute coronary syndrome (ACS), and analyzed the regulatory ability of EMMPRIN on MMPs, in order to clarify the pathogenesis of the acute coronary syndrome.

Materials and Methods

General information

232 patients with acute coronary syndrome diagnosed in the cardiology department of our hospital from May 2020

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to March 2021 were collected and set as the patient group; The coronary angiography results of 76 healthy volunteers were collected and set as a healthy group. Inclusive criteria: (i) Patients with ACS were diagnosed with ACC/AHA diagnostic criteria; (ii) The patient had no history of surgery or infection; (iii) No anti-inflammatory drugs were used within half a year. Exclusion criteria: (i) patients received thrombolytic therapy; (ii) The patient has heart failure and other cardiovascular diseases; (iii) Patients with liver and kidney failure; (iv) Tumor patients; (v) Complicated with cerebrovascular diseases and other neurological diseases. The experiment was explained in detail to all patients, and the patient was asked to sign a letter of understanding after obtaining the patient's consent. After strict approval by the Ethics Committee of our hospital, the experiment was conducted on the basis of abiding by moral principles.

Diagnostic methods

All the subjects involved in the experiment need to have coronary angiography, and the angiographic results are analyzed by two doctors with 10 years of experience in our hospital. If the two doctors disagree, the third doctor will participate in the discussion and get the results. In coronary artery imaging, 64-slice spiral CT is used. First, the heart rate of the subject needs to be adjusted to less than 70 times/min, then during the imaging process, the patient is instructed to take the supine position, scan the positioning phase, and select the 75% time phase according to the ECG lead. Two doctors read the films at the same time and divided the coronary atherosclerotic plaque into groups.

EMMPRIN expression level detection

The expression level of EMMPRIN in peripheral blood was detected by the extraction and separation of platelets and monocytes. During the extraction and separation of platelets, 5ml of patient's arterial blood was first extracted. In view of the separation solution, it was centrifuged at 3000 r/min for 15 min. After centrifugation, the platelet plasma layer at the top layer in the centrifuge tube is drawn, placed in another centrifuge tube, added with diluent, centrifuged for 20min, and the supernatant after centrifugation is removed. Then 10ml of cleaning solution is added, centrifuged for 15min, and platelets are obtained. The extracted platelets were immediately sent for testing and labeled with FTTC-CD147 and PE-CD61. In order to eliminate the nonspecific fluorescence interference, the same type of control group was set up in the testing.

In the extraction and separation of monocytes, PBS was used to dilute and collect the poured arterial blood of patients, and after dilution, it was spread into a centrifuge tube containing the separation solution, and centrifuged for 20 minutes. After centrifugation, the monocyte layer between the top plasma layer and the intermediate separation solution was drawn into another centrifuge tube, and 10ml PBS was added for washing, and then 10 people were centrifuged. After centrifugation, the supernatant in the centrifuge tube was removed, 5ml PBS suspension cells were added, and centrifuged for 10min. After centrifugation, repeat the operation more than 2 times, and finally, remove the supernatant of the centrifuged solution, and immediately send the remaining monocytes for inspection. In the detection, FTTC-CD14 and PE-CD147 were used for labeling. In order to exclude non-specific fluorescence interference, the same type of control group was set up in the detection. The inspection process is shown in Figure 1.

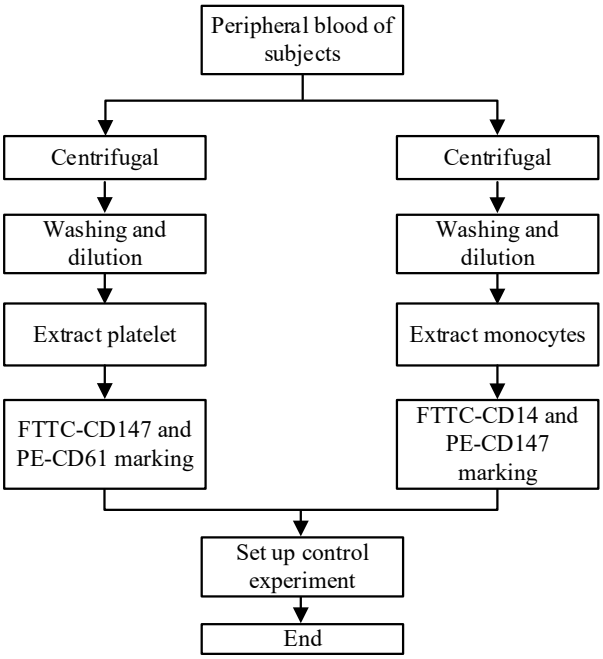

Figure 1. EMMPRIN expression level detection process.

