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RESEARCH AREA

The mitochondrion is the central hub of cellular energy production and is also essential for the regulation of several fundamental metabolic processes. Proper mitochondrial function depends on the maintenance of mitochondrial genome integrity, in which the mitochondrial single-stranded DNA-binding protein (mtSSB) plays a central role by stabilizing single-stranded DNA and coordinating genome replication. Biological condensates, which have also been observed in mitochondria, are membraneless, dynamic structures that enable the spatial and temporal regulation of cellular processes. Elucidating condensate dynamics offers a novel perspective for understanding the molecular organization of mitochondrial function. The aim of our research is to investigate the condensate-forming properties of mitochondrial proteins, with a particular focus on mtSSB, and to explore how proteins of the mitochondrial matrix participate in the formation and maintenance of biomolecular condensates.

TECHNIQUES AVAILABLE IN THE LAB

In our research, we extensively use molecular biology techniques, including recombinant DNA techniques (PCR, cloning) and the production of recombinant proteins in bacterial expression systems. It is possible to characterize protein-protein and protein-nucleic acid interactions, as well as to learn and apply techniques for the experimental investigation of liquid chromatography methods and biomolecular condensates.

SELECTED PUBLICATIONS

Farkas, S., Cioca, D., Murányi, J., Hornyák, P., Brunyánszki, A., Szekér, P., Boros, E., **Horváth, P.**, Hujber, Z., Rácz, G. Z., Nagy, N., Tóth, R., Nyitray, L., & Péterfi, Z. (2023). Chlorotoxin binds to both matrix metalloproteinase 2 and neuropilin 1. *The Biol Chem* **299(9)**: 104998.