

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

OVID THERAPEUTICS, INC.,
Petitioner

v.

MARINUS PHARMACEUTICALS, INC.
Patent Owner

Case IPR2024-00726
Patent 11,110,100

DECLARATION OF DR. MICHAEL A. ROGAWSKI

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REFERENCES CITED

Exhibit Number	Description
1001	U.S. Patent No. 11,110,100 B2 to Marinus Pharmaceuticals, Inc. (“the ’100 patent”)
1002	Declaration and Curriculum Vitae of Dr. Raman Sankar, M.D., Ph.D. (the “Sankar Declaration”)
1016	H. Vaitkevicius et al., Intravenous ganaxolone for the treatment of refractory status epilepticus: Results from an open-label, dose-finding, phase 2 trial, 63 <i>Epilepsia</i> 2381-2391 (2022) (“ <i>Epilepsia Paper</i> ”)
2018	U.S. Provisional Patent Application 62/882,648 and its file history
2022	Reddy and Kuruba, “Experimental Models of Status Epilepticus and Neuronal Injury for Evaluation of Therapeutic Interventions,” <i>Int. J. Mol. Sci.</i> 14:18284–318 (2013) (“Reddy” or “Reddy & Kuruba”)
2023	Seinfeld et al., “Status Epilepticus,” in Additional Perspectives on Epilepsy: The Biology of a Spectrum Disorder (Cold Spring Harbor Laboratory Press, 2016, ed. Gregory L. Holmes and Jeffrey L Noebels) (“Seinfeld”)
2024	Imtiyaz et al., “The Evolution of the Pilocarpine Animal Model of Status Epilepticus,” <i>Heliyon</i> 6:e04557 (2020) (“Imtiyaz”)
2025	Press Release: “Marinus Pharmaceuticals Doses First Subject in Phase I Clinical Trial for Ganaxolone IV,” Published on June 22, 2016, Available at: https://ir.marinuspharma.com/news/news-details/2016/Marinus-Pharmaceuticals-Doses-First-Subject-in-Phase-1-Clinical-Trialfor-Ganaxolone-IV/default.aspx (“June 22, 2016, Press Release” or “Marinus’s Phase I Press Release”)
2026	Press Release: “Marinus Pharmaceuticals Receives FDA Orphan Drug Designation for Ganaxolone IV to Treat Status Epilepticus,” Published April 15, 2016, Available at: https://ir.marinuspharma.com/news/news-details/2016/Marinus-Pharmaceuticals-Receives-FDA-Orphan-Drug-Designation-for-Ganaxolone-IV-to-Treat-Status-Epilepticus/default.aspx (“April 15, 2016, Press Release” or “Marinus’s Orphan Drug Press Release”)
2027	WIPO Publication No. WO 2007/062266 (“Shaw”)

2028	American Academy of Neurology (“AAN”) 2016 Annual Meeting Scientific Abstract Listing and Meeting Information, AAN 2016 Annual Meeting, Vancouver, BC, Canada, April 15–21, 2016, Available at: https://issuu.com/americanacademyofneurology/docs/16am_abstractlistingdigi_v1424 (“AAN Meeting Brochure”)
2029	Saporito et al., “Ganaxolone Administered Intravenously Prevents Behavioral Seizures and Promotes Survival in the Rat Lithium-Pilocarpine Model of Status Epilepticus,” Poster, presented April 17, 2016, at the 2016 AAN Annual Meeting (“Saporito P1” or “Saporito Poster 1” or “2016 AAN Poster 1” or “2016 AAN Saporito Poster 1”)
2030	Saporito et al., “Intravenous Administration of Ganaxolone Attenuates Electroencephalographic Seizures in a Diazepam Resistant Model of Status Epilepticus,” Poster, presented April 19 and April 20, 2016, at the 2016 AAN Annual Meeting (“Saporito P2” or “Saporito Poster 2” or “2016 AAN Poster 2” or “2016 AAN Saporito Poster 2”)
2031	Tsai et al., “Phase I Study to Determine the Pharmacokinetics, Pharmacodynamics, and Safety of IV Ganaxolone in Healthy Adults,” Abstract of Poster Presented at the 6th London-Innsbruck Colloquium on Status Epilepticus and Acute Seizures April 6–8, 2017, Salzburg, Austria (“Tsai”)
2033	Supplemental Information to Vaitkevicius et al., “Intravenous Ganaxolone for the Treatment of Refractory Status Epilepticus: Results from an Open-Label, Dose-Finding Phase 2 Trial,” <i>Epilepsia</i> 63:2381-91 (2022) (“ <i>Epilepsia</i> Supplemental Information” or “ <i>Epielpsia</i> SI”)
2034	Wylie et al., Status Epilepticus. [Updated 2022 May 15]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430686/ (“Wylie”)
2035	Trinka et al., “A definition and classification of status epilepticus—Report of the ILAE Task Force on Classification of Status Epilepticus.” <i>Epilepsia</i> , 56(10):1515-1523 (2015) (“Trinka”)

I, Michael A. Rogawski, declare as follows:

I. INTRODUCTION

1. I have been retained on behalf of Patent Owner Marinus Pharmaceuticals, Inc. (“Marinus”) in an *inter partes* review before the Patent Trial and Appeal Board of U.S. Patent No. 11,110,100 (the “’100 patent”, Ex. 1001)—IPR2024-00726. Counsel has asked me to offer opinions and testimony related to the ’100 patent and its subject matter.

2. I have no financial interest in the parties or in the outcome of this proceeding. I am being compensated for my work as an expert on an hourly basis. My compensation is not dependent on the outcome of these proceedings or the content of my opinions.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

3. A copy of my CV, which describes my qualifications, is attached as **Exhibit A** to this declaration.

4. I am currently a professor in the Department of Neurology of the School of Medicine at the University of California, Davis (“UC Davis”). I also hold the appointment of professor in the Department of Pharmacology of the School of Medicine. Prior to my appointment at UC Davis in January 2007, I served at senior investigator and chief of the Epilepsy Research Section at the

National Institute of Neurological Disorders and Stroke. In July 2021, UC Davis awarded me the honorary title of Distinguished Professor.

5. I am also a clinical neurologist at UC Davis Health and I see patients suffering from neurological disorders, including epilepsy, at the UC Davis Medical Group's Midtown Clinic in Sacramento.

6. I received my M.D. from Yale University School of Medicine in 1980. I also received a Ph.D. in pharmacology from Yale University in 1980.

7. I completed an internship in internal medicine at Yale University School of Medicine from 1980–81. I then did my residency and fellowship in neurology at The Johns Hopkins Hospital from 1982–85.

8. After residency, I was a senior staff fellow at the National Institute of Health from 1986–89. I was a member of the Active Medical Staff, Clinical Center at the National Institute of Health from 1987–2006.

9. During my entire career as a neurologist, I have been interested in the study of seizure disorders and their treatment.

10. More specifically, my research interests include cellular neurophysiological studies of ion channels as they relate to the mechanisms of action of antiseizure medications; the use of animal models for the development of new therapies for the treatment of neurological conditions (including seizures and status epilepticus); and clinical studies of new treatments for seizures and epilepsy.

11. My work on AMPA receptors and neurosteroids have led to new treatment approaches for seizures and epilepsy, and to Zulresso® (brenaxolone), which is an FDA-approved treatment for postpartum depression.

12. During my career, I have authored more than 170 peer-reviewed articles; nearly 100 reviews, book chapters, and books; and have been granted 7 patents by the United States Patent and Trademark Office, most of which relate to the treatment of neurological disorders or the development of pharmaceuticals to treat neurological disorders, including epilepsy and seizures. My CV contains a comprehensive list of peer-reviewed articles, book chapters, invited lectures, scientific presentations, and courses taught that demonstrate my expertise in research on treatments for neurological conditions, including epilepsy, seizures, and status epilepticus.

13. I have received a number of awards over the course of my career. I provide a list of those awards in my CV (attached as **Exhibit A**). I highlight several here. I have received the NIH Director's Award, the Epilepsy Research Award for Outstanding Contributions to the Pharmacology of Antiepileptic Drugs from the American Society for Pharmacology and Experimental Therapeutics, and the Service Award from the American Epilepsy Society. In October 2018, the American Association for the Advancement of Science elected me as a Fellow in the Neuroscience Section for my contributions in the fields of neuroscience,

neuropharmacology, and neurology, particularly related to the treatment of epilepsy.

14. I have also been elected to full membership in Sigma Xi, which is a scientific research honor society. I have also been elected as a fellow of the American Neurological Association, the American Association for the Advancement of Science, the American Epilepsy Society, and the National Academy of Inventors.

15. I have served on the editorial boards of a number of journals, including *Molecular Pharmacology*, *Epilepsia*, *Epilepsy Research*, *Synapse*, *CNS Drug Reviews*, *Current Neuropharmacology*, *Pharmacology & Therapeutics*, *BMC Pharmacology*, *Cellular and Molecular Neurobiology*, and *Nature Scientific Reports*, and was executive editor of *Neuropharmacology* and associate editor of *Neurotherapeutics*. Many of those publish extensively on treatments for neurological disorders, including seizure disorders. I am also one of the founders of *Epilepsy Currents*, which is the journal of the American Epilepsy Society.

16. In the past, I have served on the board of directors of the American Epilepsy Society and have been a member of advisory panels to the National Institutes of Health and the Food and Drug Administration. I was also the president of the American Society for Experimental Neurotherapeutics from 2012 to 2014.

17. I have served on the scientific advisory boards for a number of companies and am currently a member of Marinus's Scientific Advisory Board.

18. I also consult or have consulted for many companies developing treatments for neurological disorders, including Patent Owner Marinus and Petitioner Ovid.

III. MATERIALS CONSIDERED

19. I have considered all of the documents I cite in this Declaration, as well as the Petitioner's Petition for Inter Partes Review of the '100 patent ("Petition" or "Pet.") and Dr. Sankar's declaration (Ex. 1002) in forming my opinions.

IV. BACKGROUND OF THE TECHNOLOGY

A. Status Epilepticus ("SE")

20. An epileptic seizure is defined as an abnormal electrical discharge in the brain that causes alteration in consciousness, sensation, or behavior. (Reddy & Kuruba, Ex. 2022, at 18285.) Epilepsy is a chronic condition in which patients experience recurrent, unprovoked epileptic seizures. (*Id.*) Epileptic seizures can occur as singular events in people who do not warrant the diagnosis of epilepsy, such as following a head injury; in the setting of infections like meningitis; with choking; following alcohol or drug withdrawal; or in the setting of metabolic derangements, including renal failure, hepatic failure or hypoglycemia.

21. Status epilepticus (“SE”) is a seizure condition in which a patient experiences a prolonged seizure or a series of multiple seizures without full recovery of consciousness in between them. (*Id.* at 18287) According to the common definition, SE is present when this condition persists for five minutes or longer. (Seinfeld, Ex. 2023, at 1-2).

22. Many different types of triggers, including stroke, traumatic brain injury, central nervous system infections, alcohol or drug withdrawal, or the cessation of anti-seizure medications, can cause SE. (Imtiyaz, Ex. 2024 at 1; Seinfeld, Ex. 2023 at 2.) It can also occur with no known cause. (Seinfeld, Ex. 2023 at 2.)

23. While people with epilepsy may experience SE, SE may occur in people who do not warrant the diagnosis of epilepsy. While treatments for most types of epilepsy are intended to prevent seizures from occurring at all, treatments for SE are intended to stop the prolonged or repeated seizure activity that a patient is experiencing.

24. SE, particularly convulsive SE, is a serious condition that constitutes a life-threatening medical emergency and is generally treated in the hospital setting. The cause of the SE, the patient’s age, and underlying medical conditions all have an impact on the outcome for the patient. (Seinfeld, Ex. 2023, at 7.) Overall, convulsive SE has a mortality rate from 7%–39%. (*Id.*) Even where not fatal, SE

can cause significant damage to the brain, which may be associated with cognitive and other neurological impairments. (Reddy & Kuruba, Ex. 2022 at 18284.)

25. SE can be characterized by certain behavioral manifestations evolving over time (also referred to as semiology), which in the case of convulsive status epilepticus includes generalized tonic-clonic movements of the extremities and impaired mental status. In addition, SE has electrophysiological correlates (referred to as electrographic SE) detectable on an electroencephalogram (EEG) recording. (Wylie, Ex. 2034; Trinkka et al., Ex. 2035; *see also* Saporito Posters (Ex. 2029 and Ex. 2030.)

