Epilepsia Special Issue: Harmonization in Preclinical Epilepsy Research

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Harmonization in preclinical epilepsy research: a joint AES/ILAE translational initiative.
Aristea S. Galanopoulou; Jacqueline A. French; Terence O'Brien; Michele Simonato
(pages 7-9)
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The optimization and harmonization of research practices in preclinical epilepsy research has been considered as an important translational initiative as it would allow data comparisons across laboratories, encourage multicenter collaborations and systematic reviews of preclinical data, as well as allow cross-validation of findings before entering clinical testing. The AES/ILAE Translational Task Force, a joint task force formed of members elected from the American Epilepsy Society (AES) and the International League Against Epilepsy (ILAE) undertook several initiatives towards this goal. A large number of volunteer investigators were assigned into different topic-oriented working groups. This introduction to the special issue on the proceedings of this Task Force describes the first reports that were produced by some of these working groups towards the creation of improved standards for performing and interpreting rodent electroencephalography (EEG) and electrophysiological studies, systematic reviews of preclinical data, and preclinical common data elements.

Methodological standards and interpretation of video-EEG in adult control rodents. A TASK1-WG1 report of the AES/ILAE Translational Task Force of the ILAE
Shilpa D. Kadam; Raimondo D'Ambrosio, Venceslas Duveau, Corinne Roucard, Norberto Garcia-Cairasco; Akio Ikeda, Marco de Curtis, Aristea S. Galanopoulou and Kevin M. Kelly
(pages 10-27)
http://onlinelibrary.wiley.com/doi/10.1111/epi.13903/full
The TASK1-WG1 group of the Joint American Epilepsy Society and International League Against Epilepsy (AES/ILAE) Translational Task Force was selected to address methodological and interpretation issues that relate to video electroencephalography (EEG) studies in preclinical research. Rodent models of human epilepsy have provided critical insights into mechanisms underlying epilepsy as well as reliable tools for validation of drugs developed as anti-seizure agents. EEG remains the gold standard by which both the documentation of spontaneous seizures and the effectiveness of drugs in seizure suppression can be assessed. Determination of the development of epileptic seizures in any given rodent model relies heavily on comparisons between EEGs from rodents with and without epilepsy. It is therefore critical that as we endeavor to establish and validate new animal models of human epilepsy and test new therapies, we need to be aware of the problems and pitfalls associated with EEG recordings in rodents. Insights gained from previous research are provided to establish practical guidelines and recommendations to assist researchers in the design, reporting, and interpretation of future EEG studies. This first report focuses on video EEG in experimental controls.

Methodological standards and functional correlates of depth in vivo electrophysiological recordings in control rodents. A TASK1-WG3 report of the AES/ILAE Translational Task Force of the ILAE

Amanda E. Hernan, Catherine A. Schevon, Gregory A. Worrell, Aristea S. Galanopoulou, Philippe Kahane, Marco de Curtis, Akio Ikeda, Pascale Quilichini, Adam Williamson, Norberto Garcia-Cairasco, Rod C. Scott and Igor Timofeev

(pages 28-39)
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The TASK1-WG3 group of the Joint American Epilepsy Society and International League Against Epilepsy (AES/ILAE) Translational Task Force was selected to address methodological and interpretation issues that relate to depth electrophysiological recordings in rodents. In this report, which focuses on depth recordings in experimental controls, they describe and discuss advantages and limitations of multiple electrophysiological techniques and types of analysis that are currently used to study electrographic activities in the brain of rodents and other animals. This review is important for investigators looking for appropriate techniques that are most suitable to answer particular experimental questions.

Methodological standards for in vitro models of epilepsy and epileptic seizures. A TASK1-WG4 report of the AES/ILAE Translational Task Force of the ILAE

Joseph V. Raimondo, Uwe Heinemann, Marco de Curtis, Howard P. Goodkin, Chris G. Dulla, Damir Janigro, Akio Ikeda, Chou-Ching K. Lin, Premysl Jiruska, Aristea S. Galanopoulou and Christophe Bernard

(pages 40-52)
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The TASK1-WG4 group of the Joint American Epilepsy Society and International League Against Epilepsy (AES/ILAE) Translational Task Force was selected to address methodological issues and best practices in preclinical studies utilizing in vitro electrophysiological experiments. *In vitro* brain preparations are a powerful means for exploring the mechanisms underlying seizures and epilepsy. In this paper, the investigators review the many techniques and technologies which are employed in the context of *in vitro* epilepsy research. The authors call for greater inclusion of detailed descriptions of techniques, including often ignored parameters with unpredictable yet significant effects on study reproducibility and outcomes. In addition, they discuss how recent developments in brain slice preparation affect their use as models of epileptic activity.