Detection of MMPs expression level

Use ELISA to detect the expression level of MMPs in the patient's serum. First, put the kit at 25 °C room temperature for the test, take out the strips, and put the remaining strips back to 4 °C for sealing according to the number required for the test. Next, establish the standard curve, that is, set 8 standard holes, and add 100 diluents to each hole μ l. Dilute repeatedly from the first hole to the seventh hole, and take the eighth hole as the control group. Then add 100 to the hole to be measured μ L The sample to be tested shall be placed in the reaction plate at 37 °C for 120min, and the reaction plate shall be fully washed 6 times after the reaction. Then add 50 in each hole, in turn, μ L First antibody working solution reaction, 100 μ L The enzyme-labeled antibody working solution reacts, and the reaction plate is fully washed after each reaction. Finally, add 100 μ L Substrate antibody working solution, and put it in the reaction plate under 37 °C dark environment for 10min, after reaction, add 50 μL Stop the solution and detect the light absorption value of the sample obtained at 450nm.

Observations

In patient diagnosis, coronary atheromatous plaque is determined by CT value, and the CT value is expressed by HU. When the CT value is less than 60HU, the patient is a soft plaque; When the CT value is between 60 and 130 HU, the patient is a fibrous plaque; When the CT value is greater than 130HU, the patient is calcified plaque (11,12).

In the detection of EMMPRIN expression level on the platelet surface, the positive expression rates of CD61 and CD147 were taken as the detection results. In the detection of EMMPRIN expression level on the surface of monocytes, the positive expression rates of CD14 and CD147 were taken as the detection results (13). In the detection of the MMPs expression level, the absorbance value of each hole is measured. The actual absorbance value is obtained by subtracting the absorbance value of the control

Table 1. Observations.

Index	Judgment criteria
Coronary atheromatous plaque	Soft plaque:<60HU; Fibrous plaque: 60~130HU; Calcified plaque:>130 HU
EMMPRIN	Platelets: positive expression rate of CD61 and CD147; Monocytes: positive expression rate of CD14 and CD147
MMPs	Actual absorbance value = measured hole absorbance value - control hole absorbance value

hole from the absorbance value of the measured hole. The concentration of MMPs is determined according to the absorbance value (14). See Table 1 for all indicators.

Statistical methods

Collect all the data obtained in the experiment through Excel, import all the data into SPSS24.0 software for statistical analysis, in which the counting data are expressed in cases or percentages, and pass χ^2. The measurement data shall be expressed by mean ± standard deviation ($\bar{x} \pm s$), and the difference between the two groups of data shall be compared by t-test. In the comparison of differences between groups, single factor variance analysis was used, and q test was used in the comparison between groups. Correlation analysis was used to evaluate the correlation between the expression level of EMMPRIN and MMPs. The difference was statistically significant (P<0.05).

Results

General information

A total of 232 patients with ACS were included in the study to construct a patient group, and 76 healthy volunteers were included to construct a healthy control group. See Table 2 for the differences in general data between the two groups. Table 2 shows that patients with coronary syndrome are divided into Acute myocardial infarction (AMI), Unstable angina pectoris (UAP) and Stable angina pectoris (SAP). It can be seen from Table 1 that the number of patients with AMI, UAP and SAP in the patient group is 76, 72 and 84 respectively. And there is no significant difference in age, sex and BMI between the patient group and the healthy group, and the P value between the two groups is less than 0.05 through experience.

