

Magyar–német (TKA–DAAD) kutatócsere projekt

Záró beszámoló

A projekt adatai:

Nyilvántartási szám: 465828

Projektcím: A csapok posztreceptorális idepályáinak elektrofiziológiai kölcsönhatásai
egészséges és beteg emberi retinákban

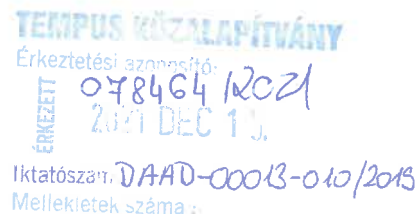
Magyar projektvezető neve: Barboni Mirella

Magyar intézmény neve: Semmelweis Egyetem

Német projektvezető neve: Kremers Jan

Német intézmény neve: Friedrich–Alexander–Universität Erlangen–Nürnberg

Támogatási időszak: 2020–2021



A. A projektidőszakban elvégzett munka összefoglalása (max. 2 oldal)

The goal of the project was to investigate physiological pathways underlying electroretinographic (ERG) changes in humans. Although the clinical standardized ERG protocols are largely used worldwide and the retinal origins of its components are well investigated and understood, the physiological origins of the sine wave, sawtooth (rapid–On and rapid–Off) white, heterochromatic modulation, and the cone–isolating ERG responses are not well understood. The groups involved in the present research project have developed and applied these alternative ERG protocols. They are using these protocols in Germany and in Hungary to investigate interactions between ON/OFF and opponent/non–opponent post–receptor pathways of the cone system what may contribute to understanding retinal mechanisms underlying ERG responses and possible interconnections between them that have not been elucidated yet.

During the grant period virtual meetings and one in–person meeting in Budapest were performed between the groups from Germany and Hungary allowing the discussion of stimulus parameters and the implementation of identical ERG protocols in both institutions. Regarding the examinations of the patients, the protocols have already been applied in a couple of controls and patients with different types of inherited retina diseases. This preliminary data allowed us to adjust some parameters of the stimuli and update the self–written MatLab programs for the data analysis. The groups

in Germany and in Hungary are now prepared to collect and compare controls and patients' data using identical ERG protocols and MatLab routines.

During the grant period there was the preparation and publication of one manuscript reporting ERG data in patients with Duchenne muscular dystrophy (Barboni, Dias, et al., 2021) and another manuscript showing ERGs in a mouse model of Duchenne muscular dystrophy (Barboni, Liber, et al., 2021). Finally, the DARTER Retina workshop <https://antisenserna.eu/event/darter-retina-workshop/> joined about 100 participants from the area of retina phenotypes and therapeutics. The modern approaches to record ERG responses driven by specific retinal mechanisms were presented by both Prof. Jan Kremers and Dr. Mirella Barboni during this virtual event.

B. A közös projekt eredményei (max. 2 oldal)

The main result of the collaborative project was the strengthening of the relationships and interactions between the groups. In addition, the publication of scientific results and the development of clinical protocols and programs for data analysis were possible. Three clinical protocols are ready to be applied in controls and patients: L-, M-, and S-cone and rod isolating stimuli to measure ERGs driven by each type of photoreceptor and the HFP, heterochromatic flicker photometry to measure parvocellular and magnocellular pathways. In the future, these protocols will be applied in control subjects and patients with inherited retina diseases. Previous and preliminary unpublished data have contributed to the knowledge of signal processing in the human retina.

