

## Epilepsy Models and Preclinical Common Data Elements

### Introduction

Preclinical *in vivo* epilepsy studies continue to evolve by maximizing the number of endpoints and biomarkers to better characterize the model being studied. This concept supports a multi-faceted approach recognizing organ systems work together and influence one another; suggesting specific pathologies cannot be described by simply studying one aspect. A joint translational task force reports suggested physiologic common data elements (CDEs) to improve experimental design and assess physiologic conditions in epilepsy models.

### CDEs

Classical Video-EEG remains the primary backbone to determine or verify different epileptic stages. Standardizing on complimentary CDEs provide an understanding of animal health and improve study design and reported data. Although not inclusive, CDEs discussed here span between gross body weight changes to more physiologically relevant parameters such as core body temperature blood pressure, electrocardiogram (ECG), respiration parameters.

Body Weight: Principally a general marker for animal welfare, loss of body weight is associated with several pathological states including epilepsy. Cause could be associated with dehydration or reduced food intake due to status epilepticus (highest severity seizure state).

Core Body Temperature: is considered to be one of the most important vital signs and physiologic parameters to collect. Changes in body temperature often correlate to change in stress levels and onset of fever. Febrile seizure animal models have been

### References:

Gorter J, van Vliet E, Dedeurwaerdere S, Buchannan G, Friedman D, Borges K, Grabenstatter H, Lukasiuk K, Scharfman H, Nehlig A (2018). "A companion to the preclinical common data elements for physiologic data in rodent epilepsy models. A report of the TASK3 Physiology Working Group of the ILAE/AES Joint Translational Task Force". *Epilepsia Open*, 3(s1):69-89.

developed to better characterize the consequences of prolonged events in juveniles and its association with increased risk in adulthood.

Electrocardiogram (ECG): can identify cardiovascular dysfunction that occurs in different seizure models. Changes in ECG morphology, including QT prolongation and cardiac arrhythmias are observed in the mouse model of sudden unexpected death in epilepsy (SUDEP).

Blood Pressure: Similar to ECG, blood pressure may be important to measure as it increases with epilepsy events, helping assess SUDEP risk.

Respiratory: Pulmonary parameters including rate, tidal volume and minute volume may be important in experimental epilepsy models as hypoxia can occur as a consequence of seizure events (status epilepticus). Hypoxic environments have also been reported to the risk of developing epilepsy.

### DSI

Data Sciences International (DSI) offers complete systems that sense, transmit, acquire, and report physiologic data. In order to create a more robust study design, scientists rely on DSI technology to study specific targets as well as obtain a holistic view; allowing them to look at side effects that are upstream or downstream of the main pathology.

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