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The biomarkers of bacterial translocation and intestinal wall damage in the patients with multiple organ dysfunction syndrome

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Introduction. In the critically ill patients in ICU due to microcirculation disorders of the intestinal wall, its permeability increases and bacteria and their endotoxins penetrate the damaged intestinal wall, which becomes systemic and ultimately can lead to multiple organ dysfunction syndrome (MODS), sepsis and even death. The aim of pilot study was to evaluate the biomarkers of bacterial translocation: lipopolysaccharide-binding protein (LBP), soluble CD14 subtype (sCD14-ST), and intestinal wall damage: intestinal fatty acid binding protein (I-FABP), Zonulin, regenerating islet-derived protein-3α (REG3α), in the patients with MODS.

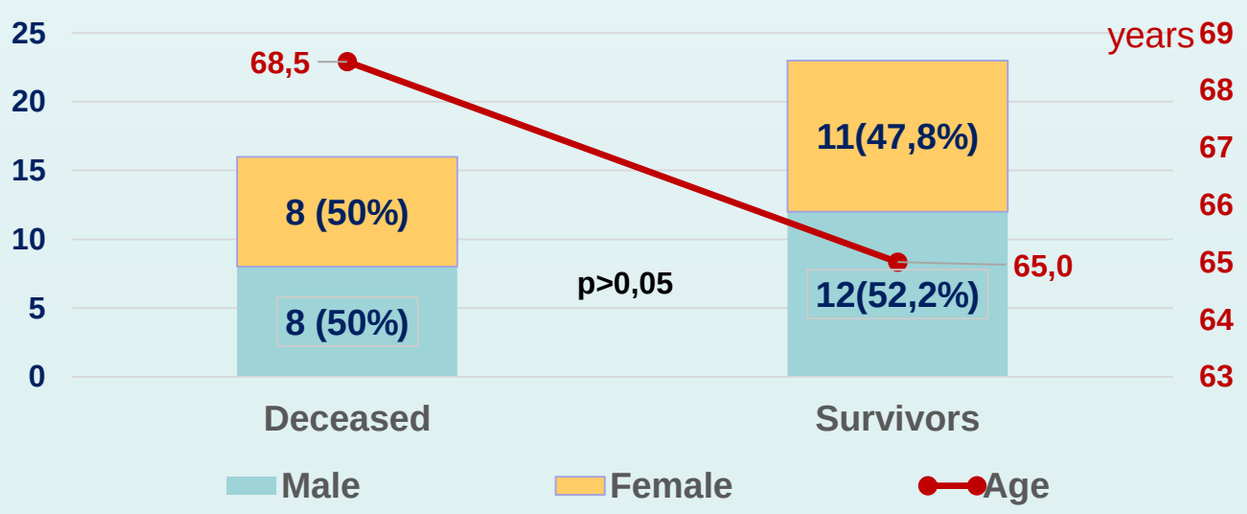
Materials & Methods

39 patients with multiple organ dysfunction syndrome

Venous blood was sampled during diagnostics of MODS according to the SOFA scale (Day1). Then Day3 and Day7 of MODS development

Biomarkers of bacterial translocation (LBP, sCD14-ST) and biomarkers of intestinal wall damage (I-FABP, Zonulin, Reg3a) in blood serum were determined by ELISA

Results & Discussion. Out of 39 patients with MODS, 23 patients survived (59%) and 16 are died (41%). Patients' profiles are presented in Figure 1. In deceased patients, the sCD14-ST on Day 1 was higher by 14.15 ng/mL, on Day 3 was higher by 14.51 ng/mL ($p=0.003$ and $p=0.029$, respectively), the I-FABP on Day 3 was higher by 76 pg/mL ($p=0.004$), the REG3α on Day 1 was higher by 4.66 ng/mL ($p=0.001$) (Figure 2). These results may indicate that in violation of the permeability of the intestinal wall the levels of I-FABP and REG3α in the blood serum increases, as a result of which bacterial translocation increases, organ dysfunction worsens and the risk of death increases. As of today, an important cause of the development and severity of MODS is the violation of the intestinal barrier followed by increased translocation of intestinal microflora into the systemic bloodstream, which is ultimately able to aggravate organ dysfunction and the development of fatal outcomes.



