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RESEARCH AREA

The focus of my research is the investigation of the pharmacological influence of the smooth muscle contractility of the uterus and the gastrointestinal (GI) tract on an in vivo preclinical model. The pharmacological management of preterm labor remains unresolved; therefore our experimental investigation is directed towards the preclinical, animal-based exploration for novel therapeutic targets, active substances, and/or synergistic drug combinations that mitigate contractions of the pregnant uterus and enhance cervical resistance, which may serve as a basis for a later clinical application.

GI disorders impact a significant number of individuals and may arise from dysfunctions in the motility of the digestive system. Our research group were the first in the detection of slow-wave electromyographic signals derived from the abdominal wall, which originate from certain segments of the GI tract of rats, thus enhancing our clinical translational measurements. Presently, we are examining the feasibility of employing smooth muscle electromyography in preclinical animal models that simulate various GI conditions (e.g., paralytic ileus, gastroparesis, and stress).

TECHNIQUES AVAILABLE IN THE LAB

Electromyographic analysis of the smooth muscle within the uterus and GI tract of rats, together with heart rate assessment, using an electrode designed for subcutaneous implantation, and in vivo evaluation of mechanical contractions via a strain gauge attached to the organ surfaces. Conducting in vivo fluorescence imaging investigations and establishing animal models that facilitate the induction of premature labor and GI disorders. Using an estrus cycle monitor. Quantification of proteins, secondary signaling molecules, and sex hormone concentrations through the ELISA methodology.

SELECTED PUBLICATIONS

Szucs, K.F., Vigh, D., Mirdamadi, M., Samavati, R., Barna, T., Schaffer, A., Alasaad, K., Gaspar, R. (2024) Smooth muscle electromyography for detecting major alterations in the estrus cycle in rats. **Plos one 19(8):** e0307932.

Saif-alnasr, H.M., 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 Scand102(4):** 457-464.

Ivić, V., Zjalić, M.*, Blažetić, S., Fenrich, M., Labak, I., Scitovski, R., **Szűcs, K.F.**, Ducza, E., Tábi, T., Bagamery, F., et al. (2023) Elderly rats fed with a high-fat high-sucrose diet developed sex-dependent metabolic syndrome regardless of longterm metformin and liraglutide treatment. **Front Endocrinol 14:** 1181064.

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.