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RESEARCH AREA

Sarcomeres, the basic contractile units of muscles, are composed of three major filament systems: a filamentous actin based thin-filament array, the myosin motor protein based thick filaments, and a titin based elastic filament system. Grounded on classic electron microscopy studies, the sarcomere is defined as a repeating unit of the myofibril bordered by two Z-disks, which serve as anchoring sites for the oppositely oriented thin-filaments of the neighboring units. The midline of the sarcomere is referred as to the M-line flanked by the H-zone corresponding to the central thin filament-free area and to the head-less area of the bipolar thick filaments. The sarcomeres are extremely highly ordered macromolecular assemblies where structural organization is intimately linked to the functionality of these contractile units. Therefore, precise structural description of the sarcomeres is critical to better understand the mechanisms of muscle development and maintenance. We previously established a single-molecule localization microscopy based approach, which can deliver localization maps of multiprotein complexes with very high precision, virtually attaining single protein size resolution. By combining the tools of Drosophila genetics with nanoscopy, we plan to better understand the molecular mechanisms of sarcomere assembly and growth during development.

TECHNIQUES AVAILABLE IN THE LAB

Classical and molecular Drosophila genetics, molecular biology, cell biology, cytoskeleton analysis, immunohisto-chemistry, the basic methods of biochemistry, confocal and superresolution microscopy, behavioral tests, live imaging, digital image analysis.

SELECTED PUBLICATIONS

Szikora, S., Gajdos, T., Novák, T., Farkas, D., Földi, I., Lenart, P., Erdélyi, M., Mihály, J. (2020) Nanoscopy reveals the layered organization of the sarcomeric H-zone and I-band complexes. **J. Cell Biol 219:** 1 Paper: e201907026 , 21 p.

Gajdos, T., Cserteg, Z., **Szikora, S.**, Novak, T., Kovacs, B. B. H., Szabo, G., Mihaly, J., and Erdelyi, M. (2019) mmSTORM: Multimodal localization based super-resolution microscopy, **Sci Rep, vol. 9.**

Migh, E., Gotz, T., Foldi, I., **Szikora, S.**, Gombos, R., Darula, Z., Medzihradszky, K., Maleth, J., Hegyi, P., Sigrist, S., Mihaly, J. (2018) Microtubule organization in presynaptic boutons relies on the formin. **Daam Development 145(6).**

Szikora, S., Foldi, I., Toth, K., Migh, E., Vig, A., Bugyi, B., Maleth, J., Hegyi, P., Kaltenecker, P., Sanchez-Soriano, N., Mihaly, J. (2017) The formin DAAM is required for coordination of the actin and microtubule cytoskeleton in axonal growth cones. **J Cell Sci 130(15):** 2506–2519.

Teréz Vig, A., Földi, I., **Szikora, S.**, Migh, E., Gombos, R., Ágnes Tóth, M., Huber, T., Pintér, R., Csaba Talián, G., Mihály, J., Bugyi, B. (2017) The activities of the c-terminal regions of the formin protein disheveled-associated activator of morphogenesis (daam) in actin dynamics. **J Biol Chem 292(33):** 13566–13583.