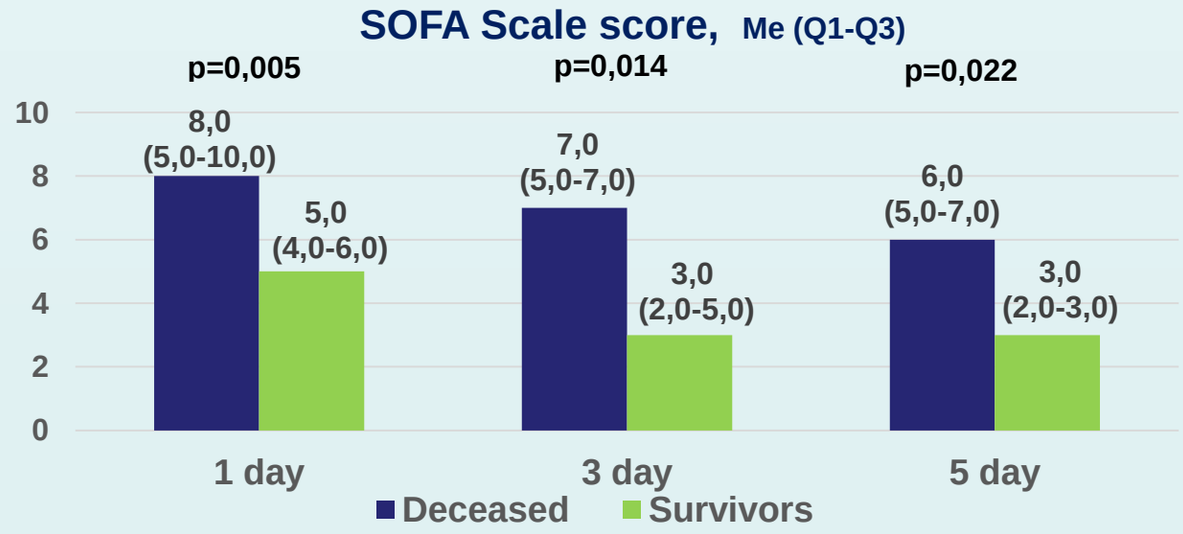
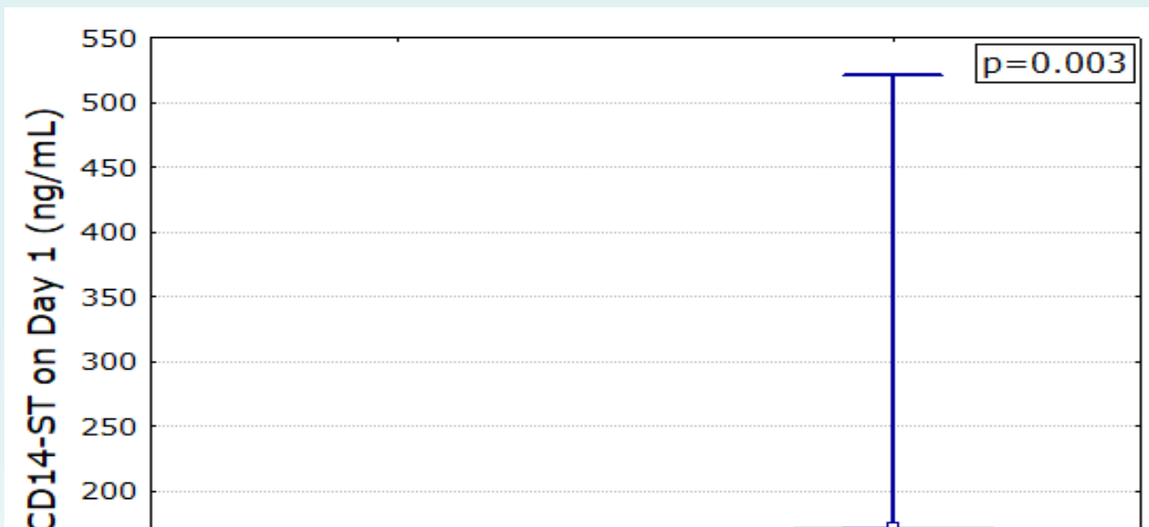