26. SE can cause significant damage to the brain, which may be associated with cognitive and other neurological impairments. (Reddy & Kuruba, Ex. 2022, at 18284.) SE may also lead to the development of epilepsy. Currently, the initial therapy for convulsive SE is with a benzodiazepine such as lorazepam, midazolam or diazepam. (*Id.* at 18287.) However, the efficacy of benzodiazepines decrease dramatically as the duration of SE increases and, in some cases, there is a complete loss of efficacy. (*Id.*) In most cases, a second drug therapy is administered, such as phenytoin, fosphenytoin, levetiracetam or valproic acid, but the initial and second therapies are not always able to successfully terminate the seizures. (*Id.*)

27. SE in which the seizures fail to stop with such treatment is referred to as refractory SE, which is treated with anesthetic drugs that come with their own risks. (*Id.*) Refractory SE constitutes up to 40% of cases. (*Id.*) There is a need for treatments that effectively terminate SE, particularly in refractory cases. (Imtiyaz, Ex. 2024, at 1.)

B. Marinus's Development of Ganaxolone as a Treatment for SE

28. Ganaxolone is a synthetic neurosteroid compound that is a GABA_A receptor positive allosteric modulator. Patent Owner Marinus has been working on developing ganaxolone as a treatment of seizure disorders including SE for over 15 years.

29. Early in its history, Marinus evaluated various dosage forms of ganaxolone for the treatment of epilepsy. (Shaw, Ex. 2027.) Later, Marinus began to develop formulations of ganaxolone specifically for the treatment of SE and to test ganaxolone as a treatment for SE in animals. (Marinus Phase 1 PR, Ex. 2025; Marinus Orphan Drug PR, Ex. 2026.) By 2016, Marinus had published studies evaluating ganaxolone in the rat lithium-pilocarpine model of SE. (Zhang, Ex. 2012; AAN Meeting Brochure, Ex. 2028 at 46, 99, 128; 2016 AAN Saporito Poster 1, Ex. 2029; 2016 AAN Saporito Poster 2, Ex. 2030.) This research examined the ability of IV-administered ganaxolone to treat SE as assessed by its effect on convulsive behavior, EEG activity, and survival. (2016 AAN Saporito Poster 1,

Ex. 2029 and 2016 AAN Saporito Poster 2, Ex 2030.) The research found that all vehicle-treated test subjects exhibited convulsive SE. By contrast, treatment with ganaxolone dramatically reduced the occurrence of SE by 30% to 100% depending on dose. Ganaxolone demonstrated a therapeutic effect when administered at 0, 15, 30, or 60 minutes after SE onset. In addition, all groups of animals treated with ganaxolone exhibited markedly improved survival at 24 hours compared with those who had received vehicle. Additional studies using EEG to assess SE showed that ganaxolone elicited a sustained (≥ 5 hrs) block of SE independent of treatment time.

30. Marinus also carried out clinical trials to examine whether ganaxolone is safe and effective for treatment of SE in humans. In 2016, Marinus issued a press release announcing that “the U.S. Food and Drug Administration (FDA) granted Orphan Drug Designation to the intravenous (IV) formulation of its CNS-selective GABA_A modulator, ganaxolone, for the treatment of [SE].” (Marinus Orphan Drug Press Release, Ex. 2026.) The press release noted that “[a] Phase 1 clinical trial evaluating the safety, tolerability and pharmacokinetics of ganaxolone IV is expected to initiate in the first half of 2016.” (*Id.*) In June 2016, Marinus reported that it had dosed the first human subjects (healthy volunteers), in a Phase 1 clinical trial for ganaxolone IV. (Marinus Phase I Press Release, Ex. 2025) In 2017, Marinus reported results from that Phase I trial, which showed that

ganaxolone “administered as a rapid IV bolus or bolus with continuous infusion was generally safe and well tolerated” in healthy volunteers and that “there were no safety issues that limit getting to a potentially efficacious plasma concentration in a short period of time.” (Tsai, Ex. 2031.)

31. After obtaining promising results in its Phase 1 clinical trial, Marinus set out to determine whether ganaxolone would be an effective treatment for SE in a Phase 2 clinical trial, which evaluated specific dosing regimens of ganaxolone in the treatment of refractory SE. The results of that trial were presented in a paper published in the journal *Epilepsia*. (*Epilepsia* paper, Ex. 1016.)

32. In that trial, patients suffering from refractory SE were administered ganaxolone infusions starting with an IV bolus over 3 minutes, followed by a continuous infusion at decreasing infusion rates for 48-96 hours and then an 18-hour taper. (*Id.* at Abstract.) The detailed dosing regimens are specified in a Supplemental Table to the *Epilepsia* paper that is reproduced below (*Epilepsia* SI, Ex. 2033):

Supplemental Table 1. Ganaxolone dosing used in this study

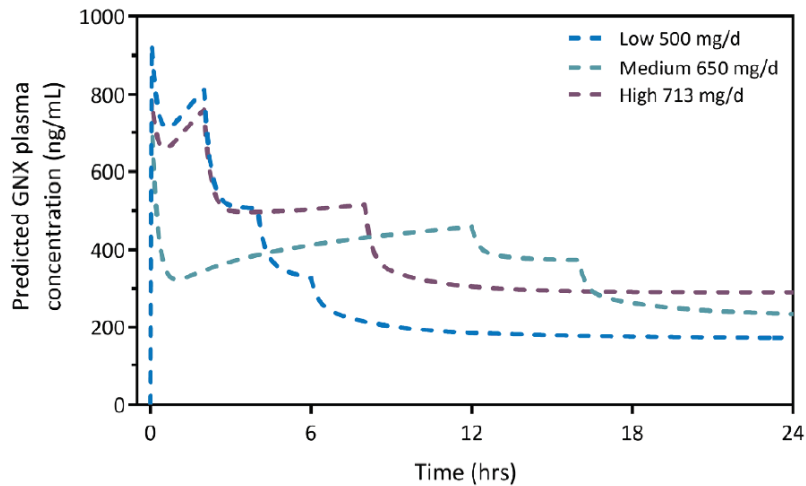
Cohort	Initial Bolus ^a	Additional Boluses PRN	Day 1 Infusion Rates	Day 2 - 4 Infusion Rates	18-h Taper ^b
High (713 mg/d)	25 mg	Not allowed	80 mg/h for 2 h 40 mg/h for 6 h 18 mg/h for 16 h	29 mg/h for 24 h	25% rate decrease every 6 h
Medium (650 mg/d)	25 mg	Allowed ^c	35 mg/h for 12 h 25 mg/h for 4 h 13 mg/h for 8 h	25 mg/h for 24 h	
Low (500 mg/d)	30 mg	Not allowed	85 mg/h for 2 h 40 mg/h for 2 h 20 mg/h for 2 h 10 mg/h for 18 h	20 mg/h for 24 h	

^aInitial bolus was delivered over 3 min.

^bTaper was initiated at the end of continuous infusion (i.e., Day 2, Day 4, or Early Discontinuation for those subjects who did not progress to 3rd line IV anesthesia for SE treatment). Ganaxolone infusion was stopped without taper in subjects who progressed to 3rd line anesthesia for SE treatment.

^cAdditional as-needed boluses were allowed in the Medium Cohort in the maximum total daily dose of up to 65 mg on Day 1 and up to 114 mg on Days 2-4 to manage seizures. It was recommended that a single dose of bolus was not to exceed 25 mg.

33. The three dosing cohorts in the trial were referred to as the “Low” “Medium,” and “High” cohorts, each of which included a bolus for the “rapid loading of ganaxolone (plasma concentration ~ 900 ng/ml) designed to abort SE” followed by continuous infusion to administer “maintenance doses aimed at sustaining seizure control.” (Ex. 1016, 2383.) The *Epilepsia* paper also provides a figure (reproduced below) that shows the predicted plasma concentrations based on modeling during the period up to 24 hours after the start of the three dosing regimens (*Id.* at 2384):



34. The study’s primary end point was “the number of patients not requiring escalation to IV anesthetic treatment within 24 h of ganaxolone initiation,” which it met. (*Id.* at 2383-85.) None of the 17 patients in the study required such escalation. (*Id.*) Marinus reported that “no patient required escalation to third-line IV anesthetics during the 24-h period following ganaxolone initiation.” (*Id.* at 2381.) The study also measured and reported the number of patients who were “[s]tatus-free” and/or required “no escalation to additional IV ASMs or to third-line IV anesthetics for status relapse” “during 24 h following infusion completion.” (*Id.* at 2386 (Table 2).) No patient in the high-dose cohort required such escalation. (*Id.*)

35. Marinus also surprisingly found during this Phase 2 study that “[s]ustained clinical response was associated with maintaining ganaxolone plasma concentrations ≥ 500 ng/ml.” (*Id.* at 2386.) As the *Epilepsia* paper explains,

“[g]anaxolone plasma levels ≥ 500 ng/ml were achieved only briefly during the initial bolus for patients in the medium-dose cohort, whereas those in the low- and high-dose cohorts maintained such levels for 4 h and 8 h, respectively.” (*Id.*) The paper highlights these results for the high-dose cohort, noting that “[t]he greatest decrease in seizure burden was seen when ganaxolone concentrations were maintained at ≥ 500 ng/ml for at least 8 h.” (*Id.*)

36. The Discussion section in the paper highlights the results obtained with the high-dose regimen, explaining that the “data support that the ganaxolone regimen administered in the high-dose cohort (713 mg/day) may reduce or prevent escalation of care to third-line IV anesthetics,” a result that would be “clinically significant” due to the risks of IV anesthesia. (*Id.* at 2388.) The paper also emphasizes the importance of maintaining the plasma concentration of ganaxolone above 500 mg/ml (as the high-dose cohort did), noting that “[p]atients in the high-dose cohort maintained ganaxolone plasma concentrations ≥ 500 ng/ml for 8 h following treatment initiation and demonstrated the most durable reductions in seizure burden.” (*Id.*) Figure 2, showing modeled plasma concentrations for the three dosing cohorts also demonstrates that “[h]igh-dose [ganaxolone] achieves and maintains target plasma levels (≥ 500 ng/ml) for ~8 h, designed to sustain SE cessation.” (*Id.* at 2384.) The *Epilepsia* paper observes that in light of the benefits that resulted from maintaining plasma concentrations of ≥ 500 ng/ml for 8 hours,

maintaining that plasma concentration for an even longer period “may offer additional benefit.” (*Id.* at 2388.)

V. Overview of The '100 Patent

37. The '100 patent (Ex. 1001) was filed as U.S. Patent Application No. 17/186,569 (the “'569 Application”) on February 26, 2021. The cover page notes that it is a continuation of PCT/US2020/044843, filed on August 4, 2020, and that it claims priority to provisional application No. 62/882,648, filed on August 5, 2019.

A. Specification

38. The '100 patent “relates to a method for treating SE.” ('100 patent, Ex. 1001, 2:61.) The specification of the '100 patent states: “[T]he inventors believed that ganaxolone could provide effective therapy for SE,” but, “given the complexity and difficulties in treating SE, and failure of prior studies to show efficacy, the inventors expected that a high drug exposure for at least 4 days, followed by a maintenance dose for at least 1 day, would be required for the effective treatment of SE.” (*Id.*, 3:4-10.) But, as described further in the '100 specification, “[c]ontrary to these expectations, the inventors surprisingly discovered that administering ganaxolone as a bolus plus continuous infusion to maintain plasma concentration of ganaxolone at a much lower than expected serum level for at least 8 hours (or possibly at least about 4 hours in some subjects)

results in rapid and continued suppression of SE.” (*Id.*, 3:10-16.) The specification also “describe[s] and exemplifie[s] [that] continued suppression of SE was achieved when the continuous infusion maintains a plasma concentration of gaanaxolone of about 500 ng/ml or higher for a target concentration period of at least about 8 hours or at least about 12 hours (although in some patients 4 hours can be sufficient, in the patients that were studied).” (*Id.*, 3:16-22.)

39. The inventors found that when these plasma concentrations are reached, “[s]urprisingly, SE continues to be suppressed by the continuous intravenous infusion even [when] the amount of [ganaxolone] administered during the continuous intravenous infusion is decreased during the treatment period.” (*Id.*, 16:63-67.) “As a result, the method[s] provide enhanced safety and efficacy with lower exposure to ganaxolone than was expected.” (*Id.*, 16:67-17:2.)

