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ECMED

The Extracellular Matrix in Epileptogenesis

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Innovative Training Networks (ITN-ETN)*

D1.8 Advanced training course3: Monitoring epilepsy in humans and animals

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PU	Public	√
CO	Confidential, only for members of the consortium (including the Commission Services)	
CI	Classified, as referred to in Commission Decision 2001/844/EC	

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1. History table

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2. Definition and acronyms

Acronyms	Definitions
ECMED	The Extracellular Matrix in Epileptogenesis
ITN	Innovative Training Networks
ESRs	Early Stage Researchers
ECoG	Electrocorticography
EEG	Electroencephalogram
ECM	Extracellular matrix
EU	European Union

3. Introduction

The advanced training course N.3 was originally planned in September 2017 and postponed so as not to overlap the IPROTEOS's practical workshop. In a cost-effective view, it was then decided to host the Training course during the International Conference "Novel Routes for the Analysis of Epilepsy" in Malta, organised by the joint effort of two European Training Networks: ECMED and Eu-GliaPhd. The reason why it was decided to merge the course within the conference was to avoid the ESRs to waste too many days by travelling rather than focusing on the last months of research programme.

The International Conference "Novel Routes for the Analysis of Epilepsy" was held at the University of Malta in Valetta from April 29 to May 2, 2018. The meeting had multiple aims: to update the consortia on the latest results in the epilepsy research field and about cell-cell communication into healthy and diseased brain, to promote PhDs' and PI's networking and collaborations, and to encourage interaction with a broader audience. During this time, it was also held the 3rd advanced ECMED training course on "Monitoring epilepsy in humans and animals" (deliverable 1.8). The advanced course was originally planned in September 2017 and postponed so as not to overlap with the IPROTEOS's practical workshop. In a cost-effective view, it was then decided to host the 3rd Advanced Training course during the International Conference in Malta. This was done for the ESRs in order to save as much time as possible in travelling, and to focus their energies on the last months of research programme.

Particularly, the Malta International Conference program included presentations from both professors, supervisors and students on the work carried out so far, followed by Q&A sessions. The talks covered the role of the ECM, of glia cells and of specific neuronal populations in the brain, with peculiar attention on the molecular, cellular and physiological signalling pathways between these cellular components. The presenters focused on how alterations of the normal brain homeostasis bring to the development of diseases such as epilepsy and how improving drug screening and biomarkers are necessary to prevent development of severe epilepsy. Potential anti-epileptic drugs and vehicle were also discussed, together with the advancement of better instrumentation to study electrical signals and their manipulation. Discussion was encouraged after each talk and the work was critically put into context of old and new theories about epilepsy and epileptogenesis. PhD students were invited to present their work into a 5-minute blitz presentation and the best presenters were awarded. The meeting ended with an open access lecture on "What is epilepsy and why do people get it?" given by Professor Matthew Walker, neurologist at University College London, followed by a roundtable discussion between researchers and people from epileptic association (some affected by epilepsy themselves).

4. Activities carried out and results

Day one: Sunday, April 29, 2018.

After registration Matthew Walker and Frank Kirchhoff welcomed the researchers and briefly stated the aims of the conferences. Dmitri Rusakov was invited to speak on Activity-dependent plasticity



of synaptic microenvironment, followed by Giorgio Carmignoto who explained to the audience “Gabaergic signalling to astrocytes”. The evening concluded with remarks and free time to visit the Valletta area.

Day two: Monday, April 30, 2018.

The morning started with talks from Alexander Dityatev which introduced the concept of ECM and brain plasticity, followed by Marco de Curtis which talked about the difference between the mechanisms of focal seizure generation in human and rodents. After the coffee break, that gave a first opportunity to the members of two consortia to introduce better each other’s, there was a first session of blitz presentation given by the ESRs. Two ERSs from each consortium were chairing the session, introducing each student and timing him/her, followed by questions from the audience. After this session Asla Pitkanen explained pro and cons of using rats as translatable model for post-traumatic epileptogenesis, and the difference with humans. Before lunch Nathalie Rouach explained her last results on “Astroglial regulation of synaptic circuits”. In the afternoon there were three talks, two of which given by the industrial partners Michel Khrestchatsky and Trine Nygaard Jørgensen on “The BBB and CNS delivery of biomolecules: application to a neuropeptide with anticonvulsant and neuroprotective properties” and “A mouse model of the human 15q13.3 microdeletion associated to schizophrenia” respectively. The last speaker of the day was Eckart Gundelfinger that gave an overview of how important is the ECM protein Bassoon and how it is related to epilepsy. Another PhD blitz session was held during mid hafternoon as previously explained.