Standards for data acquisition and software-based analysis of in vivo electroencephalography recordings from animals. A TASK1-WG5 report of the AES/ILAE Translational Task Force of the ILAE

Jason T. Moyer, Vadym Gnatkovsky, Tomonori Ono, Jakub Otáhal, Joost Wagenaar, William C. Stacey, Jeffrey Noebels, Akio Ikeda, Kevin Staley, Marco de Curtis, Brian Litt and Aristea S.

Galanopoulou
(pages 53-67)
http://onlinelibrary.wiley.com/doi/10.1111/epi.13909/full
The TASK1-WG5 group of the Joint American Epilepsy Society and International League Against Epilepsy (AES/ILAE) Translational Task Force was selected to address methodological issues and best practices in data acquisition and software-based analysis in experiments utilizing electrophysiological recordings. Electroencephalography (EEG) is a technique for directly recording the electrical activity of the brain. EEG has proven to be an important tool for studying the brain, particularly in diseases like epilepsy. Acquiring and analyzing EEG data, however, can be complicated. This is particularly true for research in animal models of epilepsy, since no standards exist for collecting and analyzing EEG. This report addresses this issue in two ways. First, this report reviews current techniques for acquiring EEG and for using software to analyze EEG signals in animal models of epilepsy. Second, where appropriate, this manuscript suggests appropriate standards for acquiring EEG, for using software to analyze EEG, and for reporting research that utilizes EEG. This is important to do, because it will increase the quality, interpretability, and usability of data generated in animal models of epilepsy using EEG. In turn, this will help the scientific community to more rapidly and efficiently translate basic research findings from preclinical studies into new, usable treatments in humans.

Identification and characterization of outcome measures reported in animal models of epilepsy. Protocol for a systematic review of the literature. A TASK2 report of the AES/ILAE Translational Task Force of the ILAE
Michele Simonato, Sloka Iyengar, Amy Brooks-Kayal, Stephen Collins, Antoine Depaulis, David W. Howells, Frances Jensen, Jing Liao, Malcolm R. Macleod, Manisha Patel, Heidrun Potschka, Matthew Walker, Vicky Whittemore and Emily S. Sena
(pages 68-77)
http://onlinelibrary.wiley.com/doi/10.1111/epi.13908/full
The TASK2 group of the Joint American Epilepsy Society and International League Against Epilepsy (AES/ILAE) Translational Task Force was selected to create to perform systematic reviews of preclinical epilepsy research studies. In this report, the authors describe the strategies utilized and the protocol that was developed to initiate the first systematic review on identifying and characterizing outcome measures in preclinical studies utilizing animal models of epilepsy. This initiative has been done in collaboration with the CAMARADES group (Collaborative Approach to Meta Analysis and review of Animal Data from Experimental Studies).

Common data elements for preclinical epilepsy research: standards for data collection and reporting. A TASK3 report of the AES/ILAE Translational Task Force of the ILAE
Lauren C. Harte-Hargrove, Jacqueline A. French, Asla Pitkänen, Aristea S. Galanopoulou, Vicky Whittemore and Helen E Scharfman
(pages 78-86)
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The TASK3 group of the Joint American Epilepsy Society and International League Against Epilepsy (AES/ILAE) Translational Task Force was selected to develop preclinical common data elements (CDEs) and case report forms (CRFs) for preclinical epilepsy research. Despite

extensive efforts, there has been difficulty developing new treatments for epilepsy based on preclinical research. It has been suggested that these efforts would be more likely to succeed if there was increased transparency, rigor and reproducibility. Of the many ways to address this need, the TASK3 group of the AES/ILAE Translational Research Task Force of the ILAE developed common data elements (CDEs) for preclinical epilepsy research. These include core, behavioral, physiology, pharmacology, video electroencephalograhy (vEEG) CDE and CRF modules. The advantages of CDEs and the approaches to developing preclinical epilepsy CDEs are described in this introductory report.