40. “Accordingly, [the ’100 patent] relates to a method for effectively treating SE that provides rapid suppression of SE, sustained efficacy (i.e., prevents SE-relapse and provides for continued suppression of SE), and improved safety.” (*Id.*, 3:23-26.)

41. The surprising results are demonstrated, for example, in Example 2, titled “Preliminary Clinical Evidence of Efficacy in Subject with Status Epilepticus,” which describes the results in 5 subjects enrolled in Study 1042-SE-2001. (*Id.*, 47:47-54:50). In all 5 subjects, “the initial 3-minute bolus dose of 30

mg [ganaxolone] with concurrent continuous infusion of 85 mg/hr for 2 hours followed by 40 mg/hr for 2 hours of [ganaxolone] infusion resulted in the *immediate cessation of seizures as evidenced by EEG activity in subjects with SE that was otherwise resistant to several second line IV AEDs and considered standard-of-care.*” (*Id.* 50:28-37, emphasis added.) The example given in the patent specification further states: “Pharmacokinetic modeling data (FIG. 2) from these 5 subjects suggested that exposure levels of [ganaxolone] at approximately 1000 ng/mL were associated with rapid and complete SE suppression, and *lower [ganaxolone] exposures at <500 ng/mL were associated with seizure relapse. Seizure activity relapsed when plasma concentrations of [ganaxolone] decreased <500 ng/mL in 4 out of 5 subjects.*” (*Id.* 51:8-14, emphasis added.) This work led the United States Food and Drug Administration to permit an increase in daily exposure limits to “allow[] for [ganaxolone] exposure to be maintained at >500 ng/ml for approximately 8 hours.” (*Id.*, 53:43-50.) The conclusions regarding the required plasma concentrations were confirmed in Example 3, titled “Phase 2 Open-Label Dose Range Study,” (*Id.*, 54:52-57:7) which shows that “[a]cute maintenance of [ganaxolone] plasma concentrations >500 ng/mL was associated with improved seizure control on EEG.” (*Id.*, 56:63-65.)

B. Claims

42. The '100 patent has 21 claims. (*Id.*, 57:9-58:41.) Claim 1 is the only independent claim and recites:

1. A method of treating status epilepticus (SE), comprising administering to a subject in need thereof an effective amount of ganaxolone to suppress SE, wherein the effective amount of ganaxolone is administered as an intravenous bolus plus continuous infusion to produce and maintain a ganaxolone plasma concentration of about 500 ng/ml to about 1000 ng/ml for about 8 hours to about 12 hours.

43. Claims 2–21 ultimately depend upon claim 1. As explained to me by Marinus’s counsel, because the remainder of the claims depend upon claim 1, they all require what is recited in claim 1 in addition to any additional features recited in the dependent claim itself.

VI. PERSON OF ORDINARY SKILL IN THE ART

44. A hypothetical person of ordinary skill in the art (“POSA”) of the '100 patent at the time of its filing would have had a medical degree, or a Ph.D. in pharmacology or other field related to the development of pharmaceuticals, or equivalent degree, and several years of experience as a practicing neurologist treating patients who suffer from seizure disorders including status epilepticus and/or several years of experience in researching treatments for such seizure disorders.

VII. LEGAL STANDARD FOR PRIORITY

45. My understanding of the legal standard for priority, as described to me by Marinus's counsel, is that the priority document (here, the '648 provisional) must provide "written descriptive support" and "enablement" of the claimed invention.

46. To meet the written descriptive support requirement, my understanding from counsel is that the priority document must describe the claimed invention well enough for a POSA to understand that the applicant possessed the claimed invention but need not describe the claim limitations exactly.

47. To meet the enablement requirement, my understanding from counsel is that the priority document must sufficiently describe the manner and process of making and/or using the claimed invention so that a POSA, reading the specification, could make or use the invention without undue experimentation.

48. My understanding from counsel is that, in an *inter partes* review, the petitioner bears the burden of proving that it is more likely than not that any challenged claims are unpatentable.

VIII. OPINION ON PRIORITY

49. Petitioner Ovid alleges that the '100 patent is not entitled to the priority date of the '648 provisional patent application because it allegedly does not meet the requirements under § 112 (written descriptive support and

enablement, explained above) for Claim 1's requirement that its method "produce and maintain a ganaxolone plasma concentration of about 500 ng/ml to about 1000 ng/ml for about 8 hours to about 12 hours." (Pet., 21-26.) I disagree. In my opinion, the '648 provisional provides both written descriptive support and enablement for administering an effective amount of ganaxolone as an intravenous bolus plus continuous infusion "to produce and maintain a ganaxolone plasma concentration of about 500 ng/ml to about 1000 ng/ml for about 8 hours to about 12 hours."

50. The '648 provisional includes initial data from the results of Marinus's Phase 2 clinical trial. (Ex. 2018, 81-90 at ¶¶ [0176]-[0209].) As described below, those results provide support for administering ganaxolone to "produce and maintain a ganaxolone plasma concentration of about 500 ng/ml to about 1000 ng/ml for about 8 hours to about 12 hours."

51. Ganaxolone is hydrophobic (Ex. 2018, 56 at ¶ [0101]) and, therefore, needs to be delivered with a solubilizing agent. Marinus used Captisol® as the solubilizing agent in the formulation of ganaxolone for its Phase 2 clinical trial. (Ex. 2018, 81 at ¶ [0177].) However, due to safety considerations, the FDA initially limited the amount of Captisol® that Marinus was able to administer to a patient in a day. (See Ex. 2018, 84-85, 90 at ¶ [0188], [0208].) The FDA later relaxed the limit as Marinus accrued experience where the formulation was dosed

to patients without safety concerns. (See Ex. 2018, 90 at ¶ [0208].) Because ganaxolone was formulated in a fixed ratio with Captisol®, the daily limit on Captisol® effectively limited the amount of ganaxolone that could be administered per day.

52. As described in Example 2 (Ex. 2018, 81-90 at ¶¶ [0176]-[0209]), the daily exposure limit for Captisol® was initially 35 g/day during Marinus’s clinical trial. (Ex. 2018, 84 at ¶ [0188].) Patients dosed under the 35 g/day Captisol® protocol received a bolus and continuous infusion of ganaxolone. (Ex. 2018, 89 at ¶ [0203].) However, the total daily dose of ganaxolone was limited to 500 mg/day due to the 35 g/day Captisol® limit. (*Id.*)

53. The first five patients dosed under that protocol were administered an “initial 3-minute bolus dose of 30 mg [ganaxolone] with concurrent continuous infusion at 85 mg/hr for 2 hours followed by 40 mg/hr for 2 hours,” which “resulted in the immediate cessation of seizures.” (Ex. 2018, 84 at ¶ [0188].) However, because of the daily Captisol® limit, the rate at which ganaxolone was infused had to be reduced to “20 mg/hr for 2 hours,” ending with “10 mg/hr for the remaining 18 hours on Day 1.” (*Id.*) When the dose of ganaxolone was reduced (because of the Captisol® limit), “seizure control could not be maintained” and seizures relapsed. (*Id.*)

54. Figure 2 of the '648 provisional shows the pharmacokinetic modeling data from the 35 g/day Captisol® patients and is reproduced below. (Ex. 2018, 84-85 at ¶ [0188].)

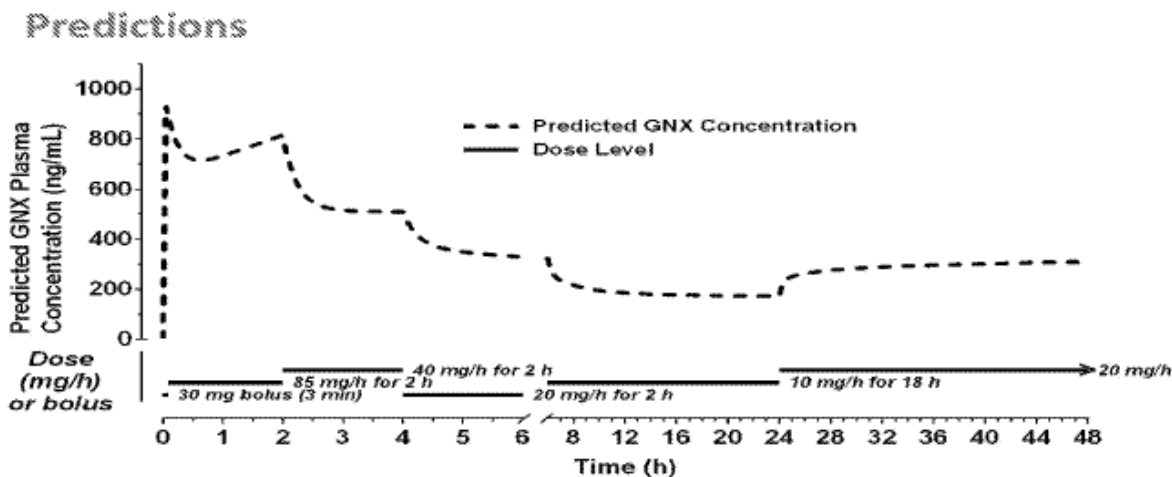


Figure 2

55. The first patient’s measured ganaxolone plasma concentration was “< 500 ng/mL” at seizure relapse, which occurred “approximately 5 hours post infusion start.” (Ex. 2018, 85-86 at ¶¶ [0191]-[0193]) Figure 3, taken from the provisional patent application, “is a graph showing predicted and actual ganaxolone plasma concentration against time for subject 0004-101. (Ex. 2018, 52 at ¶ [0080].) “The vertical line marks the time of seizure relapse.” (*Id.*)

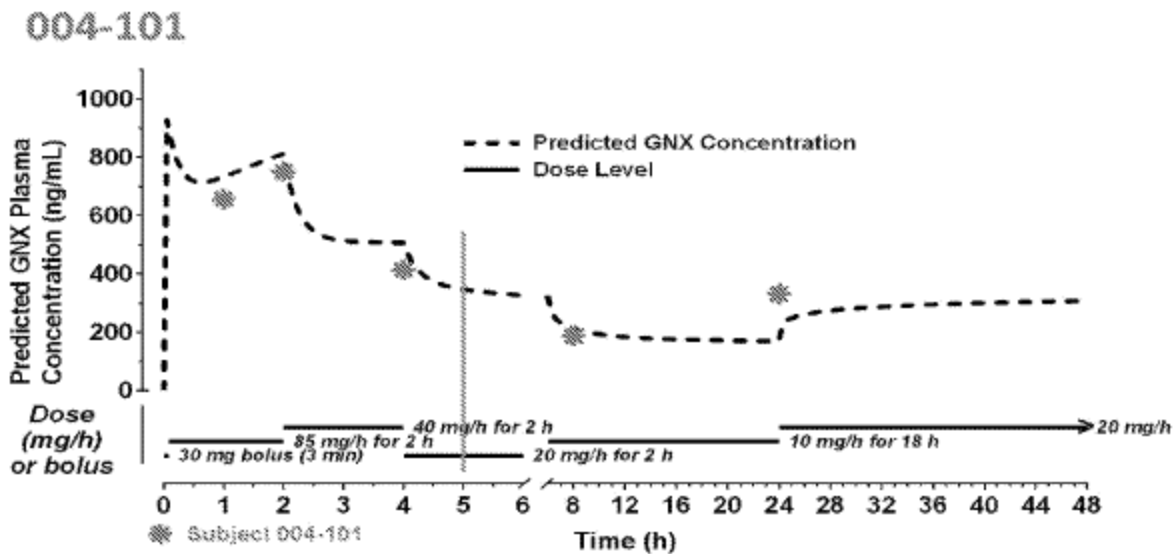


Figure 3

56. The second patient's measured ganaxolone plasma concentration was < 500 ng/mL at the time of seizure relapse, which occurred at about 6 hours post infusion start. (Ex. 2018, 86 at ¶¶ [0194]-[0195].) Figure 5, taken from the provisional patent application, "is a graph showing predicted and actual ganaxolone plasma concentration against time for subject 004-102. (Ex. 2018, 52 at ¶ [0082].) "The vertical line marks the beginning of the return of abnormal EEG activity that later required additional intervention." (*Id.*)