Comparison of EMMPRIN expression levels in patients

Analyze the EMMPRIN expression level on the platelet surface of the patient. First, analyze the EMMPRIN expression rate on the platelet surface, and judge it by fluorescence intensity. See Figure 2 for the results. It can be seen from Figure 2 that the expression rate of EMMPRIN on the surface of platelets is 93.69%~100% according to the CD61-PE-S SLOG circle gate.

Figure 3 shows the detection results of EMMPRIN expression on the surface of monocytes. With the CD14-FIFT-S SLOG gate, it can be seen that the expression rate of EMMPRIN on the surface of monocytes in the patient's

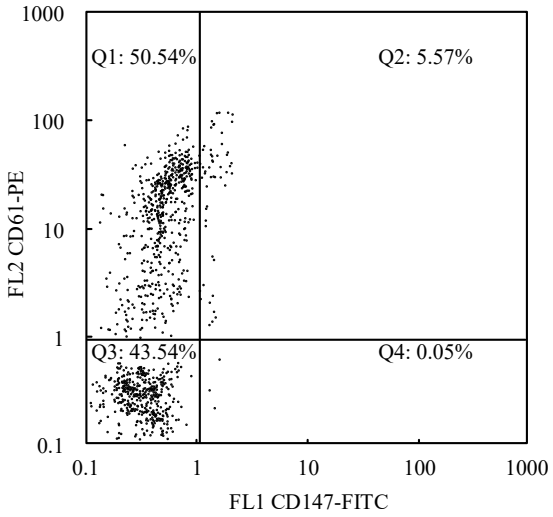

Figure 2. Detection Results of EMMPRIN Expression Level on Platelet Surface.

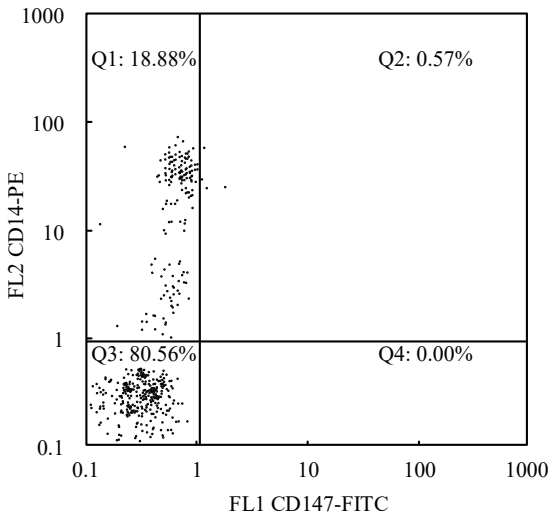

Figure 3. Detection results of EMMPRIN expression on monocytes.

Table 2. General data analysis of patients.

Index		Patient group	Health Group
Age		54.67±6.18	55.03±6.29
Gender	Male	141 (60.78%)	46 (60.53%)
	Female	91 (39.22%)	30 (39.47%)
BMI (kg/m^2)		27.14	26.56
Category of coronary heart disease	AMI	76	0
	UAP	72	0
	SAP	84	0

serum is 95.26%~100%.

Table 3 shows the comparison results of EMMPRIN expression level differences between patients with AMI, UAP, SAP and healthy groups, expressed by mean fluorescence intensity (MFI). It can be seen from Table 3 that in the comparison of EMMPRIN expression levels on the platelet surface, there is a significant difference between the patient group and the healthy group, and the test shows P<0.05. In the comparison of EMMPRIN expression levels on the platelet surface of patients with AMI, UAP and SAP in the patient group, the difference was significant, and the difference between the two groups was statistically significant. In the comparison of EMMPRIN expression level on the surface of monocytes, the difference between the patient group and the healthy group was significant, and the test showed $P<0.05$. Comparing the expression level of EMMPRIN on monocytes between AMI, UAP and SAP patients, the results showed that there was a significant difference between SAP patients and AMI, UAP patients, the P value was less than 0.05, but there was no significant difference between UAP patients and AMI patients, $P<0.05$.

