# TABLE OF CONTENTS

## Introduction

- 1. What can we model?
- 2. Comparative biology and species effects on expression of epilepsy
- 3. Strain effects on expression of seizures and epilepsy
- 4. Good welfare practice in modeling seizures and epilepsy
- 5. Ethics in the Use of Animal Models of Seizures and Epilepsy
- 6. Regulatory aspects of drug development
- 7. Use of animal models for epilepsy research and therapy development

### Technical and methodological issues

- 8. Monitoring for Seizures in Rodents
- 9. Behavioral characterization and scoring of seizures in rodents
- 10. Seizure mimics
- 11. Characterization of pathology
- 12. Monitoring cardiorespiratory and other physiological parameters during seizures in small animals
- 13. Behavioral and cognitive testing procedures in animal models of epilepsy
- 14. In vivo Imaging in rodents

#### In vitro and in silico models

- 15. Hippocampal in silico models of seizures and epilepsy
- 16. Neocortical/thalamic in silico models of seizures and epilepsy
- 17. iPS cells, stem cells
- 18. Hippocampus in vitro
- 19. Thalamus and cortex in vitro
- 20. Brain slices from human resected tissues
- 21. Organotypic Hippocampal Slice cultures as a Model of Post-traumatic Epileptogenesis
- 22. The in vitro isolated guinea pig brain in the study of ictogenesis

#### Non-mammalian in vivo models

- 23. Nematode C. elegans: Genetic Dissection of Pathways Regulating Seizure and Epileptic-like Behaviors
- 24. Drosophila
- 25. Xenopus laevis
- 26. Zebrafish models of epilepsy and epileptic seizures

# Naturally occurring seizures and epilepsies in animals

- 27. Veterinarian's perspective
- 28. Naturally occurring epilepsy and status epilepticus in dogs
- 29. Naturally Occurring Temporal Lobe Epilepsy in Cats
- 30. Naturally occurring epilepsy and status epilepticus in Sea lions
- 31. Baboon Model of Genetic Generalized Epilepsy
- 32. Genetic Models of Reflex Epilepsy and SUDEP in Rats and Mice
- 33. Genetic models of absence epilepsy in rats and mice

## In vivo mammalian models of induced seizures and status epilepticus

- 34. Electrical stimulation
- 35. Systemic Chemoconvulsants Producing Acute Seizures in Adult Rodents
- 36. Focally applied chemoconvulsants
- 37. Models of Chemically-Induced Acute seizures and Epilepsy: Toxic compounds and drugs of addiction
- 38. Pharmacologically induced animal models of absence seizures
- 39. Models of seizures and status epilepticus early in life

# In vivo mammalian models of acquired epilepsies

- 40. Tetanus toxin
- 41. Post-SE models: Systemic kainic acid
- 42. Post-SE models: Focal kainic acid
- 43. The Pilocarpine Model of Acquired Epilepsy
- 44. Post-Status Epilepticus models: Electrical stimulation
- 45. Post-SE models: Hyperthermia
- 46. Epilepsy after TBI
- 47. Post-infectious epilepsy
- 48. Post-perinatal hypoxia
- 49. Perinatal Hypoxic-Ischemic Encephalopathy: A Model of Stroke-Induced Pediatric Epilepsy
- 50. Post-stroke epilepsy
- 51. Animal Models of Drug-Refractory Epilepsy

# In vivo mammalian models of genetic epilepsies with identified gene

- 52. Spontaneous and Gene-Directed Epilepsy Mutations in the Mouse
- 53. Dravet and GEFS+ syndromes
- 54. Tuberous sclerosis and other toropathies

### Modeling conditions that predispose to seizures or epilepsy

- 55. Kindling (including fast and slow kindlers)
- 56. Human mutations associated with brain malformations resulting in hyperexcitability in rodents
- 57. Dysplasias Cortical freeze lesion
- 58. Dysplasia MAM, model of developmental epilepsy
- 59. Dysplasias In utero irradiation
- 60. Undercut cortex
- 61. Brain tumor-related epilepsy
- 62. Withdrawal seizures
- 63. Perimenstrual seizures and neurosteroid withdrawal
- 64. Metabolic disturbances: Hypo- and hyperglycemic seizures in vivo and in vitro
- 65. Stress
- 66. Blood Brain Barrier disruption
- 67. Experimental models of inflammation in epilepsy research

## Other specific epilepsy-related syndromes

- 68. Infantile spasms
- 69. Models of epileptic encephalopathies
- 70. Sudep Animal Models

# Animal models of other brain diseases with altered seizure susceptibility

- 71. Epilepsy in Models of Alzheimer's disease
- 72. Animal Models of Acquired Epilepsy and Tauopathies
- 73. Epilepsy in other neurodegenerative disorders: Huntington's and Parkinson's diseases
- 74. Animal models of other brain diseases with altered seizure susceptibility: Autism and Fragile X Syndrome
- 75. Epilepsy in Models of Rett syndrome
- 76. Models of depression

## Conclusions

77. What do models model? What needs to be modeled?