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Official title: Severity and time course of GCX damage in critically ill patients

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Objective: Endothelial glycocalyx (EG) plays central role in coupling functions of microcirculation and tissue metabolism. EG is particularly important in critically ill patients when it gets damaged. The aim of study was to describe the condition of EG in critically ill patients by non-invasive method in dependence of severity of the illness and usage of methods of organ support.

Design: monocentric, prospective observational study.

Setting: Intensive Care Unit (ICU), University Hospital.

Methods: Adult patients admitted to the ICU with anticipated length of stay at least 7 days were enrolled. Demographic and clinical data were recorded together with sublingual microcirculation recordings for Perfused Boundary Region (PBR) analysis.

Scientific background: Endothelial glycocalyx (EG) is a microscopic lining of the inner surface of blood vessels. The results of recent research have shown a central role of EG in the physiological and pathophysiological processes of microcirculation and in the development of endothelial damage. EG mucopolysaccharide structure makes it susceptible to degradation, which occurs most often in the context of critically ill patients with sepsis, trauma and ischemia-reperfusion injury. Clinical studies on the dynamics of EG changes in intensive care patients are rare, and we have not found work on the impact of organ support techniques in available resources. The most data are from the area of extracorporeal circulation in cardio surgery. Given the current evidence of EG degradation in critical conditions, we hypothesized that there is a relationship between the degree of EG degradation and the severity of the clinical condition.

Statistical considerations: The calculation of the minimum sample size of 30 patients was based on the assumption of a difference in Perfused Boundary Region values as an indirect indicator of EG damage (detailed description of the methodology below) between healthy volunteers and patients in critical condition. correlation coefficient 0.6), defining type I error = 0.05 and study strength = 0.9. The differences between groups were calculated by type of data, compared with an unpaired t-test, Mann Whitney's rank test, and One-Way ANOVA. The Pearson correlation coefficient with a 95% confidence interval was used to assess the correlation between PBR and APACHE II, SOFA and fluid balance. To assess the ability of PBRs (sensitivity and specificity) to predict septic shock or positive fluid balance, the Receiver Operating Characteristic (ROC) curve was calculated. Differences with $P < 0.05$ were considered statistically significant. Statistical analyzes and graphs were performed using MedCalc 7.6.0 computer programs. (MedCalc Software, Ostend, Belgium) or Prism 5 for Mac OS X (Version 5, Dec. 19, 2008).

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