Comparison of MMPs expression levels in patients

Analyze the differences in MMPs expression levels among all subjects. Take MMP14 and MMP15 as examples, first draw their standard curves, as shown in Figure 4. Figure 4 (a) is the standard curve of MMP14. It can be seen that there is a linear correlation between the standard concentration and the absorbance value, which shows that the absorbance value of MMP14 increases with the increase of the standard concentration. Figure 4 (b) is the standard curve of MMP15. It can be found that the correlation curve between the standard concentration of MMP15 and the absorbance value is a parabola, that is, the growth rate of the absorbance value of MMP15 decreases gradually with the continuous increase of the standard concentration.

Compare the differences between MMP14 and MMP15 in the serum of all subjects, as shown in Table 4. It can be seen from Table 4 that in comparing the serum expression difference of MMP14 between patients and healthy patients, the expression difference of MMP14 between SAP patients and healthy patients is not significant ($P>0.05$). The expression level of MMP14 in UAP and AMI patients was significantly higher than that in the healthy group ($P>0.05$); At the same time, the expression level of MMP14 in UAP and AMI patients was significantly different from that in SAP patients ($P>0.05$). In the comparison of MMP15 expression levels of all subjects, the difference between the patient group and the healthy group was significant, and the test results showed that the P value was less than 0.05. In the patient group, the level of MMP15 expression between SAP patients and AMI, UAP patients was significantly different ($P<0.05$), and the level of MMP15 expression in the serum of AMI patients was significantly different from that of UAP patients, and the difference was statistically significant.

EMMPRIN and MMPs expression levels in patients with different coronary plaque

According to the 64-slice spiral CT results, the patients were grouped according to different coronary artery plaque, and the coronary artery plaque of all patients was obtained as shown in Table 5. Table 5 shows that the distribution of coronary artery plaque in patients with different diseases is significantly different, and it can be seen that the distribution of coronary artery plaque in AMI patients is not significantly different. The coronary artery plaque in UAP patients is mainly fiber plaque and soft plaque, and the proportion of soft plaque in SAP patients is large, followed by fiber plaque.

To analyze the difference in EMMPRIN expression levels under a different coronary plaque in ACS patients, the results are shown in Table 6. It can be seen from Table 6 that in the comparison of EMMPRIN expression levels

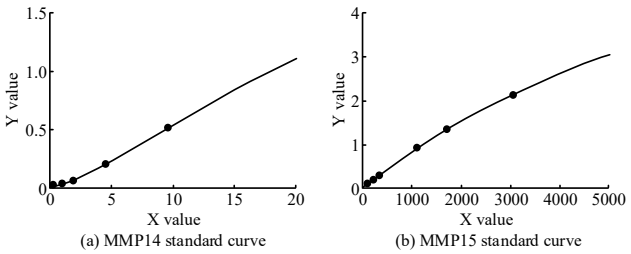

Figure 4. Standard curve of MMP14 and MMP15.

Table 3. The difference in EMMPRIN expression between different types of ACS patients and healthy people.

Group		Number of cases	EMMPRIN on platelet surface (MFI)	EMMPRIN on the surface of monocytes (MFI)
Health Group		76	2.09±2.37	6.89±4.01
Patient group	AMI	76	6.78±2.66[abc]	12.78±4.07[ab]
	UAP	72	4.87±2.69[ab]	11.49±4.01[ab]
	SAP	84	3.32±2.46[a]	9.44±3.71[a]

Note: a means compared with the healthy group, $P<0.05$; b means compared with SAP patients, $P<0.05$; c: Compared with UAP patients, $P<0.05$.

Table 4. Difference between MMP14 and MMP15 in the serum of subjects.

Group		Number of cases	MMP14 (ng/ml)	MMP15 (ng/ml)
Health Group		76	0.58±0.27	0.49±0.38
Patient group	AMI	76	0.91±0.44[ab]	4.82±9.55[abc]
	UAP	72	0.83±0.32[ab]	1.11±0.94[ab]
	SAP	84	0.58±0.28	1.07±0.89[a]

Note: a means compared with the healthy group, $P<0.05$; b means compared with SAP patients, P<0.05; C: Compared with UAP patients, $P<0.05$.

on the platelet surface, there was a significant difference between the healthy group and the patient group (P<0.05). In the patient group, the EMMPRIN expression level on the platelet surface caused by different coronary plaque was significantly different, and the EMMPRIN expression level on the platelet surface of patients with soft plaque was higher than that of patients with other two coronary plaque, with a statistically significant difference. In the comparison of EMMPRIN expression levels on the surface of monocytes, the expression levels of different coronary plaque patients were significantly different, among which the expression level of EMMPRIN on the surface of monocytes in patients with calcified plaque was the lowest, and the expression level of EMMPRIN on the surface of monocytes in patients with soft plaque was the highest.

