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# *Orosomucoid on the surface and inside the leukocytes in myocardial infarction*

Orozomukoid powierzchniowy i wewnątrzleukocytarny w zawale mięśnia sercowego

## INTRODUCTION

Myocardial infarction is one of the basic causes of population invalidisation and death that determinates the necessity of deepening fundamental research of this multifactorial disease. Many pathological states are characterised by infringement of processes of synthesis and glycosylation of blood plasma glycoproteins. A considerable number of works are devoted to studying the level and glycosylation of blood plasma orosomucoid ($б_1$-acid glycoprotein, ORM) at various pathological states [7]. Orosomucoid is a plasma glycoprotein that belongs to the group of acute-phase proteins. It is mainly synthesized in the liver, but mRNA expression for ORM has been found in other tissues [3]. The serum concentration of ORM increases several times during the acute phase response, the systemic answer to a local inflammatory stimulus [2]. A role in modulation of the immune response has been attributed to ORM, e.g. in protection against inflammation-induced tissue injury. ORM also acts on cells that are involved in the inflammatory processes, such as polymorphonuclear cells, macrophages, lymphocytes, and platelets [6]. But expression on the blood cells and the physiological function of orosomucoid are poorly understood.

The objectives of this paper were to study distribution of ORM on the surface and inside granulocytes, monocytes and lymphocytes in myocardial infarction and health.

## MATERIAL AND METHODS

Concentration and distribution of ORM were defined in blood of 12 patients, selected on the first day after a heart attack. The control group consisted of 20 healthy donors. ORM level was measured in blood plasma by immunodot using polyclonal anti-human ORM antibodies (Serva). Distribution of ORM was examined by flow cytometry (Beckman Coulter®).

## RESULTS

ORM concentration in plasma of healthy donors (n=20) was 0.842±0.068 g/l. In the group with myocardial infarction (n=12) ORM level rose to 1.072±0.081 g/l (Table 1).

Table 1. Level of orosomucoid in myocardial infarction and health

| | plasma ORM, g/l |
|---|---|
| control group | 0.842±0.068 |
| myocardial infarction | 1.072±0.081** |

*** P<0.001 ** P<0.01 * P<0.05

Studying of ORM distribution on and inside granulocytes, monocytes and lymphocytes showed that the most considerable changes were characteristic of lymphocytes and monocytes. A 1.64–fold increase of lymphocyte populations with ORM on the surface and inside the cells was observed. The amount of monocytes expressing ORM on the cell surface was increased 1.19 times (Table 2).

Table 2. Distribution of orosomucoid on the surface and inside of granulocytes, monocytes and lymphocytes in myocardial infarction and health

| | n | on cell surface (%) | | | inside the cell (%) | | |
|---|---|---|---|---|---|---|---|
| | | granulocytes | monocytes | lymphocytes | granulocytes | monocytes | lymphocytes |
| control group | 20 | 95.96±0.74 | 78.98±4.84 | 14.87±1.56 | 96.13±3.25 | 97.66±1.24 | 32.55±2.11 |
| myocardial infarction | 12 | 95.93±2.58 | 94.71±1.19** | 24.48±4.89** | 99.47±0.11** | 91.55±8.07 | 54.52±2.96*** |

***P<0.001 **P<0.01 *P<0.05

## DISCUSSION

It was shown that ORM participates in inflammation and tissue regeneration [2]. Increase of its concentration in plasma can be observed in response to various pathological processes. We showed that the level of ORM in plasma within the studied group was 1.27–fold higher than in healthy individuals ($p<0.001$, Table 1). However, ORM is an unspecific acute-phase protein. Our study revealed an increase of ORM expression on the surface and inside the leukocytes. The most significant changes were found for lymphocytes. Perhaps blood cells are the first which synthesize ORM in the early hours of IM. Activation of ORM synthesis was shown for polymorphonuclear leukocytes (PMN) in human myocardial infarction [5]. Poland et al. suggested that activated human PMN synthesize and a release a glycoform of ORM, which is transiently deposited in cardiomyocytes. There are enough articles that propose the use of ORM as a diagnostic criterion of myocardial infarction [1, 4]. But there is no consensus regarding the diagnostic value of the plasma level of ORM.

In this study, we showed that the differences in the distribution of ORM in the population of leucocytes are more significant than its concentration in blood plasma and can be more informative for assessing the course of acute coronary syndromes.

## CONCLUSIONS

1. It was found that during the first hours after a myocardium heart attack concentration of ORM was changed not so considerably as its distribution on the surface or/and inside lymphocytes and monocytes.

2. Estimation of ORM distribution on the surface and in blood cells can be used as an additional criterion for diagnostics and treatment monitoring of sharp coronary syndromes.

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## SUMMARY

We investigated the concentration and distribution of ORM in blood cells of 12 patients collected at the first day after the heart attack. We showed that the level of ORM was increased 1.27 times in the serum in myocardial infarction. The ORM distribution on the surface and inside the blood cells is a more informative marker and can be successfully used as additional criteria for monitoring patients with acute coronary syndromes.

*Keywords*: orosomucoid, leukocyte, myocardial infarction, flow cytometry.

## STRESZCZENIE

Oznaczono stężenia i dystrybucję orozomukoidu w komórkach krwi 12 pacjentów w pierwszej dobie po wystąpieniu zawału mięśnia sercowego. Wykazano, że poziom ORM był 1,27-krotnie

wyższy w surowicy chorych z zawałem niż w grupie kontrolnej. Dystrybucja ORM na powierzchni i wewnątrz komórek krwi jest markerem o większej wartości informacyjnej i może być dodatkowym kryterium biochemicznym w monitorowaniu pacjentów z zawałem.

*Słowa kluczowe*: orozomukoid, leukocyt, zawał serca, cystometria przepływowa