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Microbial phenylcarboxylic acids as potential participants of sepsis-induced organ dysfunction

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Objectives In previous studies we demonstrated increased level of phenylcarboxylic acids (PhCAs) in serum of critical patients, especially in sepsis. It was shown that at patients with lethal outcome the level of sepsis-associated PhCAs was higher in comparison with survived patients. PhCAs are derivatives of phenylalanine and tyrosine. We have already proved that besides endogenous origination, PhCAs can be produced by clinically important nosocomial pathogens. Phenyllactic (PLA) and p-hydroxyphenyllactic (p-HPLA) acids are produced in large quantities.

Methods 16 critically ill patients with peritonitis arising from mesenteric ischemia (n=4), perforation (n=6) and mechanical obstruction (n=6) of intestines were included. The median of APACHE II score value was 10 (IR 9—15). The median of age was 75 (IR 60—79) years. We have measured the level of PLA, p-HPLA, phenylacetic (PAA), p-hydroxiphenylacetic (p-HPAA) acids and total sum of PhCAs in serum by gas chromatography (GC-FID).

Results The correlation between total level of PhCAs, SOFA ($r=0,7$, $p<0,05$) and MODS II ($r=0,7$, $p<0,05$) was revealed. Comparing the level of PhCAs with the signs of infection it was found that maximum body temperature and heart rate correlated with PLA ($r=0,8$ and $r=0,5$ respectively, $p<0,05$,) and the level of white blood cells moderately correlated with p-HPLA ($r=0,5$, $p<0,05$). Both PLA and p-HPLA had inverse correlation ($r=-0,9$ and $r=-0,8$ respectively, $p<0,05$) with mean arterial pressure. p-HPLA had correlation between tissue perfusion parameters, such as: BE ($r= -0,7$, $p<0,05$) and lactate ($r=0,8$, $p<0,05$).

Comparing the level of PhCAs with the biomarkers of organ failure it was found that PAA and p-HPAA had correlation with the serum creatinine ($r=0,8$ and $r=0,7$ respectively, $p<0,05$) and p-HPLA had correlation with total bilirubin ($r=0,9$, $p<0,05$).

Conclusion Total level of PhCAs and their metabolic profile in blood serum could potentially be used as new markers of severe sepsis in patients with peritonitis. The participation of a microbial factor in pathogenesis of sepsis-induced organ dysfunction may be associated with PhCAs.

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