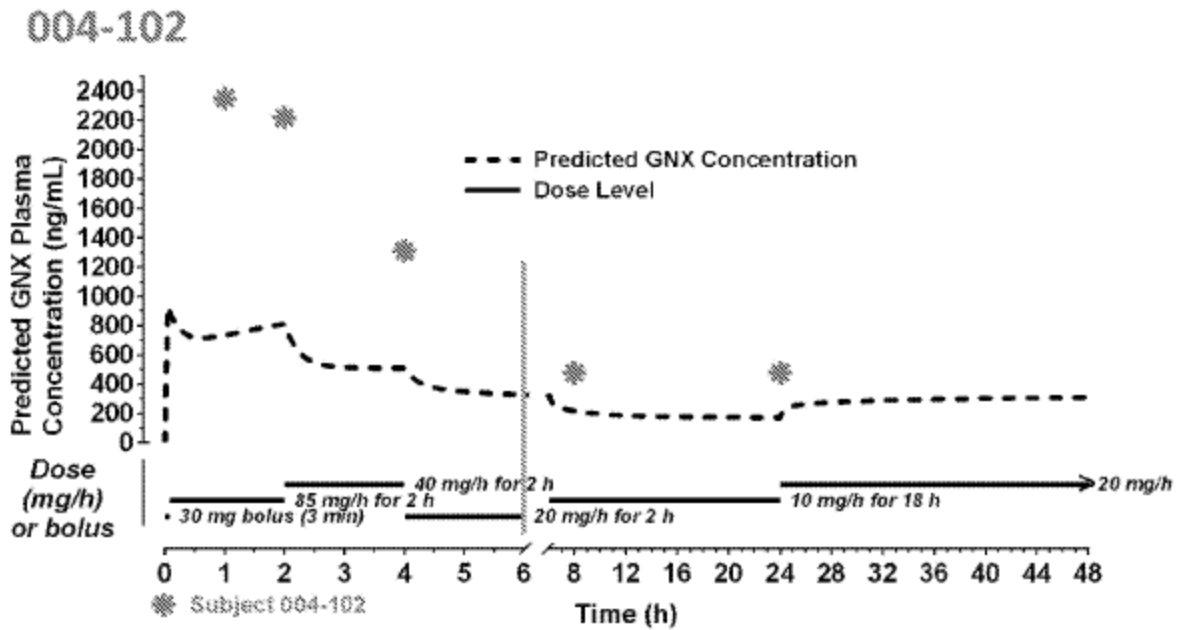


Figure 5

57. The third patient’s measured ganaxolone plasma concentration was “< 500 ng/mL at the time of seizure relapse,” which occurred at about 6 hours post infusion start. (Ex. 2018, 86-87 at ¶¶ [0196]-[0198], Fig. 7.) The fourth patient’s measured ganaxolone plasma concentration was “< 500 ng/mL at the time of seizure relapse,” which “occurred at approximately 6 hours post infusion start.” (Ex. 2018, 87-88 at ¶¶ [0199]-[0200], Fig. 9.) The final patient’s seizures “did not return during the treatment period.” (Ex. 2018, 88-89 at ¶¶ [0201]-[0202].) Figures 7, 9, and 10, taken from the provisional patent application show “graph[s] showing predicted and actual ganaxolone plasma against time for subject[s] 006-101, 006-102, and 015-101, respectively.” (Ex. 2018, 52 at ¶¶ [0084], [0086],

[0088].) “The vertical line[s on Figures 7 and 9] mark[] the time[s] of seizure relapse.” (*Id.*)

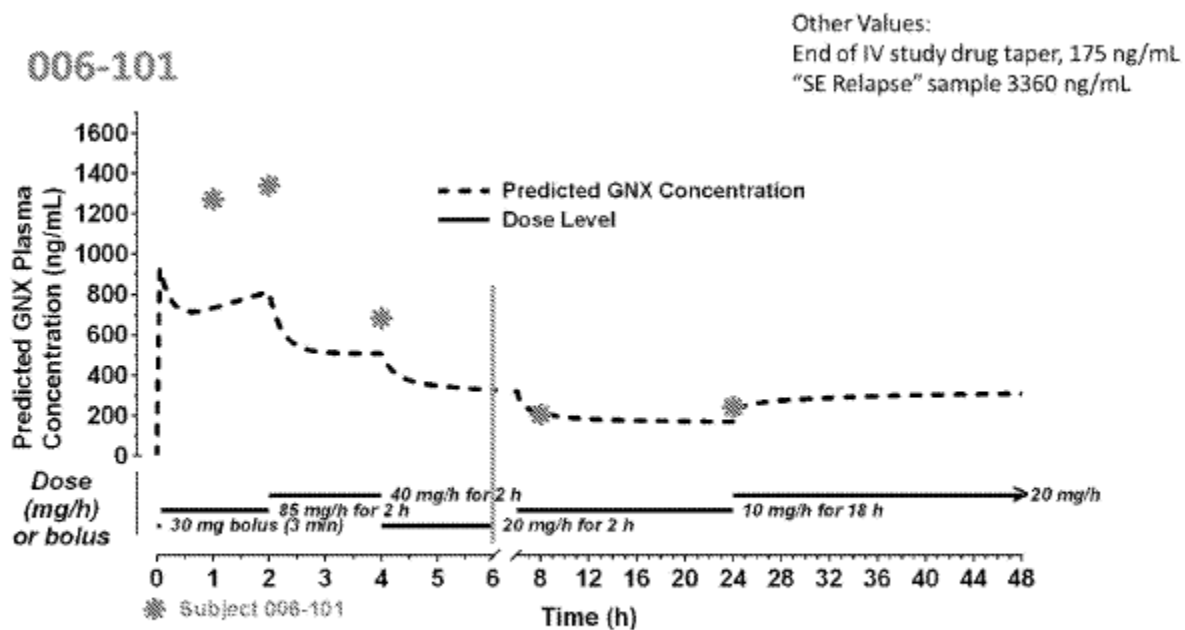


Figure 7

006-102

Other values:
End of IV study drug taper, 192 ng/mL
SE relapse, 433 ng/mL

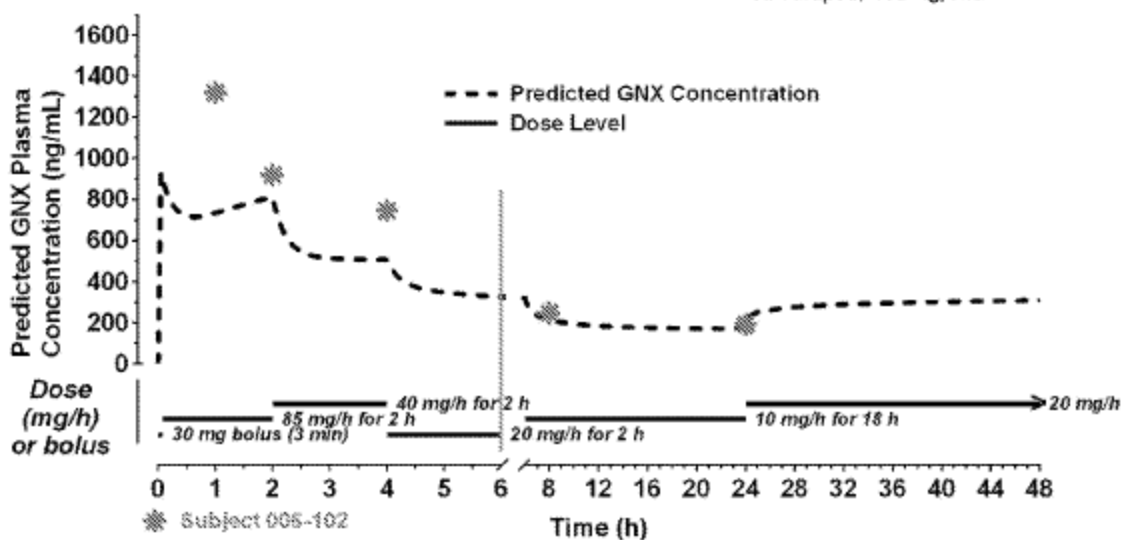


Figure 9

015-101

Other values:
End of IV study drug taper, 74.4 ng/mL

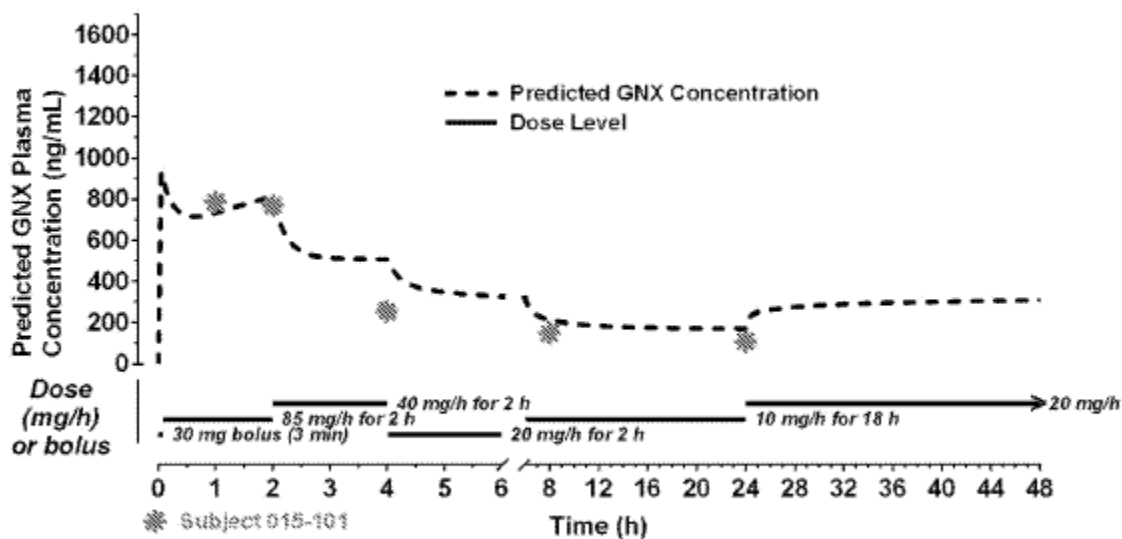


Figure 10

58. The data from the clinical trial (as summarized above) and the inventors' interpretation set forth in the '648 provisional patent application demonstrate to a POSA that the inventors recognized maintaining ganaxolone plasma concentrations of about 500 ng/mL to about 1000 ng/mL (as claimed) was important and that seizures would likely return if the lower bound concentration was not maintained.

59. Because it appeared that a higher dose of ganaxolone would be needed to maintain plasma levels in the desired range hours for longer after initiation of the infusion than was possible under the 35 g/day Captisol® limit, Marinus requested and received permission from the FDA to “allow[] the daily limit of Captisol® exposure to increase to 50 g/day (and the total daily dose of [ganaxolone] to increase from 500 to 715 mg), thereby allowing for [ganaxolone] exposure to be maintained at > 500 ng/ml for approximately 8 hours.” (Ex. 2018, 89, 90 at ¶¶ [0203], [0208].) With that increased daily limit of Captisol®, Marinus developed a new dosing protocol using fixed doses for adults (or children weighing more than 40 kg) and weight-based doses for children (or adults weighing less than 40 kg). (Ex. 2018, 82-84 at ¶¶ [0182]-[0186].) The dosing regimen for adults is excerpted, below.

Days	Start Time from Dose Initiation	Dose Level of Study Drug IV (infusion rate)	Duration
Day 1	0 hours: bolus dose via syringe or infusion pump	25 mg	3 minutes
Day 1	0 hours through 2 hours post-dose: continuous infusion, started with bolus	80 mg/hour	2 hours
Day 1	2 hours post-dose through 8 hours post-dose	40 mg/hour	6 hours
Day 1	8 hours post-dose through 24 hours post-dose	18 mg/hour	16 hours
Day 2 or Day 2 through Day 4	24 hours post-dose through 48 hours post dose (Day 2) or 24 hours post-dose through 96 hours post-dose (Day 2-4)	29 mg/hour	24-72 hours (Day 2 or Day 4)
Taper for subjects discontinuing study drug			
Day 3 or Day 5	48 or 96 hours post-dose: 18-hour taper	Reduce infusion rate by 25%	6 hours
		Reduce infusion rate by 25%	6 hours
		Reduce infusion rate by 25%	6 hours

60. Adding the milligram amounts of ganaxolone during each phase of the dosing protocol results in a total dose of 713 mg in the first 24 hours. 25 mg is administered as an initial bolus, followed by 160 mg in the next 2 hours (80 mg/hour times 2 hours), followed by 240 mg in the next 6 hours (40 mg/hour times 6 hours), followed by 288 mg in the final 16 hours (18 mg/hour times 16 hours).