Secondly, analyze the difference in serum MMPs expression levels in patients with different plaque types, which are also expressed in MMP14 and MMP15, as shown in Table 7. It can be seen from Table 7 that the expression levels of MMP14 and MMP15 in the patient group are significantly different from those in the healthy group, and the test results show that the P value is less than 0.05. From the comparison of patients with different plaques, it can be found that the expression levels of MMP14 and MMP15 in patients with different plaques are significantly different, and it can be found that the expression levels of MMP14 and MMP15 in patients with soft plaques are the highest, and they are significantly different from those in patients with calcified plaques and fibrous plaques (P<0.05).

Correlation analysis between EMMPRIN expression level and MMPs in patients

Analyze the correlation between the expression level of EMMPRIN in peripheral blood and the expression level of MMPs in the serum of patients with ACS. First, analyze the correlation between the expression level of EMMPRIN on the platelet surface and the expression of MMPs, and draw the relevant scatter plot and trend line as shown in Figure 5. Figure 5 (a) shows the correlation analysis between the expression level of EMMPRIN on the platelet surface and the expression level of MMP14 in the patient's serum. It can be seen that with the increase of the expression level of EMMPRIN in the patient's platelets, the expression level of MMP14 in the patient's serum shows a gradually increasing trend, that is, there is a positive correlation between the expression level of EMMPRIN on the platelet surface and the concentration of MMP14 in the serum of ACS patients, The expression level of EMMPRIN and MMP14 on platelet surface can regulate each other. Figure 5 (b) shows the results of the correlation analysis between EMMPRIN and MMP15 on the platelet surface. It can be found that EMMPRIN and MMP15 in platelets of patients show a significant positive correlation. At the same time, from the correlation between them, it can be found that the EMMPRIN expression level and MMP14 expression level can also achieve mutual regulation.

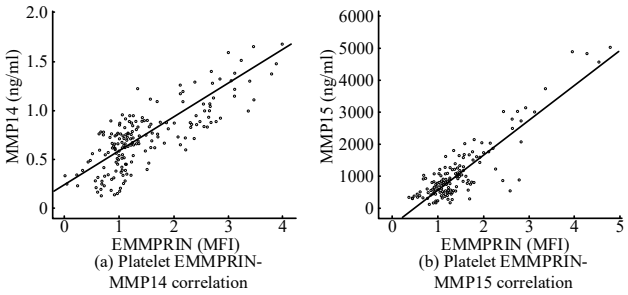

Figure 5. Correlation between EMMPRIN expression on the platelet surface and MMPs expression in serum.

Table 5. Distribution of coronary artery plaque in patients.

Group	Calcified plaque	Fibrous plaque	Soft plaque
AMI	28	36	20
UAP	12	32	28
SAP	2	22	52

Table 6. Expression of EMMPRIN in peripheral blood of patients with different coronary plaque. Types.

Group	Number of cases	EMMPRIN on platelet surface (MFI)	EMMPRIN on the surface of monocytes (MFI)
Health Group	76	2.11±2.38	6.83±4.07
Calcified plaque	42	3.45±2.88 [a]	8.79±4.25 [a]
Fibrous plaque	90	5.56±2.20 [ab]	12.18±2.71 [ab]
Soft plaque	100	7.24±2.57 [abc]	14.14±3.04 [abc]

Note: a means compared with the healthy group, P<0.05; b means compared with patients with calcified plaque, P<0.05; c: Compared with patients with fibrous plaque, P<0.05.

Table 7. The difference in serum MMPs expression in patients with different plaque types.

