Summary

Background. The multiple organ dysfunction syndrome (MODS), a subsequent failure of two or more vital organs, is the endstage of initial trigger events, such as acute coronary syndrome or sepsis. The mortality is high - up to sixty percent. We have recently shown that a decrease in heart rate variability ([HRV], HRV variable InVLF) can identify a subgroup of MODS with a worse prognosis. Parasympathetic stimulation can depress inflammation and might thus improve survival. The aim of the present study was to detect whether β-blockers as mainly indirect but also direct parasympathetic modulators have a positive impact on outcome.

Methods. We retrospectively analysed the data of 120 consecutively admitted ICU patients with MODS. HRV was measured according to the international standards using a 24-hour-ECG. All patients were checked for β-blocker treatment and followed up for 28-day-survival. We calculated a cutpoint (maximum of sensitivity x specificity in ROC analysis) for the HRV parameter InVLF which predicted 28-day-survival best. The APACHE II score (APII) was calculated to characterize the severity of illness; a MODS was defined as a APII ≥ 20 points.

Results. The demographic data of the patients were as follows: age 59.9 ± 13 y, weight 76.6 ± 14.9, height 170.4 ± 10.0 cm, APACHE II score 26.9 ± 7.6. 56 of the 120 included patients received β-blocker treatment during the ICU stay. Patients with β-blockers had a significantly higher HRV at admission than patients without β-blockers (3.4 vs. 4.5 lnms², p<0.0001). Dividing the cohort of patients into four subgroups we found that patients with β-blocker treatment and a high HRV on admission had the best survival compared with 1) patients with low HRV and β-blocker-treatment (log rank [LR] of Kaplan-Meier-Analysis=3.9, p=0.047), 2) patient with high HRV but without β-blockers (LR=4.6, p=0.03) and 3) patients with low HRV and without β-blockers (LR= 13.4, p=0.0003).

Conclusion. β-blocker treatment could improve survival in MODS patients. This favourable effect might be mediated by a restoration of blunted HRV which could yield depression of the overwhelming inflammation seen in MODS.