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## RESEARCH AREA

The lymphatic system plays an essential role in regulating fluid balance, controlling immune cell migration and lipid absorption. Recently, other novel and unexpected functions of the system have been revealed. It is therefore critical that we understand the organ-specific functions of the lymphatic system. Our research group aims to study the organ-specific roles of the lymphatic system and lymphatic growth signaling pathways under physiological and pathological conditions using preclinical transgenic mouse models. In our experiments, we have developed a nucleoside-modified mRNA-based system that induces organ-specific lymphatic growth and reverses experimental lymphedema. We revealed that pulmonary lymphatic function and fetal breathing movements play a critical role in the preparation of the fetal lung for inflation at birth. In addition, our data suggest that the mechanical forces induced by lymphatic flow are critical factors in controlling the developmental program of meningeal lymphatics.

## TECHNIQUES AVAILABLE IN THE LAB

Lymphatic growth, the molecular mechanisms controlling this process, and the physiological and pathophysiological role of lymphatic function will be studied in specific organs and tissues during the embryonic and postnatal periods in preclinical transgenic animal models. For our in vivo oriented experiments, imaging, histology, molecular biology and general laboratory techniques and methods are used.

## SELECTED PUBLICATIONS

Szőke, D., Kovács, G., Kemecei, É., Bálint, L., Szoták-Ajtay, K., Aradi, P., Styevkóné, Dinnyés, A., Mui, B.L., Tam, Y.K., Madden, T.D., Karikó, K., Kataru, R.P., Hope, M.J., Weissman, D., Mehrara, B.J., Pardi, N., **Jakus, Z.** (2021) Nucleoside-modified VEGFC mRNA induces organ-specific lymphatic growth and reverses experimental lymphedema. **Nat Commun** 12: 3460.

Bálint, L., Ocskay, Z., Deák, B.A., Aradi, P., **Jakus, Z.** (2020) Lymph Flow Induces the Postnatal Formation of Mature and Functional Meningeal Lymphatic Vessels. **Front Immunol** 10: 3043.

Szoták-Ajtay, K., Szőke, D., Kovács, G., Andréka, J., Brenner, G.B., Giricz, Z., Penninger, J., Kahn, M.L., **Jakus, Z.** (2020) Reduced Prenatal Pulmonary Lymphatic Function Is Observed in Clp1 K/K Embryos With Impaired Motor Functions Including Fetal Breathing Movements in Preparation of the Developing Lung for Inflation at Birth. **Front Bioeng Biotechnol** 8: 136.

Bálint, L., **Jakus, Z.** (2021) Mechanosensation and Mechanotransduction by Lymphatic Endothelial Cells Act as Important Regulators of Lymphatic Development and Function. **Int J Mol Sci** 22: 3955.

Pawlak, J.B., Bálint, L., Lim, L., Ma, W., Davis, R.B., Benyó, Z., Soares, M.J., Oliver, G., Kahn, M.L., **Jakus, Z.**, Caron, K.M. (2019) Lymphatic mimicry in maternal endothelial cells promotes placental spiral artery remodeling. **J Clin Invest** 129: 4912-4921.