ROLAND PATAI

Biological Research Centre
Institute of Biophysics

Address: Temesvári krt. 62., H-6726 Szeged, Hungary

RESEARCH AREA

The saying originating from the US at the beginning of the previous century "*A picture is worth a thousand words*" is particularly adequate for the description of the complexity of the brain. A new discipline, called geometrical statistics, is used now by micro-anatomical photography to derive unbiased data characterizing the number, size, specified surface portions, etc. of nerve cells by using tiny samples from an enormously high population (≈ 200 billion) of neurons constituting the brain.

The results of such investigations either may contribute to the interpretation of the industrial amount of data coming from (sometimes) automated molecular biology instruments, or may substitute those, when variations of biological functions should be attributed to distributional instead of quantitative changes in e.g. gene expression. The development of biological microstructural investigations is undoubtedly motivated by a typical human desire expressed by *"seeing is believing"*. This is most obvious in the regular need of seeking the structural correlates of the results obtained by another cutting edge technology, electrophysiology.

Our micro-anatomical research is aimed to derive quantitative data characterizing nerve cells in healthy conditions, during disease and ageing, which are also suitable to measure the effect of treatments aimed to halt or reverse disease progression.

TECHNIQUES AVAILABLE IN THE LAB

Microsurgical methods to induce acute neurodegeneration in experimental animals. Basic methods in structural investigations (light, fluorescent, confocal and electron microscopic and electron tomography techniques) and chemical element determination (energy-dispersive X-ray microanalysis, chemical elemental mapping), sample preparation methods for biological structural research, labeling techniques for molecular imaging and statistical basis of sampling for unbiased quantitative microscopy, derivation of biological relevant three-dimensional parameters from biological tissue, interactive and automatic computer assisted image analysis, image analysis programming languages.

SELECTED PUBLICATIONS

Obál, I., Nógrádi, B., Meszlényi, V., **Patai, R.**, Ricken, G., Kovacs, G.G., Tripolszki, K., Széll, M., Siklós, L., Engelhardt J.I. (2019) Experimental Motor Neuron Disease Induced in Mice with Long-Term Repeated Intraperitoneal Injections of Serum from ALS Patients. **Int J Mol Sci 20:** 2573.

Patai, R., Paizs, M., Tortarolo, M., Bendotti, C., Obál, I., Engelhardt, J.I., Siklós, L. (2017) Presymptomatically applied AMPA receptor antagonist prevents calcium increase in vulnerable type of motor axon terminals of mice modeling amyotrophic lateral sclerosis. **Biochim Biophys Acta 1863:** 1739–1748.

Patai, R., Nógrádi, B., Obál, I., Engelhardt, J.I., Siklós, L. (2017) Calcium in the pathomechanism of amyotrophic lateral sclerosis – taking center stage? **Biochem Biophys Res Comm 483:** 1031–1039.

Paizs, M., **Patai, R.**, Engelhardt, J.I., Katarova, Z., Obál, I., Siklós, L. (2017) Axotomy leads to reduced calcium increase and earlier termination of CCL2 release in spinal motoneurons with upregulated parvalbumin followed by decreased neighboring microglial activation. **CNS Neur Disord Drug Targets 16:** 356–367.