Group	Number of cases	MMP14 (ng/ml)	MMP15 (ng/ml)
Health Group	76	0.59±0.28	0.45±0.38
Calcified plaque	42	0.86±0.38 [a]	0.77±0.18 [a]
Fibrous plaque	90	0.85±0.49[a]	1.45±1.39 [ab]
Soft plaque	100	0.95±0.23 [abc]	5.51±10.62 [abc]

Note: a means compared with the healthy group, P<0.05; b means compared with patients with calcified plaque, P<0.05; c: Compared with patients with fibrous plaque, P<0.05.

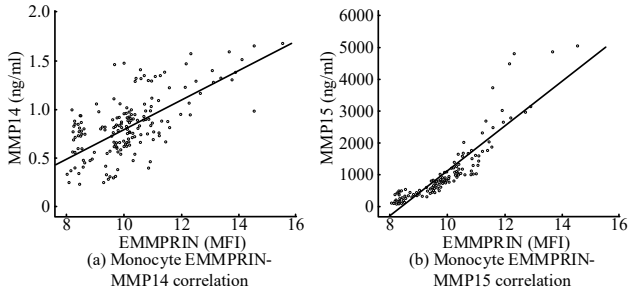

Figure 6. Correlation between EMMPRIN expression on monocytes and MMPs expression in serum.

Figure 6 shows the results of the correlation analysis between the expression level of EMMPRIN on the surface of monocytes and the expression level of MMPs in patients' serum. Figure 6 (a) shows the correlation analysis between the expression level of EMMPRIN on the surface of monocytes and the expression level of MMP14 in patients' serum. It can be found that the expression level of EMMPRIN on the surface of monocytes is positively correlated with MMP14, that is, with the increase of the expression level of EMMPRIN, MMP14 will gradually increase. Figure 6 (b) is the correlation analysis between the expression level of EMMPRIN on the surface of monocytes and the expression level of MMP15 in patients' serum. It can be seen from the figure that there is a positive correlation between the expression level of EMMPRIN on the surface of monocytes and MMP15, showing that the expression level of MMP15 in patients' serum increases with the increase of the expression level of EMMPRIN on the surface of monocytes. And from the relationship between the two, we can find that the expression level of EMMPRIN and MMPs in ACS patients can achieve mutual regulation.

Discussion

ACS is a relatively serious clinical coronary heart disease, in which the common acute myocardial infarction has a high mortality rate in clinical practice, and more than 60% of ACS patients have more vulnerable plaque rupture. The rupture of vulnerable plaque is affected by an individual inflammatory reaction, and a large number of studies have found that the migration of white blood cells within individuals and other processes will also lead to the formation of vulnerable plaque, thereby increasing the incidence of ACS (15,16). With the deepening of clinical research and the diagnosis and treatment of ACS, some studies have found that inflammatory factors can make vulnerable plaque unstable and further develop vulnerable plaque (17). In addition, some studies believe that vulnerable plaque will gradually increase in the late stage of atherosclerosis in some ACS patients, which will promote the increase of MMPs expression level in individual serum, further regulate more inflammatory factors, aggravate the individual inflammatory response, and increase the instability of vulnerable plaque (18-20). In addition, it has been proposed that the secretion of MMPs by fibroblasts is also affected by EMMPRIN, and the analysis of a large number of inflammatory diseases shows that the overexpression of EMMPRIN can significantly increase the expression level of individual MMPs (21,22). As a kind of chronic inflammation, the occurrence of atherosclerosis in patients with ACS is also affected by EMMPRIN, and some studies have found that, under the stimulation of inflammatory factors, the expression of EMMPRIN shows a gradual upward trend, and under this influence, the expression of MMPs in patients' serum also shows a rising trend (23,24). However, a large number of studies have not clarified the specific impact of EMMPRIN and serum MMPs expression in ACS patients, and therefore the specific mechanism of EMMPRIN and MMPs affecting ACS cannot be clarified (25). Therefore, the study deeply analyzed the correlation between peripheral blood EMMPRIN and serum MMPs in ACS patients, so as to determine the pathogenesis of ACS and achieve early diagnosis of ACS.