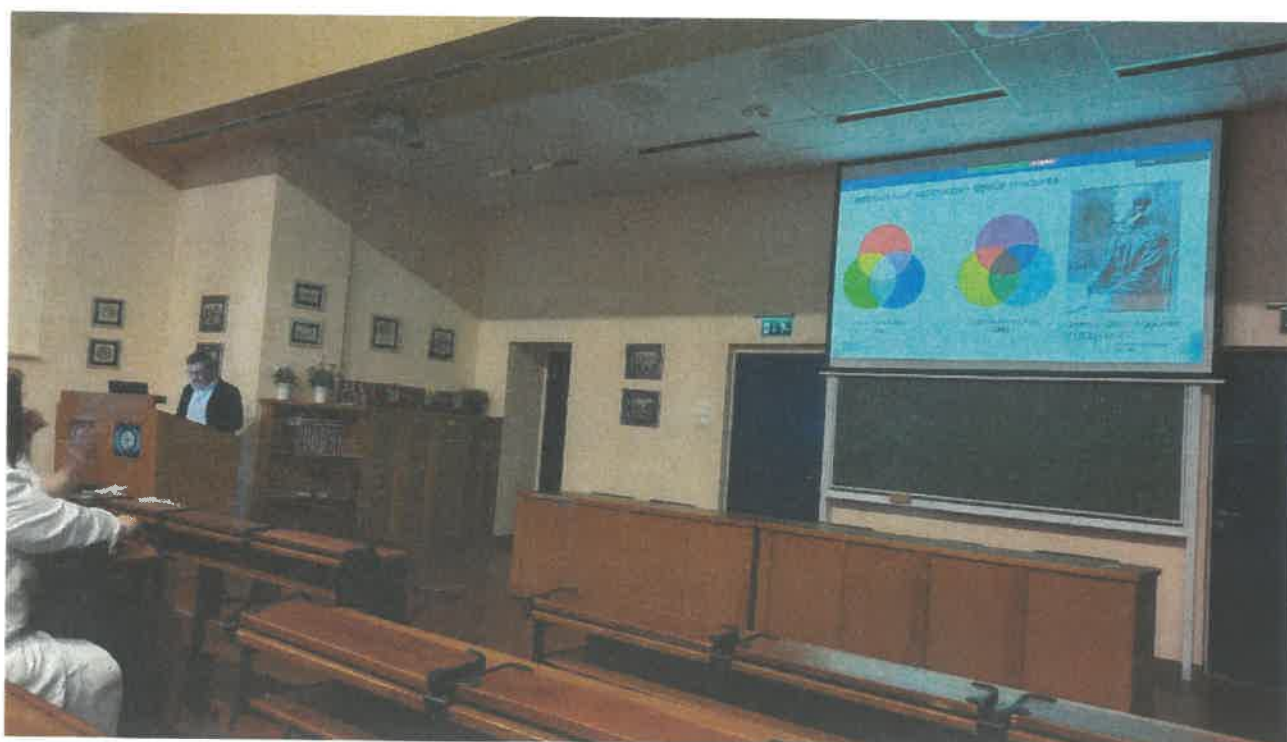
C. Az együttműködés további szempontjai: (max. 3 oldal)

1. Mennyiben alapulnak a projekt elért eredményei a német–magyar együttműködésen?

The new protocols developed during the research grant will be integrated in the routine procedures for the early diagnosis and phenotype of the retinal diseases. For instance, a new research project to evaluate heterochromatic flicker responses in patient with Stargardt diseases, an inherited retina dystrophy, has been established in collaboration between the German and Hungarian groups. In the continuation of this joint collaborative research, it may be possible to recommend new methods for evaluating and analyzing ERG signals elicited by cone pathways.

2. Hogyan befolyásolta a támogatás a projekt előmenetelét?

The DAAD–Tempus grant helped the project enabling the exchange of researchers. The travel restrictions due to the pandemic situation was an obstacle. Nevertheless, it was possible to organize one visit of Prof. Jan Kremers to Budapest at the end of the grant period, in December of 2021.



3. Hogyan csatlakozott a második évi munka az első év eredményeihez?

The travel restrictions due to the pandemic situation did not allow to execute the project during the first year of the research grant.

4. Milyen szempontból volt jelentős a projekt a fiatal kutatók tapasztalatszerzése, szakmai fejlődése szempontjából?

The travel restrictions due to the pandemic situation did not allow the direct participation of young participants (PhD students and postdoctoral researchers) in the project. However, data analysis and discussions to interpret ERG signals were possible during the visit of Prof. Jan Kremers in Budapest.

5. Sorolja fel azokat a hazai vagy külföldi tudományos közleményeket és publikációkat, amelyek az együttműködés eredményeként jelentek meg!

Barboni, M. T. S., Dias, S. L., Silva, L. A., Damico, F. M., Vidal, K. S., Costa, M. F., Nagy, B. V., Kremers, J., & Ventura, D. F. (2021). Correlations Between Dark-Adapted Rod Threshold Elevations and ERG Response Deficits in Duchenne Muscular Dystrophy. *Investigative Ophthalmology & Visual Science*, 62(4), 29. <https://doi.org/10.1167/iovs.62.4.29>

Barboni, M. T. S., Liber, A. M. P., Joachimsthaler, A., Saoudi, A., Goyenvalle, A., Rendon, A., Roger, J. E., Ventura, D. F., Kremers, J., & Vaillend, C. (2021). Altered visual processing in the mdx52 mouse model of Duchenne muscular dystrophy. *Neurobiology of Disease*, 105288. <https://doi.org/10.1016/j.nbd.2021.105288>

6. Milyen akadályokat vagy problémákat érzékelt a projekt végrehajtása során?

The travel restrictions due to the pandemic situation was the major limiting factor of the present research project. From the six visits originally planned only one was executed in December 2021.

7. Mi a legjelentősebb szakmai eredmény, amit kiemelne a projektegyütműködés kapcsán?

Implementation and validation of the ERG protocols and publication of scientific results.

8. Van-e olyan javaslat, amivel módosítaná a pályázati felhívás és végrehajtás szempontjait a jövőre nézve?

Kelt: Budapest, 2021.12.14

Aláírás