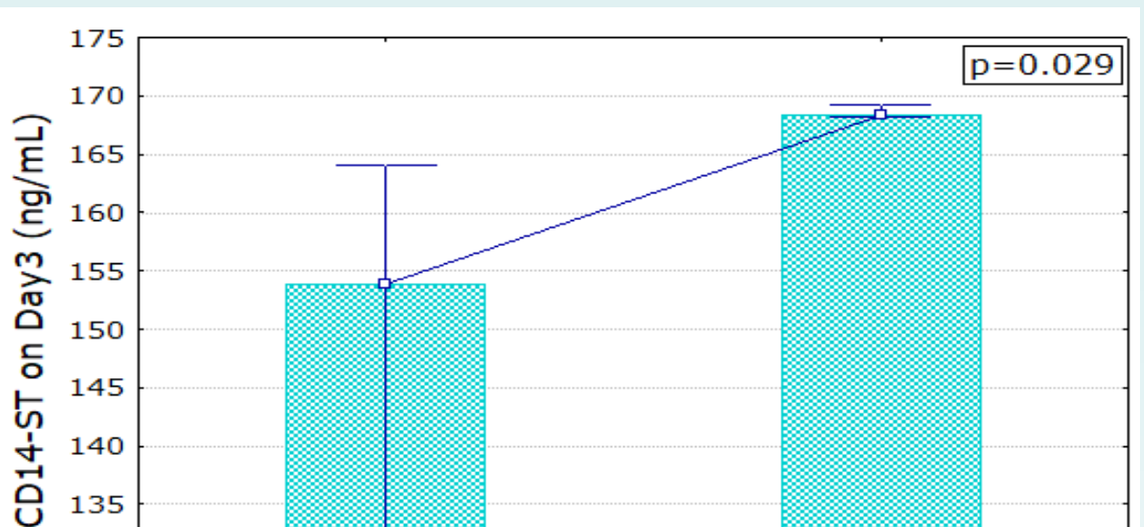
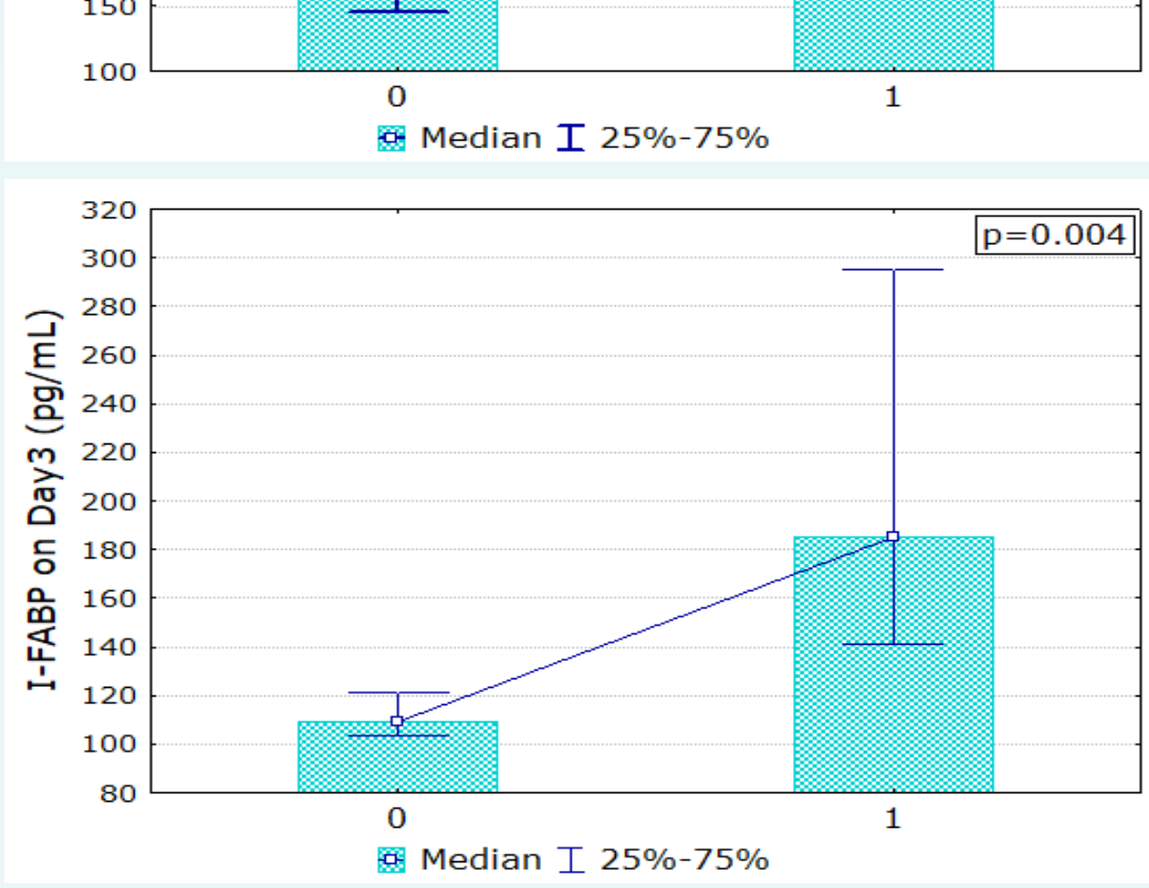