In this study, we analyzed the EMMPRIN expression rate of ACS patients, including the EMMPRIN expression rate of platelet surface and the EMMPRIN expression rate of monocyte surface. The results showed that the EMMPRIN expression rate on the platelet surface of ACS patients exceeded 93%, and the EMMPRIN expression rate on the monocyte surface of patients exceeded 95%. Some studies have found in the peripheral blood detection of ACS patients that EMMPRIN in patients will show a high expression phenomenon, and found that under the stimulation of inflammatory factors, the expression of EMMPRIN in monocytes increases significantly, which is consistent with the results in the study (26,27). At the same time, according to the type of ACS patients, the patients were divided into AMI, UAP and SAP, and the differences in EMMPRIN expression among the three types of patients were analyzed. The results showed that the differences in EMMPRIN expression on the platelet surface of AMI, UAP and SAP patients were significant, and the expression of EMMPRIN was the highest in AMI patients and the lowest in SAP patients. The EMMPRIN expression on the surface of monocytes in patients with AMI, UAP and SAP was significantly different, but the difference between patients with AMI and patients with UAP was small ($P>0.05$). At the same time, both patients showed that the expression of EMMPRIN on the surface of monocytes was significantly higher than that in patients with SAP ($P<0.05$). The above results indicate that the aggravation of ACS patients will directly lead to the increase of EMMPRIN in their peripheral blood, which is similar to previous studies. In addition, 64 slice spiral CT showed that the expression of MMPs in the serum of patients with AMI, UAP and SAP also showed significant differences, and compared with healthy people, the expression level of MMPs in patients was significantly increased, which was consistent with previous studies (28,29).

In addition, the study divided all ACS patients into groups according to their coronary plaque types and found that the distribution of coronary plaque in patients with different disease types was different. At the same time, the study analyzed the difference in the expression of EMMPRIN in peripheral blood and MMPs in the serum of patients with different coronary plaque. The results showed that there was a significant difference in the expression of EMMPRIN in peripheral blood and MMPs in the serum of patients with different coronary plaque ($P<0.05$), which was consistent with previous studies (30,31). Finally, in order to determine the impact of EMMPRIN expression in the peripheral blood of ACS patients on serum MMPs expression, correlation analysis was used to evaluate. The

results showed that EMMPRIN expression on the platelet surface and monocyte surface was positively correlated with serum MMPs expression. From the experimental results, we can know that EMMPRIN expression and serum MMPs expression can achieve mutual regulation, which is consistent with previous research results (32-33). Therefore, in the early diagnosis of ACS, the expression of MMPs in patients can be determined by detecting the expression of EMMPRIN in patients' peripheral blood, and the expression level of EMMPRIN can also be inferred by detecting the expression of MMPs in patients' serum.

To sum up, in the pathogenesis of ACS, the expression level of EMMPRIN in peripheral blood and MMPs in serum is significantly higher than that of healthy people, which indicates that EMMPRIN and MMPs play a significant role in ACS. At the same time, the study found that the increased expression of EMMPRIN and MMPs would increase the instability of coronary plaque. Further understanding clarified the correlation between the expression of EMMPRIN in peripheral blood and MMPs in serum, showing a positive correlation, indicating that both can play a role in the pathogenesis of ACS, and affect the development of ACS through mutual regulation. Therefore, we can know that in the early diagnosis of ACS patients, the detection of EMMPRIN expression in patients' peripheral blood can early determine the expression of MMPs in patients' serum, and then early diagnosis and treatment of patients. However, the number of MMPs family members included in the analysis is still small, so it is impossible to comprehensively evaluate the correlation between peripheral blood EMMPRIN and serum MMPs. Increasing the analysis of other MMPs family members is the main direction of the next step.

Conclusion

ACS has a significant impact on the life of patients. In this study, we analyzed the correlation between EMMPRIN in peripheral blood and serum MMPs in patients with ACS. The results showed that EMMPRIN and MMPs in ACS patients were significantly different from those in healthy people, and MMPs were affected by the expression level of EMMPRIN. Therefore, in order to achieve the early diagnosis and treatment of ACS patients, we should pay close attention to the expression level of EMMPRIN in their peripheral blood, and analyze the expression of MMPs in patients' serum, so as to provide reasonable arrangements for the early prevention and treatment of patients, and thus reduce the incidence of ACS in China.

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