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RESEARCH AREA

The main goal of my research is to understand and reveal the role of intercellular communication between blood-brain barrier-forming endothelial cells and metastatic tumor cells, as well as its effects on brain metastasis formation. The development of brain metastases depends on the ability of tumor cells to penetrate the endothelial barrier. Recent studies have shown that tumor cell-released extracellular vesicles promote tumor formation and progression. Tumor-derived extracellular vesicles contain various biomolecules, such as mRNAs, miRNAs, enzymes, and growth factors. Through their cargo, these vesicles can influence the tumor microenvironment and alter the functions of recipient cells. Currently, we are investigating how exosomes derived from triple-negative breast cancer cells affect the properties and functions of brain endothelial cells, thereby potentially facilitating brain metastasis formation.

TECHNIQUES AVAILABLE IN THE LAB

Isolation of primary cells, cerebral and tumor cell culture. Construction of in vitro cell culture models, impedance measurement, permeability assays, gene silencing. Isolation of extracellular vesicles. Immunofluorescence, in situ hybridization, confocal and superresolution microscopy. Real-time qPCR and western blot.

SELECTED PUBLICATIONS

Csonti, K., **Fazakas, C.**, Molnár, K., Wilhelm, I., Krizbai, IA., Végh, AG. (2024) Breast adenocarcinoma cells adhere stronger to brain pericytes than to endothelial cells. **Colloids Surf B Biointerfaces 234:** 113751.

Mészáros, Á., Molnár, K., **Fazakas, C.**, Nógrádi, B., Lüvi, A., Dudás, T., Tiszlavicz, L., Farkas, AE., Krizbai, IA., Wilhelm, I. (2023) Inflammasome activation in peritumoral astrocytes is a key player in breast cancer brain metastasis development. **Acta Neuropathol Commun11**(1):155.

Fazakas, C., Kozma, M., Molnár, K., Kincses, A., Dér, A., Fejér, A., Horváth, B., Wilhelm, I., Krizbai, IA., Végh, AG. (2021) Breast adenocarcinoma-derived exosomes lower first-contact de-adhesion strength of adenocarcinoma cells to brain endothelial layer. **Colloids Surf B Biointerfaces 204:** 111810.

Haskó, J., **Fazakas, C.**, Molnár, K., Mészáros, Á., Patai, R., Szabó, G., Erdélyi, F., Nyúl-Tóth, Á., Győri, F., Kozma, M., Farkas, AE., Krizbai, IA., Wilhelm, I. (2019) Response of the neurovascular unit to brain metastatic breast cancer cells. **Acta Neuropathol Commun 7:** 133.

Herman, H., **Fazakas, C.***, Haskó, J., Molnár, K., Mészáros, Á., Nyúl-Tóth, Á., Szabó, G., Erdélyi, F., Ardelean, A., Hermenean, A., Krizbai, IA., Wilhelm, I. (2019) Paracellular and transcellular migration of metastatic cells through the cerebral endothelium. **J Cell Mol Med 23**(4): 2619-2631. (* first author)