The second day concluded with a roundtable discussion between the researchers and the patient’s association (British Epilepsy Action (UK) and Malta Epilepsy association) with personal

statements about life with epilepsy from patients and relatives.



Day three: Tuesday, May 1, 2018. The morning session started with Vincenzo Crunelli speaking about cortical and thalamic circuits in a certain type of epileptic seizures (Cortical drive and thalamic feed-forward inhibition control thalamic output synchrony during absence seizures), followed by Lorenzo Cingolani which enlightened the audience with an insight on “Integrins in neuronal excitability”. After the morning PhD-5-minute sessions, Christian Steinhäuser explained how the rescuing of glial gap junction coupling prevents epileptogenesis. During lunchbreak the scientific discussion continued. The afternoon concluded with Heiko Luhmann which gave a talk about “How spontaneous neuronal activity shapes developing neuronal networks”. Afterwards the jury, composed of all the principal investigators, decided the winners for the blitz presentation. The diner was offered by ECMED and EU-GliaPhD at Aaron’s kitchen restaurant, which gave an excellent occasion for the students to engage with members of the other consortium, the patient associations and PIs. During diner, the winners of the blitz presentations were announced and awarded.



Day four: Wednesday, May 2, 2018. The ECMED and EuGliaPhD consortia were invited to attend the public lecture given by Prof. Matthew Walker on “What is epilepsy and why do people get it?”. In this seminar, Professor Walker described the history of EEG, and the recording of normal and abnormal brain activity. He described the impact that EEG has on diagnosis, and how more analysis of the EEG can give us insights into pathophysiology. Lastly, the professor explained the concept of excitability “threshold” and the importance of it in a healthy and diseased brain. Lastly, he gave an insight into the categories of focal and generalised seizures in humans. The lecture was largely advertised during the days beforehand and during the day the event was further sponsored via twitter and facebook social networks. After the lecture, there was the second roundtable session between patients’ associations, researchers and students, and general public. The session was chaired by the scientific journalist Giulia Bonelli, part of the Formicablu foundation, and two delegates of ECMED and EU-GliaPhD volunteered for taking part of the interview panel. During this time also the future of the foundlings for epilepsy research in Europe was discussed.



After lunch, Prof. Matthew Walker continued with the advanced training course on “EEG recording from clinical perspectives”. The advanced course was divided into two parts. In the first part, Prof Walker described the mechanisms underlying the generation of the EEG and different approaches to recording the EEG including scalp and intracranial recordings and the advantages and disadvantages of each. He then went on to discuss the use of EEG in



identifying seizures and localising seizure activity and described source localisation. Lastly, more recent and advanced methods of EEG analysis were described including dynamic causal modelling. In the second part, there was a more practical session with videos describing the different seizure types in humans

and the different manifestations of epilepsy. The evening finished with a walking tour of the beautiful city centre of Valletta and its history.

5 Conclusions

In conclusion, the conference was an excellent occasion for two European consortia to meet and learn from each other's. The joint lectures were a great way to foster the knowledge about distinct cellular units of the brain in healthy state and in diseases, with great emphasis on epilepsy. The ESRs, by preparing and presenting the blitz presentations, learnt to summarize their work in a short time, to present in front of a scientific audience their results and to critically answer to the questions asked. The talks also serve as update for the latest discoveries in the epilepsy field and to promote new collaborations between European partners. The lunches and dinners offered were an excellent platform for the student for networking and to meet new fellows and laboratories.

Lately, the roundtable with the patient's associations was enormously beneficial for both researchers and patients (or patients' relatives). The people in the patient's association were encouraged to ask questions to students and to PIs in order to discover more about reality of modern research in a lab. The students' motivation, on the other hand, was strengthened by hearing the patients' stories and their needs to get control of their seizures and to live a life free of discrimination.

The final version of the program can be found at <http://www.ecmed-itn.eu/news-and-events/network-events>. All materials related to the course have been uploaded to the intranet section of the ECMED website.