61. The '648 provisional application also reports that one patient was successfully treated with ganaxolone using this dosing regimen intended to maintain the ganaxolone exposure at >500 ng/ml for approximately 8 hours.

Specifically, the application states that this patient had the following response to the dosing regimen: “[w]ithin 3 minutes after starting the IV [ganaxolone] infusion, the [patient’s SE] ceased and seizure protection was maintained for the remaining 48 hours of [ganaxolone] treatment.” (Ex. 2018, 89 at ¶ [0204].)

62. In summary, the provisional application discloses a dosing regimen that was designed to achieve a ganaxolone plasma concentration >500 ng/ml for approximately 8 hours. (Ex. 2018, 89 at ¶¶ [0203]-[0204].) And although I understand from counsel that it is not required to establish priority, I note that the provisional application *does* contain Example 2 demonstrating that a patient was successfully treated with this dosing regimen (again, designed to “allow[] for [ganaxolone] exposure to be maintained at > 500 ng/ml for approximately 8 hours.”) (Ex. 2018, 89 at ¶ [0203].) For that patient, SE was suppressed and did not return “for the remaining 48 hours of [ganaxolone] treatment.” (Ex. 2019, 89 at ¶ [0204].) A POSA reviewing Example 2 would understand that this represents an example of the invention in Claim 1.

63. Furthermore, a POSA would have understood that in the treatment of SE, as in the drug treatment of any medical condition, the required therapeutic plasma levels will vary from patient to patient due to variations in the disease process and in pharmacodynamic responsiveness between patients. Similarly, in the treatment of SE, a POSA would recognize that the required duration of drug

exposure (plasma levels) varies from patient to patient due to differences in the disease process and in specific patient factors. In my opinion, a POSA would have considered maintaining the target plasma concentrations (about 500 ng/ml to about 1000 ng/ml) for “about 8 hours to about 12 hours” to be reasonable given patient-to-patient variability. I note that this range is within the ranges taught in the ’648 provisional patent application. (See, e.g., Ex. 2018 at 38-39, 45-46 ¶¶ [0028], [0042].)

64. The provisional patent application teaches both the target plasma concentration range and timeframe as well as a specific dosing regimen to be used to achieve them. The additional data appearing in the ’100 patent (Example 3 at 54:52-57:7 and Figures 12-15 in Ex. 1001) simply confirm in a larger number of patients what was presented in the ’648 provisional patent application. The dosing for the “high” dose cohort in Example 3 of the ’100 patent (“25 mg bolus, 80 mg/hr for 2 hours, 40 mg/hr for 6 hours, and 18 mg/hr for 16 hours” as specified in Table 4) is identical to the dosing regimen specified in ¶ [0183] of the ’648 provisional patent application (also specified in the table titled “Dosing for Subjects $\geq$ 40 kg (on a mg/hour basis) under ¶ [0184]). (Ex. 1001, 55:5-30; Ex. 2018, 82-84 at ¶¶ [0182]-[0186].)

65. In conclusion, it is my opinion that the ’648 provisional application provides a clear and complete description such that a POSA would understand that

the inventors had both possession of the invention of Claim 1, as well as more than enough information to make and use it, including administering an effective amount of ganaxolone as an intravenous bolus plus continuous infusion “to produce and maintain a ganaxolone plasma concentration of about 500 ng/ml to about 1000 ng/ml for about 8 hours to about 12 hours.” Therefore, it is my opinion that the '648 provisional patent application provides an adequate written description and enables the invention of Claim 1.

I declare under the penalty of perjury that the foregoing is true and correct.

Executed on June 26, 2024.



Michael A. Rogawski, M.D., Ph.D.

EXHIBIT A

MICHAEL ANDREW ROGAWSKI

EDUCATION

Undergraduate and Graduate

- 1974 B.A., *magna cum laude*, Amherst College.
1980 M.D., Yale University School of Medicine.
1980 Ph.D., Pharmacology, Yale University.

Postgraduate Research and Clinical Training

- 1980–1981 Intern (Internal Medicine), Yale University School of Medicine (Waterbury Hospital).
1982–1985 Resident and Fellow (Neurology), The Johns Hopkins Hospital.
1981–1984 Medical Staff Fellow (Pharmacology Research Associate Training Program), Laboratory of Neurophysiology, National Institute of Neurological and Communicative Disorders and Stroke, National Institutes of Health.

Special Courses

- 1981 Electrophysiology of the Mammalian Brain Slice, Cold Spring Harbor Laboratory.
1983 Electrophysiological Methods Used in Analyzing the Mode of Action of Transmitters, Cold Spring Harbor Laboratory.
1986 Fundamental Neurobiological Approaches to Disease: Epilepsy, Rockefeller University.

PROFESSIONAL APPOINTMENTS

- 1986–1989 Senior Staff Fellow, Medical Neurology Branch, National Institute of Neurological and Communicative Disorders and Stroke, National Institutes of Health.
1987–2006 Active Staff, Clinical Center, National Institutes of Health.
1989–1990 Medical Officer – Research, National Institute of Neurological Disorders and Stroke, National Institutes of Health.
1990–2006 Senior Investigator and Chief, Epilepsy Research Section, National Institute of Neurological Disorders and Stroke, National Institutes of Health.
2007– Professor and Chair (until 2012), Department of Neurology, University of California, Davis; and Pharmacology and Toxicology Graduate Group; Neuroscience Graduate Group; Molecular, Cellular and Integrative Physiology Graduate Group; and Center for Neuroscience.
2008– Special Government Employee, Peripheral and Central Nervous System Drugs Advisory Committee, Center for Drug Evaluation and Research, Food and Drug Administration.
2012–2014 President, American Society for Experimental Neurotherapeutics.
2012–2023 Co-Director, CounterACT Center of Excellence, University of California, Davis.
2016– Professor, Department of Pharmacology, University of California, Davis.
2017– Campus Lead and Principal Investigator (since 2018), University of California Drug Discovery Consortium.

HONORS AND AWARDS

- 1974 Phi Beta Kappa, Society of Sigma Xi
1991 NINDS Merit Award
1992 NINDS Equal Opportunity Achievement Award
1993 NIH Director's Award

1994	Epilepsy Research Award, American Society for Pharmacology and Experimental Therapeutics
2000	British Pharmacological Society Lecture in Honor of Retirement of Brian Meldrum
2001	Killam Lecture, Montreal Neurological Institute
2003	Elected to Active Membership, American Neurological Association
2006	Certificate of Appreciation, Society for Neuroscience
2009	William G. Lennox Lecture, American Epilepsy Society
2011	Service Award, American Epilepsy Society
2015	Neuroendocrine Research Award, American Academy of Neurology
2017	Physician-Scientist Award, Epilepsy Foundation Greater Los Angeles
2018	Elected Fellow, American Association for the Advancement of Science (Section on Neuroscience)
2018	Elected Full Member, Sigma Xi, the Scientific Research Honor Society
2019	Innovator of the Year, UC Davis Chancellor's Innovation Awards
2019	The Theodore Koppányi Lectureship in Pharmacology, Department of Pharmacology & Physiology, Georgetown University
2020	Elected Fellow, National Academy of Inventors
2021	Designated honorary title of Distinguished Professor (Above-Scale)

PROFESSIONAL ACTIVITIES

Professional Society Memberships

Society for Neuroscience
American Society for Pharmacology and Experimental Therapeutics
American Academy of Neurology
American Epilepsy Society (Elected Fellow)
American Society for Experimental Neurotherapeutics
American Neurological Association (Elected Fellow)

Editorial Board Memberships

1975–1979 *Yale Journal of Biology and Medicine*
1988– *Cellular and Molecular Neurobiology*
1992–1999 *Jasper's Basic Mechanisms of the Epilepsies, Third Edition* – Advisory Board)
1992–2008 *Neuropharmacology* – Executive Editor (1996–2008)
1993–2004 *Synapse*
1994–1998 *Epilepsy Advances*
1994–1997 *Epilepsia*
1994– *Molecular Pharmacology*
1999–2010 *CNS Neuroscience & Therapeutics* (formerly *CNS Drug Reviews*)
2000–2004 *Pharmacology and Therapeutics*
2001– *BMC Pharmacology and Toxicology* (formerly *BMC Pharmacology*)
2001– *Epilepsy Currents* – Founder, Associate Editor (2001–2008), Co-Chief Editor (2008–2012)
2001–2006 *Epilepsy Research*
2002– *Current Neuropharmacology*
2005– *Neurotherapeutics, The Journal of the American Society for Experimental NeuroTherapeutics* – Associate Editor (2006–2012)
2006–2012 *Jasper's Basic Mechanisms of the Epilepsies, Fourth Edition* – Co-editor)
2011– *Scientific Reports* (Nature Publishing Group)
2011– *The Scientific World Journal (Pharmacology Domain)*
2012– *PeerJ* – Academic Editor
2016– *Epilepsia Open* – Associate Editor

Review Committee Memberships

1992–1993	Reviewers Reserve, Alcohol, Drug Abuse and Mental Health Administration
1993–1997	Regular Member, Neuropharmacology and Neurochemistry Study Section (NPNC), NIH
1996	Reviewer, Pharmacology Research Associate Program, NIGMS
1998	Review Panel Member, Advanced Anticonvulsant Program, U.S. Army Medical Research Institute of Chemical Defense
2000	Chair, Peer Review Panel, Neurotoxin Exposure Treatment Research Program, U.S. Army Research and Materiel Command
2001	Member, Molecular, Cellular and Developmental Neuroscience 5 (MDCN-5) Study Section, Center for Scientific Review, NIH
2002	Chair, Peer Review Panel, Neurotoxin Exposure Treatment Research Program (Pathogenesis and Therapeutics in Parkinson's and other Neurodegenerative Diseases), U.S. Army Research and Materiel Command
2002–2005	Scientific Advisory Board, CURE – Citizens United for Research in Epilepsy
2002	Review Committee Member, Research Grants and Fellowships Committee, Professional Advisory Board, Epilepsy Foundation
2004	Review Committee Member, Partnership for Pediatric Epilepsy Research, Epilepsy Foundation
2005	Reviewer, Epilepsy Research Foundation (U.K.)
2005	Chair, Peer Review Panel, Epilepsy and Traumatic Brain Injury, Peer Reviewed Medical Research Program, Office of Congressionally Directed Medical Research Programs (CDMRP), U.S. Army Research and Materiel Command
2005	Chair, Traumatic Brain Injury and Epilepsy Scientific Advisory Board, CURE – Citizens United for Research in Epilepsy
2006	Reviewer, Mental Retardation and Developmental Disabilities Research Centers 2006 Special Emphasis Panel ZHD1 DSR–H(30), National Institute of Child Health and Human Development, NIH
2006	Reviewer, Countermeasures Against Chemical Threats (CounterACT) Special Emphasis Panel ZNS2 SRB-R(22), National Institute of Neurological Disorders and Stroke
2007	Reviewer, Prevention of Epilepsy After Traumatic Brain Injury Program, CURE – Citizens United for Research in Epilepsy
2008	Reviewer, CURE – Citizens United for Research in Epilepsy
2008	Reviewer, Brain Disorders and Clinical Neurosciences Fellowships Special Emphasis Panel ZRG1 F01-V(20), Center for Scientific Review, NIH
2008–2009	Consultant, Peripheral and Central Nervous System Drugs Advisory Committee, FDA
2009	Site Visit Reviewer, Program Project Grant “Anesthetics: Cellular and Molecular Actions” (5 PO1 GM47969-18; Program Director: J. H. Steinbach), Washington University, St. Louis
2009	Reviewer, Challenge Grants Panel ZRG1 ETTN-A (58), Center for Scientific Review, NIH
2009	Reviewer, NSD-A Study Section ZNS1 SRB-R (39), National Institute of Neurological Disorders and Stroke, NIH
2009	Reviewer, CURE – Citizens United for Research in Epilepsy
2009	Reviewer, Neuroprotection and Neurodegeneration Special Emphasis Panel ZRG1 MDCN-G (02), Center for Scientific Review, NIH
2010, 2012	Consultant, Division of Metabolism and Endocrinology Products, FDA
2011	Reviewer, ZNS1 SRB-B (31), National Institute of Neurological Disorders and Stroke Special Emphasis Panel, NIH
2011	Reviewer, ZNS1 SRB-P (62), National Institute of Neurological Disorders and Stroke Special Emphasis Panel, NIH
2012	Reviewer, ZNS1 SRB-B (33), NIH Epileptogenesis Centers Without Walls Planning Grant Study Section, National Institute of Neurological Disorders and Stroke, NIH

