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RESEARCH AREA

Diseases of the exocrine pancreas include acute and chronic pancreatitis (CP) and pancreatic cancer, with limited therapeutic options currently available. Organoids are three-dimensional cell cultures that closely model the function and structure of specific tissues, making them suitable for studying organ development and disease. Pancreatic ductal organoids are increasingly used in preclinical research; however, information on the functional and cellular changes occurring during their maintenance is lacking. One of our aims is to determine how long organoids can be safely used for protein, gene expression, and functional analyses, a key question in preclinical studies. Additionally, our research focuses on understanding fibrosis processes in CP, particularly the role of the Orai1 Ca^{2+} channel in disease progression. We also aim to develop an organoid-fibroblast co-culture that closely mimics *in vivo* cell organization, providing an excellent platform for therapeutic testing.

TECHNIQUES AVAILABLE IN THE LAB

In our research, we routinely establish and culture mouse and human pancreatic ductal epithelial organoids and fibroblast cultures, performing immunofluorescent staining, Western blot, gene expression analyses (qRT-PCR), and functional ion channel measurements using fluorescence microscopy. On pancreatic tissue, we also apply immunohistochemistry and enzyme activity assays. Our laboratory has facilities for studying *in vivo* mouse disease models, and we maintain several collaborations with national and international research groups.

SELECTED PUBLICATIONS

Szabó, V., Csákány-Papp, N., Görög, M., Madácsy, T., Varga, Á., Kiss, A., Tél, B., Jójárt, B., Crul, T., Dudás, K., Bagyánszki, M., Bódi, N., Ayaydin, F., Jee, S., Tiszlavicz, L., Stauderman, K.A., Hebbbar, S., Pallagi, P., Maléth, J. (2023) Orai1 calcium channel inhibition prevents progression of chronic pancreatitis. **JCI Insight** 8(13): e167645.

Varga, Á., Madácsy, T., Görög, M., Kiss, A., Susánszki, P., Szabó, V., Jójárt, B., Dudás, K., Farkas, G. Jr., Szederkényi, E., Lázár, G., Farkas, A., Ayaydin, F., Pallagi, P., Maléth, J. (2023) Human pancreatic ductal organoids with controlled polarity provide a novel *ex vivo* tool to study epithelial cell physiology. **Cell Mol Life Sci** 80(7): 192.

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Madácsy, T., Varga, Á., Papp, N., Tél, B., Pallagi, P., Szabó, V., Kiss, A., Fanczal, J., Rakonczay, Z. Jr., Tiszlavicz, L., Rázga, Z., Hohwieler, M., Kleger, A., Gray, M., Hegyi, P., Maléth, J. (2022) Impaired regulation of PMCA activity by defective CFTR expression promotes epithelial cell damage in alcoholic pancreatitis and hepatitis. **Cell Mol Life Sci** 79(5): 265.

Pallagi, P., Görög, M., Papp, N., Madácsy, T., Varga, Á., Crul, T., Szabó, V., Molnár, M., Dudás, K., Grassalkovich, A., Szederkényi, E., Lázár, G., Venglovecz, V., Hegyi, P., Maléth, J. (2022) Bile acid- and ethanol-mediated activation of Orai1 damages pancreatic ductal secretion in acute pancreatitis. **J Physiol** 600(7): 1631-1650.