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RESEARCH AREA

Our group has two main research focuses:

On the one hand, we use fish models of rare, monogenic human diseases to gain a more precise understanding of the molecular and cellular changes that lead to the development of the symptoms in the patients of these diseases. Using fish lines created through genome editing, we focus primarily on diseases that are somehow caused by ribosomal dysfunction or mutations in genes important for maintaining genome integrity. In addition to providing a more accurate understanding of these diseases, our disease models may also offer opportunities for finding potential therapies.

TECHNIQUES AVAILABLE IN THE LAB

Our research involves a variety of techniques: from classical molecular cloning, to genome editing and transcriptomics, and from modern imaging techniques (e.g. confocal microscopy and microCT), to machine learning-based analysis of behavior. We use zebrafish and paradise fish as models during our research.

SELECTED PUBLICATIONS

Annus, T., Müller, D., Jezsó, B., Ullaga, G., Németh, B., Harami, G. M., Orbán, L., Kovács, M., & **Varga, M.** (2022). Bloom syndrome helicase contributes to germ line development and longevity in zebrafish. **Cell Death Dis 13(4):** 363.

Balogh, E., Chandler, J. C., **Varga, M.**, Tahoun, M., Menyhárd, D. K., Schay, G., Goncalves, T., Hamar, R., Légrádi, R., Szekeres, Á., Gribouval, O., Kleta, R., Stanescu, H., Bockenhauer, D., Kerti, A., Williams, H., Kinsler, V., Di, W. L., Curtis, D., Kolatsi-Joannou, M., … Tory, K. (2020). Pseudouridylation defect due to DKC1 and NOP10 mutations causes nephrotic syndrome with cataracts, hearing impairment, and enterocolitis. **Proc Nat Acad Sci U S A 117(26):** 15137–15147.

Fodor, E., Okendo, J., Szabó, N., Szabó, K., Czimer, D., Tarján-Rácz, A., Szeverényi, I., Low, B. W., Liew, J. H., Koren, S., Rhie, A., Orbán, L., Miklósi, Á., **Varga, M.**, & Burgess, S. M. (2024). The reference genome of Macropodus opercularis (the paradise fish). **Sci Data 11(1):** 540.

Varga, Z. K., Pejtsik, D., Csorvási, T., Mikics, É., Miklósi, Á., & **Varga, M**. (2025). Paradise fish (Macropodus opercularis) as a complementary translational model for emotional and cognitive function. **Commun Biol 8(1):** 1125.