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RESEARCH AREA

The musculoskeletal system is the active organ of movement; its main function is to move the elements that make up the body's skeleton in relation to each other, thereby changing the position of the body. The skeletal muscle is made up of skeletal muscle fibres, whose basic function is contraction in response to nerve command. In skeletal muscle, electro-mechanical coupling (ECC, Excitation-Contraction Coupling) is the conversion of an electrical signal (action potential) at the sarcolemma into a contraction response. Modifications of the finely regulated steps of ECC, such as ageing, oxidative stress, genetic causes can lead to severe muscle diseases.

The endocannabinoid system (ECS) is a widespread signalling system whose alteration is associated with an increasing number of human diseases. Increased ECS activity has been observed in degenerative muscle diseases such as Duchenne muscular dystrophy (DMD). Our current research investigates the role of skeletal muscle ECS: in the development of degenerative muscle diseases, in muscle function, in mitochondrial calcium homeostasis processes, and also its effects on regenerative processes.

TECHNIQUES AVAILABLE IN THE LAB

Interested students will learn about performing in vitro patch-clamp electrophysiological measurements combined with confocal microscopy on isolated skeletal muscle cells. In the research group we use a number of modern techniques including:

- in vivo gene electroporation
- gene expression studies: polymerase chain reaction (RTqPCR),
- protein expression studies

SELECTED PUBLICATIONS

Kalkan, H., Panza, E., Pagano, E., Ercolano, G., Moriello, C., Piscitelli, F., **Sztretye, M.**, Capasso, R., Di, Marzo, V., Iannotti, F.A. (2023) Dysfunctional endocannabinoid CB1 receptor expression and signaling contribute to skeletal muscle cell toxicity induced by simvastatin. *Cell Death Dis* **14**: 544.

Sztretye, M., Singlár, Z., Ganbat, N., Al-Gaadi, D., Szabó, K., Köhler, Z., Dux, L., Keller-Pintér, A., Csernoch, L., Szentesi, P. (2023) Unravelling the Effects of Syndecan-4 Knockdown on Skeletal Muscle Functions. *Int J Mol Sci* **24**: 6933.

Singlár, Z., Ganbat, N., Szentesi, P., Osgonsandag, N., Szabó, L., Telek, A., Fodor, J., Dienes, B., Gönczi, M., Csernoch, L., **Sztretye, M.** (2022) Genetic Manipulation of CB1 Cannabinoid Receptors Reveals a Role in Maintaining Proper Skeletal Muscle Morphology and Function in Mice. *Int J Mol Sci* **23**: 15653.

Singlár, Z., Szentesi, P., Fodor, J., Angyal, Á., Csernoch, L., **Sztretye, M.** (2021) Assessing the Potential of Nutraceuticals as Geroprotectors on Muscle Performance and Cognition in Aging Mice. *Antioxidants* **10**: 1415.

Sztretye, M., Szabó, L., Dobrosi, N., Fodor, J., Szentesi, P., Almássy, J., Magyar, Z., Dienes, B., Csernoch, L. (2020) From Mice to Humans: an Overview of the Potentials and Limitations of Current Transgenic Mouse Models of Major Muscular Dystrophies and Congenital Myopathies. *Int J Mol Sci* **21**: 8935.