

RÓBERT GÁSPÁR



University of Szeged
Albert Szent-Györgyi Medical School
Department of Pharmacology and Pharmacotherapy

Address: Dóm tér 12., H-6720 Szeged, Hungary

RESEARCH AREA

Our research focus is on smooth muscle pharmacology, including the pharmacological modification of uterine and digestive tract musculature in isolated organ and live animal studies.

Preterm birth (birth before 37 weeks of gestation) and its consequences are among the greatest challenges in obstetric practice, carrying a significant health risk and a major cause of neonatal morbidity and mortality. The pathophysiology of preterm birth is not fully understood, its prevention is only partially possible, its drug therapy is not yet solved and there is still a significant clinical need for new solutions. This is particularly true in Hungary, where the prevalence of preterm births, which significantly reduce life expectancy, is around 9%, and nearly 20% of premature babies do not reach the age of one year, despite all efforts. Therefore, one part of our experimental work is aimed at the search for new targets, active substances and/or combinations of active substances that inhibit uterine contraction and increase resistance of the cervix in animals, which could be starting points for a future clinical application.

Digestive smooth muscle disorders affect many people suffering from abdominal complaints caused by abnormal contractions of the digestive tract. In animal experiments, we were the first to identify and separate the electromyographic signals from the digestive tract that can be derived from the abdominal wall, to demonstrate the changes in the gastrointestinal tract in a stress and a reflux model and to provide clinical evidence of these processes. Currently, we are investigating the applicability of smooth muscle electromyography in animal models of additional gastrointestinal pathologies (e.g. paralytic ileus, gastroparesis).

TECHNIQUES AVAILABLE IN THE LAB

Isolated organ smooth muscle contractility studies (stomach, small intestine, large intestine, pregnant and non-pregnant uterus, cervix). Measurement of uterine and gastrointestinal smooth muscle contractions in anaesthetised animals (rat) using implantable strain gauge to the walls of the organs. Electromyographic measurement

of uterine and gastrointestinal smooth muscle function and heart rate in the anaesthetised or awake rat using a subcutaneous electrode. Imaging of various processes using fluorescent markers in awake or anaesthetised animals. Carrying out animal models of premature birth or digestive tract disorders, treatment of animals by gastric lavage or injection (intravenous, subcutaneous, intraperitoneal), implantation of measuring sensors. Use of oestrus cycle monitor. Determination of proteins, second messengers, sex hormone levels by ELISA technique, PCR, Western blot and immunohistochemical measurements in collaboration.

SELECTED PUBLICATIONS

Mohammed, S.H., Mirdamadi, M., Szucs, K.F., **Gaspar, R.** (2024) Non-genomic actions of steroid hormones on the contractility of non-vascular smooth muscles. **Biochem Pharmacol** **222**: 116063.

Barna, T., Szucs, K.F., Mirdamadi, M., **Gaspar, R.** (2023) The combined uterorelaxant effect of sildenafil and terbutalin in the rat: The potential benefit of co-administration of low doses. **Heliyon** **9**: 12 e22488.

Barna, T., Szucs, K.F., Schaffer, A., Mirdamadi, M., Hajagos-Toth, J., **Gaspar, R.** (2023) Combined uterorelaxant effect of magnesium sulfate and terbutaline: Studies on late pregnant rat uteri in vitro and in vivo. **Acta Obstet Gynecol Scand** **102**: 4, 457-464.

Nagy, A., Szűcs, K.F., Grosz, G., Süle, M., Fekete, F., Karoliny, A., Borsos, M., Papp, Z., Vigh, D., **Gáspár, R.** (2023) Prediction of gastroesophageal reflux episodes by smooth muscle electromyography: A translational study in rats and adolescents. **Heliyon** **9**: 8, e18859.

Schaffer, A., Ducza, E., Bódi, N., Bagyánszki, M., Szalai, Z., Mirdamadi, M., Barna, T., Szűcs, K.F., **Gáspár, R.** (2022) The ontogenies of endometrial and myometrial leptin and adiponectin receptors in pregnant rats: Their putative impact on uterine contractility. **Life Sci** **297**: 120465.

Kothencz, A., Hajagos-Toth, J., Szucs, K.F., Schaffer, A., **Gaspar, R.** (2019) α -Tocopherol potentiates the cervical resistance decreasing effects of COX inhibitors in pregnant rats: The putative role of cyclooxygenase-2 inhibition. **J Pharmacol Exp Ther** **368**: 2, 292-298.