2012	Reviewer, ZRG1 MDCN-B (91), Drug Discovery for the Nervous System, Center for Scientific Review, NIH
2013	Consultant, Neurological Devices Advisory Panel, Center for Devices and Radiological Health, FDA
2013	Reviewer, Peer Review Panel, Psychological Health and Traumatic Brain Injury Research Program, Congressionally Directed Medical Research Programs (CDMRP)
2015	Reviewer, Peer Review Panel, Chronic Migraine and Post-Traumatic Headache Preapplication, Congressionally Directed Medical Research Programs (CDMRP)
2016	Chair, Peer Review Panel, 2015 Epilepsy Research Program, Congressionally Directed Medical Research Programs (CDMRP)
2016	Chair, ZNS1 SRB-T (22), Small Molecule Drug Discovery and Development (BPN), National Institute of Neurological Disorders and Stroke, NIH
2017	Reviewer, ZRG1 PSE-N (02), Behavioral Genetic, Neurological and Musculoskeletal Epidemiology, NIH
2017	Chair, Peer Review Panel, Focused Program – Pain Medicine, Peer Reviewed Medical Research Program, U.S. Army Medical Research and Materiel Command (USAMRMC), Congressionally Directed Medical Research Programs (CDMRP)
2018	Reviewer, ZRG1 EMNR-S 55, Translational Research in Pediatric and Obstetric Pharmacology and Therapeutics Special Emphasis Panel, Center for Scientific Review, NIH
2018	Reviewer, ZNS1 SRB-T(34), Blueprint Neurotherapeutics Network Review Panel, National Institute of Neurological Disorders and Stroke, NIH
2019	Reviewer, ZNS1 SRB-T(37), Blueprint Neurotherapeutics Network Review Panel, National Institute of Neurological Disorders and Stroke, NIH
2019	Reviewer, ZNS1 SRB-T (41), Blueprint Neurotherapeutics Network Review Panel, National Institute of Neurological Disorders and Stroke, NIH
2021	Reviewer, ZRG1 ETTN-S (14 B), Small Business: Drug Discovery Involving the Nervous System, Special Emphasis Panel, Center For Scientific Review, NIH
2022	Chair, Peer Review Panel, Idea Development - Research Partnership - 4 (ID-RP-4), Peer Reviewed Medical Research Program, U.S. Army Medical Research and Materiel Command (USAMRMC), Congressionally Directed Medical Research Programs (CDMRP)
2022	Reviewer and Co-Chair, Reviewer, ZRG1 ETTN-S (14), Small Business: Drug Discovery Involving the Nervous System, Special Emphasis Panel, Center For Scientific Review, NIH
2022	Reviewer, ZNS1 SRB-K (35), R13 Review, Special Emphasis Panel, National Institute of Neurological Disorders and Stroke, NIH
2022–2023	Chair, ZRG1 NV-S 14 B, Small Business: Drug Discovery Involving the Nervous System, Special Emphasis Panel, Center for Scientific Review, NIH
2023	Reviewer, ZNS1 SRB-Q (07), BPN Small Molecule and Biologic Therapeutic Drug Discovery for Disorders of the Nervous System, Special Emphasis Panel, National Institute of Neurological Disorders and Stroke, NIH

Committee Memberships

1991–2004	Technology Advisory Committee, NINDS
1992–1994	Long Range Planning Committee, American Epilepsy Society
1993–1994	Technology Transfer Policy Board, NIH
1993–1994	Program Committee, Winter Conference on Brain Research
1994–1995	Program Committee, 4th International Congress on Amino Acids
1995–1997	Program Committee, American Epilepsy Society
1996–1997	Chair, Program Committee, American Epilepsy Society (and Member, Annual Meeting Committee and Annual Course Committee)
1998–2005	Ad Hoc Committee on Electronic Initiatives, Society for Neuroscience

1999–2003 Chair, Technology Committee, American Epilepsy Society
 2000–2003 Board of Directors, American Epilepsy Society
 2003–2005 Scientific Advisory Board, CURE – Citizens United for Research in Epilepsy
 2004 Program Committee, American Society for Experimental NeuroTherapeutics
 2005–2006 Chair, Publications Committee, American Epilepsy Society
 2006 Information Technology Committee, Society for Neuroscience
 2005–2015 Board of Directors, American Society for Experimental NeuroTherapeutics
 2015 Epilepsy Research Benchmark Stewards Committee, American Epilepsy Society

Meetings Organized

1993 Antiepileptic Drugs in the 1990s: Current and Investigational Therapies (Focus on Epilepsy II), Whistler, B.C., Canada (with M. Avoli and B.J. Wilder).
 1995 Regulation of Ion Channel Gene Expression by Seizures, Investigators Workshop, Annual Meeting, American Epilepsy Society, Baltimore, MD.
 1996 *Neuropharmacology* Symposium on Potassium Channels (satellite to Society for Neuroscience Meeting sponsored by Elsevier Science Ltd.), Washington, D.C. (with I. Levitan).
 1999 Generalized Epilepsies: From Genes to Clinic (Focus on Epilepsy V), Québec City, Canada (with M. Avoli, C. Marescaux and G. Avanzini).
 2001 Treatment of Epileptic Syndromes: From Molecular Targets to Quality of Life (Focus on Epilepsy VI), Château Mont-Tremblant, Québec, Canada (with M. Avoli, C. Wasterlain and G. Avanzini).
 2003 Amygdala, Seizures and Epileptogenesis (Focus on Epilepsy VII), Montreal Neurological Institute, Montreal (with M. Avoli).
 2004 National Capital Cure Epilepsy Conference, American Association for the Advancement of Science, Washington, D.C. (with S. Axelrod).
 2004 Disorders of Impulsivity and Amygdala Neurocircuitry, Uniformed Services University of the Health Sciences, Bethesda, MD (conference steering committee).
 2005 Antiepileptic Drugs: Not Just for Epilepsy, Annual Meeting, American Society for Experimental NeuroTherapeutics, Washington, D.C.
 2008 New Horizons in the Development of Antiepileptic Drugs IV: Nontraditional Approaches to Treat Epilepsy, Clontarf Castle, Dublin, Ireland (with G. Holmes).
 2009 Fourth International Workshops, Jasper's Basic Mechanisms of the Epilepsies, Yosemite National Park, California (with J.L. Noebels, M. Avoli, R.W. Olsen, A.V. Delgado-Escueta).
 2019 Fifth International Workshops, Jasper's Basic Mechanisms of the Epilepsies, Yosemite National Park, California (with J.L. Noebels, M. Avoli, A. Vessani, A.V. Delgado-Escueta).

Graduate Student Thesis Committee Member and Major Professor

1991–1993 R. Alberto Travagli, Department of Pharmacology, Georgetown University School of Medicine.
 1994–1996 Jon Poling, Department of Pharmacology, Georgetown University Medical Center.
 1994–1996 Wolfram A. Gottschalk, Department of Physiology and Biophysics, Georgetown University School of Medicine.
 2003–2005 Natalie White, Department of Pharmacology, Texas Tech University.
 2011–2014 Emir Leal Leon, Pharmacology and Toxicology Graduate Group, University of California, Davis.
 2015–2017 Pearl Chen, Molecular, Cellular and Integrative Physiology Graduate Group, University of California, Davis.

INVITED PRESENTATIONS

- 1977 "Hirschsprung's Disease in the 70's," Surgical Grand Rounds, Yale-New Haven Hospital (with R.J. Touloukian).
- 1978 "Hirschsprung's Disease: Absence of Serotonergic Neurons in the Aganglionic Colon," Ninth Annual Meeting of the American Pediatric Surgical Association, Hot Springs, Virginia. Awarded best scientific paper.
- 1978 "Response of Central Monoaminergic Neurons to the Ergots Lisuride and LSD: Single Cell Studies," Greater Hartford Chapter of the Society for Neuroscience, University of Hartford.
- 1980 "Norepinephrine and Serotonin Have Opposite Effects on the Excitability of Lateral Geniculate Neurons," Ninth Annual Meeting, New England Pharmacologists, University of Connecticut, Storrs.
- 1980 "Physiology of Norepinephrine in the Brain: Results from Single Neuron Recording," Amherst College, Amherst, Massachusetts.
- 1981 "An α -Adrenoceptor in Brain which Modulates Neuronal Excitability," Laboratory of Biochemical Genetics, National Heart, Lung and Blood Institute, NIH.
- 1982 "An Alpha-receptor which Modulates Neuronal Excitability: Studies on the Noradrenergic Pathway to the Lateral Geniculate Nucleus," Physiology Department, Armed Forces Radiobiology Research Institute.
- 1982 "An α -Adrenoceptor which Modulates Neuronal Excitability: Studies on the Physiology of the Noradrenergic Pathway to the Lateral Geniculate," Physiology Department, University of Maryland School of Medicine, Baltimore.
- 1982 "Cholecystokinin Octapeptide Enhances the Excitability of Cultured Mouse Spinal Neurons," Third Winter Neuropeptide Conference, Breckenridge, Colorado.
- 1982 "Alpha-Adrenoceptor Modulation of Neuronal Excitability in the Lateral Geniculate," Neuroscience Lecture Series, NIH.
- 1982 "Electrophysiological Analysis of Brain Serotonin Receptors," Biochemical Pharmacology Discussion Group, New York Academy of Sciences.
- 1982 "Physiological Analysis of Brain Norepinephrine Receptors," Brain Research Institute, Zurich.
- 1982 "Physiological Analysis of Brain Norepinephrine Receptors: Mechanism of Action of Antidepressants," Psychiatric Grand Rounds, Department of Psychiatry, University of California, Irvine.
- 1982 "Alpha-Adrenoceptor Modulation of Neuronal Excitability: Studies on the Noradrenergic Pathway to the Lateral Geniculate," Department of Neurology, University of California, Los Angeles.
- 1983 "Norepinephrine and the Lateral Geniculate Nucleus," Department of Cell Biology and Anatomy, Johns Hopkins University School of Medicine, Baltimore, Maryland.
- 1984 "Single Channel Properties of a Voltage-Activated Potassium Conductance in Cultured Hippocampal Neurons," UCLA Symposia on Molecular and Cellular Biology, Keystone, Colorado.
- 1984 "Potassium Conductances that Regulate the Excitability of Central Neurons: Voltage Clamp and Single-Channel Recordings," Department of Neurology, University of Pennsylvania, Philadelphia.
- 1985 "Electrical Excitability of Cultured Neurons from the Central Nervous System: Studies Using Voltage Clamp and Patch Clamp Techniques," Department of Anatomy, Emory University School of Medicine, Atlanta, Georgia.

