Introduction:
The purpose of this study is to investigate the endothelial glycocalyx at the onset of sepsis. We hypothesize that the perfused boundary region (PBR) in microvessels (5-25µm) measured by side stream darkfield imaging (SDF) and plasma markers of glycocalyx shedding is increased in non-survivors.

Methods:
We studied 31 sepsis patients and divided them into survivors (n=17) and non-survivors (n=14) (30-day mortality). SDF measurements and blood sampling were performed within 24h of ICU-admission. ELISAs were used to quantify syndecan-1, angiopoietin-1 (Ang-1) and angiopoietin-2 (Ang-2). Non-parametric tests (Spearman for correlations, Mann Whitney for group comparison) were used to assess statistical significance. A p<0.05 was considered significant. Results are presented as median (25th-75th percentile).

Results:
Syndecan-1 levels were higher in non-survivors compared to survivors (519,2 (255,6-1056,7) vs. 178.0 (58,1-298,2) ng/ml, p=0.005) (Fig 1). PBR tended to be higher in non-survivors (2,0 (1,9-2,2)µM) than in survivors (1,9 (1,7-2,1) µM) (p=0,05) (Fig 2). Syndecan-1 correlated positively with APACHE II (ρ=0,60; p=0,02) and Ang-2/Ang-1 ratio (ρ =0,59; p=0,004), but not with PBR.

Conclusion:
Plasma markers of glycocalyx shedding at ICU admission are predictors of 30-day mortality and correlate with APACHE II score. However, there is no correlation between these plasma markers and glycocalyx thickness measured by SDF imaging on ICU admission. Further studies should address the cause of this apparent discrepancy to define the role of SDF imaging in the assessment of glycocalyx shedding in sepsis.
Figure 1: boxplot of Syndecan-1 for survivors and non-survivors

Figure 2: boxplot of PBR for survivors and non-survivors