FERENC PETÁK

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RESEARCH AREA

The cardiopulmonary research laboratory performs scientific activities in various fields of cardiopulmonary physiology and pathophysiology by using translational animal models of lung diseases and performing assessments in clinical environment. A research area is focusing on the involvement of the pulmonary hemodynamics and lung vasculature in various respiratory diseases. We clarify the mechanisms responsible for the lung function deteriorations with a particular focus on the cardiopulmonary interactions. Further research focuses on the characterization of the pulmonary consequences of general anesthesia in various animal models and in clinical environment. Improvement of patient monitoring is essential for the optimization of patient management in anesthesia and intensive care settings. Analyses of the expired gases has great importance in respiratory patient monitoring. Thus we analyze the within-breath dynamics of CO_2 exhalation by using capnography to gain insights into the ventilation-perfusion matching. Further research focuses on the pulmonary manifestations of type-2 diabetes mellitus (T2DM) that presents major public health concerns. We characterize the changes in airway function and clarify the deteriorations in the viscoelastic properties of the pulmonary parenchyma, which may be a consequence of lung volume loss, interstitial edema, proliferation, and the effect of advanced glycation endproducts and their interaction with receptors.

TECHNIQUES AVAILABLE IN THE LAB

- Measurement methodologies for the assessment of lung mechanics in animal models and in clinical environment involving spontaneously breathing subjects and anaesthetized mechanically ventilated patients.
- Techniques for circulatory and respiratory monitoring.
- Models of airway hyperresponsiveness.
- Inhalation of airborne nanoparticles: exposition and measurement methods.
- Analyses of expired gases, evaluation of the dynamics of expired CO_2 concentration with capnography, oxygraphy.
- Assessment of pulmonary consequences of diabetes mellitus in animal models and patients.
- Near infrared spectroscopy for the assessment of cerebral tissue oxygen saturation.
- Assessment of perioperative hemostasis.

SELECTED PUBLICATIONS

Fodor, G.H., Bayat, S., Babik, B., Habre, W., **Petak, F.** (2018) Reversing Cholinergic Bronchoconstriction by Common Inotropic Agents: A Randomized Experimental Trial on Isolated Perfused Rat Lungs. **Anesth Analg** doi: 10.1213/ANE.0000000000003502. [Epub ahead of print]

Babik, B., Balogh, A.L., Sudy, R., Ivankovitsne-Kiss, O., Fodor, G.H., **Petak, F.** (2017) Levosimendan prevents bronchoconstriction and adverse respiratory tissue mechanical changes in rabbits. **Am J Physiol Lung Cell Mol Physiol. 313(5):** L950-L956.

Petak, F., Fodor, G.H., Babik, B., Habre, W. (2016) Airway mechanics and lung tissue viscoelasticity: effects of altered blood hematocrit in the pulmonary circulation. **J Appl Physiol 121(1):** 261-7.

Filep, Á., Fodor, G.H., Kun-Szabó, F., Tiszlavicz, L., Rázga, Z., Bozsó, G., Bozóki, Z., Szabó, G., **Petak, F.** (2016) Exposure to urban PM1 in rats: development of bronchial inflammation and airway hyperresponsiveness. **Respir Res. 10;17:** 26.

Fodor, G.H., Babik, B., Czövek, D., Doras, C., Balogh, Á.L., Bayat, S., Habre, W., **Petak, F.** (2016) Fluid replacement and respiratory function: comparison of whole blood with colloid and crystalloid: A randomised animal study. **Eur J Anaesthesiol. 33(1):** 34-41