- 1985 “Electrophysiological Analysis of Brain Noradrenergic Receptors,” Department of Neurology, University of Massachusetts Medical Center, Worcester.
- 1985 “Potassium Channels and the Excitability of Mammalian Central Neurons,” Medical Neurology Branch, National Institute of Neurological and Communicative Disorders and Stroke, NIH.
- 1985 “Excitability Mechanisms in CNS Neurons: From EEG to Patch Clamp,” Neurology Grand Rounds, The Oregon Health Sciences University (Good Samaritan Hospital), Portland.
- 1986 “Electrophysiological Analysis of Brain Noradrenergic Receptors,” Parkinson’s and Brain Peptides Seminar, Department of Neurology, Columbia University, College of Physicians and Surgeons, New York.
- 1986 “Voltage-Dependent K⁺ Channels in Mammalian CNS Neurons,” Department of Neurobiology, University of California, San Francisco.
- 1986 “Potassium Channels in Neural and Endocrine Cells,” Center for Neurobiology, The Mount Sinai School of Medicine, New York.
- 1987 “Excitability Mechanisms in CNS Neurons: From EEG to Patch Clamp,” Neurology Grand Rounds, Georgetown University Hospital, Washington, D.C.
- 1988 “Cellular Pharmacology of Phencyclidine: Effects on NMDA-Receptors and Voltage-Dependent K⁺ Channels,” Department of Pharmacology, St. Louis University School of Medicine, St. Louis, Missouri.
- 1988 “Actions of Phencyclidine (PCP): Receptors, Physiology, and Behavior,” Neuroscience Lecture, Amherst College, Amherst, Massachusetts.
- 1989 “New Research Strategies for Antiepileptic Therapy,” Current and Future Trends in Anticonvulsant, Anxiety and Stroke Therapy, Princeton Drug Research Symposia, Princeton, New Jersey.
- 1989 “Excitatory Amino Acids, Seizures and Antiepileptic Drugs,” NINDS Grand Rounds, NIH.
- 1990 “Techniques in Cellular Neurophysiology Short Course,” Potomac Chapter, Society for Neuroscience, Bethesda, Maryland.
- 1990 “Glyburide-Sensitive Voltage-Gated K⁺ Channels in Hippocampal Cells,” Sulfonylureas: Molecular Mechanisms of Action Workshop, NIH.
- 1990 “Electrophysiological Approaches to Understanding Hallucinogens,” NIDA Addiction Research Center, Baltimore, Maryland.
- 1990 “Novel Strategies for Antiepileptic Drug Development,” ICI Pharmaceuticals, Wilmington, Delaware.
- 1990 “Pharmacological Regulation of Voltage-Dependent Potassium Channels in Central Neurons,” Department of Pharmacological and Physiological Sciences, University of Chicago.
- 1990 “Excitatory Amino Acid Receptors: Novel Research Strategies for Antiepileptic Therapy,” Excitatory Amino Acid Receptors in the Brain: Functions and Disorders, Montréal Neurological Institute.
- 1991 “Therapeutic Potential of Weak Uncompetitive NMDA Antagonists for Neurological Disorders,” Parke-Davis Pharmaceutical Research Division, Warner-Lambert Co., Ann Arbor, Michigan.
- 1991 “Interaction of Dissociative Anesthetics with Voltage-Dependent K⁺ and Ca²⁺ Channels and NMDA Receptors in Hippocampal Neurons: Diverse Blocking Mechanisms,” Department of Physiology, University of Maryland School of Medicine, Baltimore.
- 1991 “Therapeutic Potential of Weak Uncompetitive NMDA Antagonists for Neurological Disorders,” Neurogen Corporation, Baltimore, Maryland.

- 1991 "Pharmacological Regulation of K⁺ Channels in CNS Neurons," SmithKline Beecham Pharmaceuticals, Philadelphia, Pennsylvania.
- 1991 "Prospects for the Development of Non-Competitive NMDA Antagonists in the Treatment of Epilepsy," Focus on Epilepsy: Cellular Mechanisms and Pharmacological Approaches, St. Adèle, Quebec City.
- 1991 "Anticonvulsant 1-Phenylcyclohexylamine Analogs: Uncompetitive NMDA antagonists with Less Motor Toxicity than PCP," Third French-U.S. Joint Seminar, Multiple *Sigma* and PCP Receptor Ligands, La Grande Motte, France.
- 1991 "Symposium on Receptors and Disease: The Glutamate Receptor and Epilepsy" (discussant of presentation by Dr. J.O. McNamara), 116th Annual Meeting of the American Neurological Association, Seattle, Washington.
- 1991 "Ion Channels, Drugs and the Treatment of Epilepsy," Department of Neuroscience, Johns Hopkins University School of Medicine, Baltimore, Maryland.
- 1991 "Glyburide Sensitive K⁺ Channels in Central Neurons," Miles Laboratories, West Haven, Connecticut.
- 1991 "Mechanisms of Action of Antiepileptic Drugs," Montreal Neurological Institute, Montreal.
- 1991 "Potassium Channels and Epilepsy," Investigator's Workshop, Annual Meeting, American Epilepsy Society, Philadelphia, Pennsylvania.
- 1992 "Anticonvulsant Drugs," Neurology Grand Rounds, VA Medical Center, Washington, D.C.
- 1992 "Ion Channels as Targets for Stroke Therapy: Focus on Excitatory Amino Acid Receptors and ATP-Sensitive K⁺ Channels," Wyeth-Ayerst Research, Princeton, New Jersey.
- 1992 "Theoretical and Practical Considerations in the Use of Excitatory Amino Acid Antagonists in Epilepsy Therapy," XVIIIth C.I.N.P. Congress, Nice, France.
- 1992 "Cellular Electrophysiological Studies on Noncompetitive NMDA and Non-NMDA Antagonists: Implications for Neurological Therapeutics," First International Congress of the Polish Neuroscience Society, Warsaw.
- 1992 "Potential Antiepileptic Drugs that Act on Excitatory Neurotransmitter Systems," Excitatory and Inhibitory Neurotransmitters in Epilepsy and New Anti-Epileptic Drugs," Annual Meeting, American Epilepsy Society, Seattle, Washington.
- 1993 "Strategies for Antiepileptic Drug Development," Future Applications of Cellular Biology, Marion Merrell Dow, Kona, Hawaii.
- 1993 "ATP-Sensitive K⁺ Channels," Winter Conference on Brain Research, Whistler, B.C., Canada.
- 1993 "Therapeutic Potential of Noncompetitive Excitatory Amino Acid Antagonists," Lilly Research Laboratories, Eli Lilly and Company, Indianapolis, Indiana.
- 1993 "Antiepileptic Drug Mechanisms: Voltage-dependent Na⁺ Channels," 20th International Epilepsy Congress, Oslo Norway.
- 1993 "Uncompetitive NMDA Antagonists," Antiepileptic Drugs in the 1990s: Current and Investigational Therapies (Focus on Epilepsy II), Whistler, B.C., Canada.
- 1994 "Noncompetitive Antagonism of AMPA and NMDA Receptors by 2,3-Benzodiazepines and Channel Blockers," Neuroscience Seminar Series, Uniformed Services University of the Health Sciences, Bethesda, Maryland.
- 1994 "New Anticonvulsant Mechanisms: K⁺ Channels," International Union of Pharmacologists, 125th Meeting, Toronto, Canada.

- 1994 "Cellular Physiology of Antiepileptic Drugs: Clues for Improved Therapies," New Frontiers in the Neuroscience of Epilepsy, Bowman Gray School of Medicine, Wake Forest University, Winston-Salem, North Carolina.
- 1994 "The Pharmacology of NMDA Antagonists," Behavioral Pharmacology Research Unit, The Johns Hopkins University School of Medicine, Baltimore, Maryland.
- 1994 "Excitatory Amino Acid Antagonists for Epilepsy Therapy: New Approaches," Ninth Rinshoken International Conference, Tokyo.
- 1995 "Potassium Channels Modulators in Neurological Disease," IBC USA Conferences, Washington, D.C.
- 1995 "New Developments in Antiepileptic Drugs," Neurology Grand Rounds, University of Maryland, School of Medicine, Baltimore, Maryland.
- 1995 "Promise and Progress in the Treatment of Seizure Disorders," Winter Conference on Brain Research, Steamboat Springs, Colorado.
- 1995 "Pharmacological Properties of AMPA Receptor Isoforms," Neuroscience Seminar, University of Massachusetts Medical Center, Worcester, Massachusetts.
- 1995 "Barbiturates, Neuroactive Steroids and Dicarbamates: New Directions for Antiepileptic Drug Development," GABA and Epileptogenesis (Focus on Epilepsy III), Whistler, B.C., Canada.
- 1995 "Excitatory Amino Acids and Epilepsy: Etiology and Therapy (Drug Targeting AMPA Receptor Subtypes)," Fourth International Congress on Amino Acids, Vienna, Austria.
- 1995 "Excitatory Amino Acids, Epilepsy and Remacemide." and "Rational Development of Antiepileptic Drugs," Twenty-first International Congress on Epilepsy, Sydney, Australia.
- 1995 "Pharmacology and Gating of AMPA Receptors," Membrane Ion Channels: Structure and Function, Fogarty International Center, National Institutes of Health, Bethesda, Maryland.
- 1995 "Modulation of GABA_A Receptors by Neuroactive Steroids: Epilepsy Therapy," Pre- and Postsynaptic Modulation of the GABA_A Receptors: Molecular Pharmacology and Therapeutic Implication, Satellite Symposium, 25th Annual Meeting, Society for Neuroscience, San Diego, California.
- 1996 "K⁺ Channels as Drug Targets in the Treatment of Neurological Diseases," Voltage-Gated Ion Channel Modulators, IBC USA Conferences, Philadelphia.
- 1996 "The NMDA Receptor as Target for AEDs," Molecular Targets and Cellular Mechanisms of Antiepileptic Drugs, Genoa, Italy.
- 1996 "AMPA Receptors as Antiepileptic Drug Targets," Epilepsy: Advances in Understanding and Latest Drug Developments, IBC USA Conferences, Orlando, Florida.
- 1996 "Ion Channels and AED Development," Third International Symposium on Basic Mechanisms of the Epilepsies, San Diego, California.
- 1996 "Mechanism Specific Pathways for New AED Discovery," Antiepileptic Drug Trials III (University of Pennsylvania School of Medicine), Charleston, South Carolina.
- 1996 "Basic Mechanisms of Epilepsy," Neurology Resident Lecture, The Johns Hopkins University School of Medicine, Baltimore.
- 1996 "Pharmacological Properties and Mechanisms of Action of the New Antiepileptic Drugs," Third Eilat Conference on New Antiepileptic Drugs, Eilat, Israel.
- 1996 "Basic Mechanisms of Epilepsy: What Can We Modulate with Antiepileptic Drugs?" New Antiepileptic Drug Development – Focus on Mechanism of Action, Annual Meeting, American College of Clinical Pharmacology, Philadelphia.

- 1996 "Approaches to Hormonal Therapy of Epilepsy," Investigator's Workshop, Annual Meeting, American Epilepsy Society, San Francisco, California.
- 1997 "Neuroactive Steroids and Epilepsy," Department of Pharmacology and Experimental Therapeutics, Boston University School of Medicine.
- 1997 "Mechanisms of AED Action: Present & Future," Symposium on Epilepsy, Millennium Pharmaceuticals, Cambridge, Massachusetts.
- 1997 "The GABA Hypothesis," 8th International Bethel-Cleveland Clinic Epilepsy Symposium, Bielefeld, Germany.
- 1997 "Antiepileptic Drugs for the 21st Century," Spring Epilepsy Research Conference, Grand Cayman, British West Indies.
- 1997 "New Strategies for Antiepileptic Drug Discovery," Lilly Research Laboratories, Eli Lilly and Company, Indianapolis, Indiana.
- 1977 "Modulation of AMPA Receptors," Department of Psychiatry, University of Illinois School of Medicine, Chicago.
- 1977 "Neuroprotection Strategies: Excitatory Amino Acid Systems," Focus on Epilepsy IV: Seizure-Induced Brain Damage, Hôtel Le Chantecler, Saint-Adèle, Canada.
- 1997 "Anticonvulsants for the 21st Century," Plenary Lecture in Symposium "Emerging Strategies for the 21st Century," Child Neurology Society Annual Meeting, Phoenix, Arizona.
- 1998 "Glutamate Receptors as Targets of Antiepileptic Drugs," Department of Pharmacology, Uniformed Services University of the Health Sciences, Bethesda, Maryland.
- 1998 "Sodium and Potassium Channels as Targets for Antiepileptic Drugs," Department of Pharmacology and Toxicology, University of Utah, Salt Lake City, Utah.
- 1998 "Preclinical AED Development: Model Specific vs. Mechanism Specific," Antiepileptic Drug Trials IV (University of Pennsylvania School of Medicine), Charleston, South Carolina
- 1998 Neurology Grand Rounds, Ottawa General Hospital, Ottawa, Canada
- 1998 "Cellular Mechanisms of Antiepileptic Drug Action," Department of Neurology, Yale University School of Medicine, New Haven, Connecticut.
- 1998 "Glutamate Neurotransmission in Epilepsy: New Treatment Strategies," The Glutamate Cascade: Common Pathways of Central Nervous System Disease States, National Institutes of Health, Bethesda, Maryland.
- 1998 "Targeting Ion Channels for Neuroprotection in Epilepsy," Nerve Cell Death and Neuroprotection in Epilepsy, Program in Neuroscience, University of Maryland, Baltimore.
- 1998 "ADCI: An NMDA Receptor and Sodium Channel Antagonist with Broad Spectrum Anticonvulsant Activity and Favorable Toxicity Characteristics," Fourth Eilat Conference on New Antiepileptic Drugs, Eilat, Israel.
- 1998 "Mechanisms of Action of Antiepileptic Drugs," Merritt-Putnam Lectures on Epilepsy (sponsored by American Epilepsy Society), Costa Mesa, California.
- 1998 "Kainate Receptors and Synaptic Plasticity in the Amygdala," *Neuropharmacology* Symposium on Ionotropic Glutamate Receptors (satellite to Society for Neuroscience Meeting), Los Angeles.
- 1998 "AMPA Receptor Antagonists and Allosteric Modulators in Epilepsy," Excitatory Amino Acids - Ten Years Later, Manaus, Brazil.
- 1998 "Progesterone Metabolites as Modulators of Seizure Susceptibility," Symposium, Annual Meeting, American Epilepsy Society, San Diego.