Figure 1. *The studied patients' profiles*







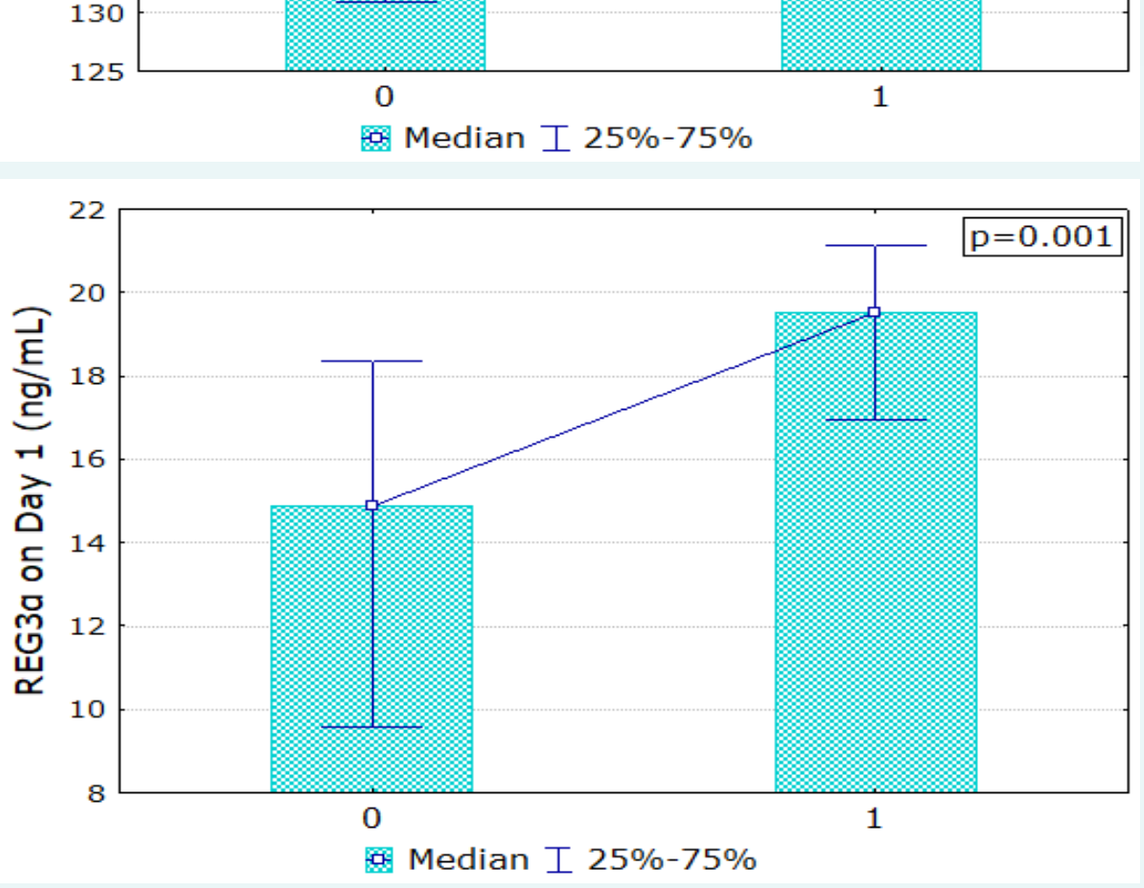


Figure 2*. The sCD14-ST levels on Day 1 and 3, I-FABP level on Day 3 and REG3α on Day 1 after diagnosing MODS depending on the lethal outcome (deceased patients -1, survived - 0)*

Conclusion. In the patients with MODS the increase of sCD14-ST, I-FABP, REG3α in blood indicates a violation of intestinal barrier function and increased bacterial translocation which may increase the risk of death. It is required to further study the factors leading to intestinal wall permeability disorders to screen for timely intensive care measures for prevention unfavorable outcomes.

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