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RESEARCH AREA

Sepsis is one of the most challenging diseases in intensive care, with a high mortality rate despite modern, costly therapies. The septic disease process is an uncontrolled inflammatory response to infection, leading to the development of life-threatening multi-organ failure. The main difficulty in the therapy of sepsis is the heterogeneity of organ damage and the dynamic variability of the septic response, which significantly complicate the diagnosis and the use of effective OTC therapies. Nowadays, the main goal of clinical care is to eliminate the infection and, if necessary, to use organ-supportive therapies, which are not sufficient in themselves. The focus of our experiments is on new therapeutic strategies that may be able to correct the global oxygen and energy deficits that are most responsible for the development of multi-organ failure and to restore oxygen dynamic balance. In addition to reducing the inflammatory response, our therapeutic goal is to improve the function of the main elements of oxygen transport: macro- and microcirculation; and mitochondrial oxygen consumption, the key to energy production.

TECHNIQUES AVAILABLE IN THE LAB

Participation in in vivo animal experiments. Induction of sepsis and monitoring the health of experimental animals. Learning experimental anaesthesia and surgical techniques. Monitoring of circulation, respiration and major organ functions (liver function, excretion), application of organ support therapies. Assessment and evaluation of microcirculation using intravitreal video microscopic imaging (Cytocam-IDF). Tissue sampling and processing of samples. Recording, analysis and statistical analysis of experimental data.

SELECTED PUBLICATIONS

Rutai, A., Zsikai, B., Tallósy, SP., Érces, D., Bizánc, L., Juhász, L., Poles, MZ., Sóki, J., Baaity, Z., Fejes, R., Varga, G., Földesi, I., Burián, K., Szabó, A., Boros, M., Kaszaki J. (2022) *A Porcine Sepsis Model With Numerical Scoring for Early Prediction of Severity.* **Front Med (Lausanne) 9:** 867796.

Tallósy, SP., Poles, MZ., **Rutai, A.**, Fejes, R., Juhász, L., Burián, K., Sóki, J., Szabó, A., Boros, M., Kaszaki, J. (2021) *The microbial composition of the initial insult can predict the prognosis of experimental sepsis.* **Sci Rep. 11:** 22772.

Poles, MZ., Nászai, A., Gulácsi, L., Czakó, BL., Gál, KG., Glenz, RJ., Dookhun, D., **Rutai, A.**, Tallósy, SP., Szabó, A., Lőrinczi, B., Szatmári, I., Fülöp, F., Vécsei, L., Boros, M., Juhász, L., Kaszaki, J. (2021) *Kynurenic Acid and Its Synthetic Derivatives Protect Against Sepsis-Associated Neutrophil Activation and Brain Mitochondrial Dysfunction in Rats.* **Front Immunol. 12: 717157.**

Rutai, A., Fejes, R., Juhász, L., Tallósy, SP., Poles, MZ., Földesi, I., Mészáros, AT., Szabó, A., Boros, M., Kaszaki, J. (2020) *Endothelin A and B Receptors: Potential Targets for Microcirculatory-Mitochondrial Therapy in Experimental Sepsis.* **Shock 54:** 87-95.

Juhász, L., **Rutai, A.**, Fejes, R., Tallósy, SP., Poles, MZ., Szabó, A., Szatmári, I., Fülöp, F., Vécsei, L., Boros, M., Kaszaki, J. (2020) *Divergent Effects of the N-Methyl-D-Aspartate Receptor Antagonist Kynurenic Acid and the Synthetic Analog SZR-72 on Microcirculatory and Mitochondrial Dysfunction in Experimental Sepsis.* **Front Med (Lausanne) 7:** 566582.