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RESEARCH AREA

Phagocytosis (engulfment) is an ancient, mechanistically conserved process that performs numerous functions, ranging from nutrient uptake to immune defense. During phagocytosis, the cell membrane comes into contact with the particles to be engulfed, surrounds them with pseudopodia, and closes around them, thereby trapping the particles inside the cell in a structure called a phagosome. The phagosome then undergoes a maturation process, which ends with the fusion to the digestive organelle (lysosome) within the cell, where the ingested particle is broken down by acidic pH and digestive enzymes.

Phagocytosis is a very well-characterized process, however, a number of questions remain unanswered. Our knowledge is lacking on the various phagocytosis receptors on the cell surface, the signal transduction pathways that are initiated within the cell in response to activated receptors, and how the maturation of the phagosome within the cell differs from other vesicular processes that also end with fusion to lysosomes (endocytosis, autophagy).

To understand these questions, we examine existing paradigms and develop new models in fruit flies (*Drosophila melanogaster*). Using fluorescent markers that can also be studied in living animals, we track the fate of various phagocytic cargoes (matrix proteins, cell debris, microbes) from their engulfment to their degradation in the lysosome. We study the membrane proteins and signaling pathways involved in engulfment using gene silencing and mutations in different cell types capable of phagocytosis (glia, immune cells).

TECHNIQUES AVAILABLE IN THE LAB

Basic and advanced *Drosophila* genetics, transgenesis and mutant generation, genetic screening in *Drosophila* models, isolation of *Drosophila* organs and tissues for live cell imaging or super-resolution confocal microscopy, microscopic image analysis methods, learning molecular biology and biochemistry methods, joining transcriptomics, proteomics, and lipidomics projects, sterile cell culture techniques (fruit fly and human cultured cells), creative method development for phenotype analysis.

SELECTED PUBLICATIONS

Külshammer, E., Kilinc, M., **Csordás, G.**, Bresser, T., Nolte, H., & Uhlirova, M. (2022). The mechanosensor Filamin A/Cheerio promotes tumourigenesis via specific interactions with components of the cell cortex. **FEBS J 289**(15): 4497–4517.

Csordás, G., Gábor, E., & Honti, V. (2021). There and back again: The mechanisms of differentiation and transdifferentiation in Drosophila blood cells. **Dev Biol 469**: 135–143.

Csordás, G., Grawe, F., & Uhlirova, M. (2020). Eater cooperates with Multiplexin to drive the formation of hematopoietic compartments. **eLife 9:** e57297.

Donohoe, C. D., **Csordás, G.**, Correia, A., Jindra, M., Klein, C., Habermann, B., & Uhlirova, M. (2018). Atf3 links loss of epithelial polarity to defects in cell differentiation and cytoarchitecture. **PLoS Genet 14**(3): e1007241.

Honti, V., **Csordás, G.**, Márkus, R., Kurucz, E., Jankovics, F., & Andó, I. (2010). Cell lineage tracing reveals the plasticity of the hemocyte lineages and of the hematopoietic compartments in Drosophila melanogaster. **Mol Immunol 47**(11-12): 1997–2004.