Epilepsy Animal Models







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OncoWuXi Newsletter



Background

Epilepsy is one of the most common serious brain conditions, affecting over 70 million people worldwide. It is characterized by a lasting predisposition to generate spontaneous epileptic seizures and has numerous neurobiological, cognitive, and psychosocial consequences. The process is conceptualized to result from an imbalance between excitatory and inhibitory activity within a neuronal network, so that it becomes likely to function in an excessive, hypersynchronous, oscillatory manner, which when sustained, disrupts normal neuronal processing and is capable of disrupting other neuronal networks.



Thijs, Roland D et al. Lancet. 2019; Fernandez-Baca Vaca, G et al. Seizure. 2020





EEG seizure pattern is generalized at onset as indicated by the bracket. Posterior dominant rhythm is indicated by the blue arrow before the seizure onset.

The International League Against Epilepsy framework for the classification of epilepsies.

Epilepsy animal models available at WuXi AppTec

For epilepsy related preclinical researches, the electrophysiological pharmacology platform of WuXi AppTec provides following animal models.

Model ID	Model type	Species	Readouts
Pentylenetetrazole (PTZ) induced Model	Acute	Mouse/Rat	Racine score (5 Grades) Other behavioral tests EEG recording
Kainic Acid (KA) induced Model	Chronic Acute	Mouse	Racine score (5 Grades) EEG recording Spontaneous Epilepsy
LiCl-Pilocarpine induced Model	Chronic	Mouse/Rat	Racine score (5 Grades) EEG recording Spontaneous Epilepsy
Maximal Electroshock Seizure (MES) Model	Acute	Mouse	Limb spastic duration

Pentylenetetrazole (PTZ)-induced Animal Model



Case study: racine score on PTZ-induced epileptic model in rat



- Intraperitoneal injection of PTZ resulted in the grimace scale scores of SD rats up to almost 5, which is grand mal seizure behavior, indicating the modeling was successful.
- Positive control Carbamazepine and test compounds significantly inhibited the increased grimace scale scores induced by PTZ injection, and most of them were minor epileptic behaviors below grade 3.

Pentylenetetrazole (PTZ)-induced Animal Model



Case study: EEG recording on PTZ-induced epileptic rat model using DSI implantable telemetry system



- Intraperitoneal injection of PTZ caused typical epileptiform discharges in rats (Vehicle group, Figure C), also indicating the success of modeling.
- Positive control Carbamazepine and test compounds elongated epileptiform discharge latency (Figure D), decreased the number (Figure E) and duration (Figure F) of the high frequency and amplitude discharge compared with the Vehicle group.

Pentylenetetrazole (PTZ)-induced Animal Model



Case study: EEG recording on PTZ-induced epileptic rat model using DSI implantable telemetry system



- Intraperitoneal injection of PTZ caused different power spectrum of δ-band β-band. There was no difference in the δ-band oscillation power (Figure G).
- Positive control Carbamazepine and test compounds reduced β-band oscillation power compared to Vehicle group (Figure H).



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