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RESEARCH AREA

The microbiota thrives on all epithelial surfaces of the human body, encompassing the skin, respiratory tract, digestive tract, and urogenital tract. These microbiome communities influence the development, progression, metastasis formation, and treatment response of several cancer types. While there is limited direct evidence of causation, there is widespread recognition of the significant scientific and clinical significance of gaining a deeper molecular understanding of these interactions between microbes and cancer and how they affect cancer treatment.

To explore the microbiome's impact on the microevolution of human tumors, we apply a combination of 3D cell culture technology, analysis of mutational signatures, and profiling of the response to DNA damage. Our particular focus lies in uncovering the microbiome-related mutagenic mechanisms that accelerate the progression of cancer. We are constructing an integrated framework that enables the classification of patients based on their cancer risk and responsiveness to therapy. Furthermore, these studies will explore new pathways in the human DNA damage response system that are implicated in the evolution of cancer. Our aim is to develop biomarkers associated with the microbiome in non-cancerous patients before tumors emerge, thus revolutionizing therapeutic approaches from reactive to predictive.

TECHNIQUES AVAILABLE IN THE LAB

- Human tissue culture-based reporter assays;
- Microscope techniques
- Data science
- Whole genome data analysis

SELECTED PUBLICATIONS

Réthi-Nagy, Z., Ábrahám, E., Sinka, R., **Juhász, S.***, Lipinszki, Z.* (2019) Protein Phosphatase 4 Is Required for Centrobin Function in DNA Damage Repair. **Cells 12(18):** 2219. *Correspondence authors

Elbakry, A., **Juhász, S.**, Chan, KC., Löbrich, M. (2021) ATRX and RECQ5 define distinct homologous recombination subpathways. **Proc Natl Acad Sci U S A 118(3):** e2010370118.

Juhász, S.*, Smith, R.*, Schauer, T., Spekhardt, D., Mamar, H., Zentout, S., Chapuis, C., Huet, S., Timinszky, G. (2020) The chromatin remodeler ALC1 underlies resistance to PARP inhibitor treatment. **Science Advances 6(51):** eabb8626. *These authors contributed equally to this work.

Juhasz, S., Elbakry, A., Mathes, A., Löbrich, M., (2018) ATRX Promotes DNA Repair Synthesis and Sister Chromatid Exchange during Homologous Recombination. **Mol Cell 71(1):** 11-24.e7.

Elbakry, A., **Juhász, S.**, Mathes, A., Löbrich, M. (2018) DNA repair synthesis and histone deposition partner during homologous recombination. **Mol Cell Oncol 5(5):** e1511210.