- 1999 "Neurosteroids, GABA and Seizures," Department of Neurology, Children's National Medical Center, Washington, D.C.
- 1999 "New Developments in Epilepsy Therapy: Potential Ion Channel Modulators," DuPont Pharmaceuticals Company, Wilmington, Delaware.
- 1999 "Channel Blocking NMDA Receptor Antagonists," Institute for Biological Sciences, National Research Council, Ottawa, Canada.
- 1999 "Therapeutic Agents Targeting Brain Glutamate Systems," Special Keynote Presentation, New Developments in Glutamate Pharmacology, IBC USA Conferences, Orlando, Florida.
- 1999 "AMPA and Kainate Receptors as Antiepileptic Drug Targets," The Sangamon County Chapter of the Society for Neuroscience, Southern Illinois University School of Medicine, Springfield, Illinois.
- 1999 "Therapeutic Agents Targeting Brain Glutamate Systems," Department of Pharmacology, University of Colorado Health Sciences Center, Denver, Colorado.
- 1999 "Ligand-gated Ion Channels As Therapeutic Targets," Generalized Epilepsies: From Gene to Clinic (Focus on Epilepsy V), Québec City, Canada.
- 1999 "Low Affinity Channel Blockers: Past Present and Future," 6th International Congress on Amino Acids, University of Bonn, Germany.
- 1999 "Neurosteroids in Epilepsy," Interdisciplinary Program in Neuroscience, Georgetown University.
- 1999 "Molecular Targets for Neuroprotection," Speaker and Chair, Symposium on Neuroprotection: Implications for the Future Clinical Management of Epilepsy, Annual Meeting, American Epilepsy Society, Orlando.
- 2000 "New Developments in Antiepileptic Drugs," Maryland Psychiatric Research Center, University of Maryland, Catonsville.
- 2000 "New Advances in Epilepsy Treatment," Spring Brain Conference, Sedona, Arizona.
- 2000 "Therapeutic Applications of Potassium Channel Modulators," Plenary Speaker and Chair, Potassium Channels: Structure, Function and Therapeutic Utilities, Keystone Symposia on Molecular & Cellular Biology, Granlibakken Resort, Tahoe City, California.
- 2000 "Ion Channels and Epilepsy," ICAgen, Research Triangle Park, North Carolina.
- 2000 "Neuroactive Steroids," Fifth Eilat Conference on New Antiepileptic Drugs, Eilat, Israel.
- 2000 "GABA Involvement and the Case for Neurosteroids," University of Washington Pediatric Epilepsy Research Symposium on Epilepsy, Infantile Spasms and Developmental Encephalography, Seattle, Washington.
- 2000 "NMDA, AMPA and Kainate Antagonists as Potential Antiepileptic Drugs," British Pharmacological Society Lecture in Honor of Retirement of Brian Meldrum, University of Bradford.
- 2001 "GluR5 Kainate Receptors and Epileptogenesis in the Amygdala," Killam Lecture, Montreal Neurological Institute, McGill University, Montréal, Québec, Canada.
- 2001 "Novel Approches to Targeting Glutamate and GABA Receptors," Treatment of Epileptic Syndromes: From Molecular Targets to Quality of Life (Focus on Epilepsy VI), Mont-Tremblant, Québec, Canada.
- 2001 "Kainate Receptors and Synaptic Plasticity in the Amygdala," Department of Neuroscience, Albert Einstein College of Medicine, Bronx, New York.
- 2001 "The Mechanisms of Old and New Antiepileptic Drugs: Have Previous Strategies Preselected Drugs Which Act by Old Mechanisms?" New Horizons in the Development of Antiepileptic Drugs, Satellite to Annual Meeting, American Epilepsy Society, Philadelphia.

- 2001 "A Model of Catamenial Epilepsy: Role of Neurosteroids," Neuroendocrinological Aspects of Epilepsy, Annual Meeting, American Epilepsy Society, Philadelphia.
- 2002 "Hormonal Regulation of Seizures," Neurology Grand Rounds, The Ohio State University, Columbus.
- 2002 "Neurosteroids and Epilepsy," Department of Pharmacology, University of Tennessee Health Science Center, Memphis.
- 2002 "Women's Issues in Epilepsy" (half-day course), 54th Annual Meeting, American Academy of Neurology, Denver.
- 2002 "A New Look at the Role of Kainate Receptors in Epilepsy," 35th Winter Conference on Brain Research, Snowmass Village, CO.
- 2002 "Neurological Diseases and Neuroprotection Therapeutic Strategy: Role of Antiepileptic Drugs," satellite symposium to "Sixth Eilat Conference on New Antiepileptic Drugs," Taormina, Sicily.
- 2002 "Kainate Receptor Mediated Long-Term Plasticity, Seizures and Epileptogenesis in the Amygdala," The Amygdala in Brain Function: Basic and Clinical Approaches, New York Academy of Sciences, Galveston Island, Texas.
- 2002 "Hormonal Regulation of Seizure Susceptibility: Catamenial Epilepsy and Stress," Neurology Grand Rounds, The University of Washington School of Medicine, Seattle.
- 2002 "Targeting Glutamate Receptors for Neuroprotection in Epilepsy: The Calcium Connection," Neuroprotection in Epilepsy, Montefiore Medical Center and Albert Einstein College of Medicine, New York.
- 2003 "Hormonal Regulation of Seizure Susceptibility," Epilepsy Research Seminar Series, Division of Neurology, Children's Hospital of Philadelphia and University of Pennsylvania.
- 2003 "Molecular Targets for Drug Development for Neuroprotection: AMPA, NMDA, Kainate and K^+ , Ca^{++} , Na^+ Channels as Potential Targets," Clinical Trials In Neuroprotection, University of Pennsylvania, Key Biscayne, Florida.
- 2003 "Neurosteroid Regulation of Seizure Susceptibility: Catamenial Epilepsy and Stress," XXXIII Annual Congress of the International Society of Psychoneuroendocrinology, Pisa, Italy.
- 2003 "Women's Issues in Epilepsy" (half-day course), 55th Annual Meeting, American Academy of Neurology, Honolulu.
- 2003 "Tolerance: Neuronal Mechanisms," Long-Term Efficacy of Antiepileptic Drugs and the Phenomenon of Tolerance, Medical College of Wisconsin, Milwaukee.
- 2003 "Role of Kainate Receptors in Synaptic Plasticity and Epileptogenesis," Amygdala, Seizures and Epileptogenesis (Focus On Epilepsy VII), Montréal Neurological Institute, Montréal.
- 2003 "Understanding the Optimal Treatment Approach to Alzheimer's Disease: The NMDA Receptor as a Novel Target," 11th National Alzheimer's Disease Education Conference, Chicago.
- 2003 "Beyond Acetylcholine: Novel Targets in Alzheimer's Disease," U.S. Geriatric and Long-Term Care Congress, San Francisco.
- 2003 "Hormones and Epilepsy," Neurology Grand Rounds, Georgetown University, Washington, D.C.
- 2003 "Neurosteroid Modulation of Seizure Susceptibility," Departments of Pharmacology and Neurology, Medical College of Ohio.
- 2003 "Neurosteroid Update: Integrating the Basic and Clinical Data," 42nd Annual Meeting, American College of Neuropsychopharmacology, San Juan.

- 2004 “Neurosteroids and the Regulation of Seizure Susceptibility,” Center for Neuroscience Research, Children’s Research Institute, Children’s National Medical Center, Washington, D.C.
- 2004 “Cognitive Neuropsychiatry of Glutamate,” Society for Behavioral and Cognitive Neurology Workshop, 15th Annual Meeting, American Neuropsychiatric Association, Bal Harbour, Florida.
- 2004 “What is the Rationale for New Treatment Strategies in AD?,” Assessing Current Practice in Alzheimer’s Disease, American Association for Geriatric Psychiatry 17th Annual Meeting, Baltimore.
- 2004 “Kainate Receptors in the Amygdala,” The Synapse: Molecular Mechanisms of Plasticity, Celebrating the Opening of the Porter Neuroscience Research Center, Harbourtowne Conference Center, St. Michaels, Maryland.
- 2004 “Neurosteroids and Epilepsy,” Pharmacology Department Seminar, Uniformed Services University of the Health Sciences, Bethesda.
- 2004 “How Do Hormones Influence Seizures?” National Capital Cure Epilepsy Conference, American Association for the Advancement of Science, Washington, D.C.
- 2004 “Catamenial Epilepsy,” NINDS Grand Rounds, Clinical Center, National Institutes of Health, Bethesda.
- 2004 “Physiology of Kainate Receptors and their Role in Synaptic Plasticity and Epileptogenesis in the Amygdala,” Department of Physiology and Neuroscience Center, Dartmouth Medical School, Hanover, New Hampshire.
- 2004 “Women’s Issues in Epilepsy” (half-day course), 56th Annual Meeting, American Academy of Neurology, San Francisco.
- 2004 “Catamenial Epilepsy,” Neurology Grand Rounds, George Washington University, Washington, D.C.
- 2004 “Role of Neurosteroids in the Regulation of Seizure Susceptibility,” Department of Neuroscience Seminar, Albert Einstein College of Medicine, Bronx, New York.
- 2004 “The ABCs of Alzheimer’s Disease Management: Understanding the Latest Advances and Rationale of Pharmacological Management,” Canadian Association of Geriatric Psychiatry, Montreal.
- 2004 “Neurosteroids and Epilepsy – How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Epilepsy Center, Barrow Neurological Institute, Phoenix, Arizona.
- 2004 “The Role of Kainate Receptors in Epilepsy,” Investigator’s Workshop, Annual Meeting, American Epilepsy Society, New Orleans, Louisiana.
- 2004 “Molecular Mechanisms of Action of Antiepileptic Drugs in the Treatment of Bipolar Disorder: How Can More Effective Agents Be Developed?,” American College of Neuropsychopharmacology Annual Meeting, San Juan, Puerto Rico.
- 2005 “Neurosteroids and Epilepsy,” Grand Rounds, Department of Neurology, New York Presbyterian Hospital–Cornell Medical Center.
- 2005 “Neurosteroids and Epilepsy – How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Grand Rounds, The Neurosciences Institute, Albany Medical Center.
- 2005 “Modulation of GABA_A Receptors by Neurosteroids,” Frontiers in Neuroscience III, Montreal Neurological Institute, Mont-Tremblant, Québec, Canada.
- 2005 “Memantine: Mechanism of Action in Alzheimer’s Disease,” Cloister Eberbach, Eltville, Germany.

- 2005 “Episodic Nervous System Disorders: Pathophysiology to Neurotherapeutics,” symposium on “Antiepileptic Drugs: Not Just for Epilepsy,” American Society for Experimental NeuroTherapeutics Annual Meeting, Washington, D.C.
- 2005 “Molecular Targets vs Models for New Drug Development,” Antiepileptic Drug Trials VIII (University of Pennsylvania Medical Center), Sonesta Beach Resort, Key Biscayne, Florida.
- 2005 “Epilepsy,” Demystifying Medicine Lecture Series, Office of Intramural Research, Office of the Director, NIH.
- 2005 “Avenues of Neuroprotection in Epilepsy,” Disease Modification in Epilepsy, Comprehensive Epilepsy Center, Weill Medical College/New York-Presbyterian Hospital, New York.
- 2005 “Special lecture: Modulation of Ion Channel by Antiepileptic Drugs,” and “Neurosteroids and Epilepsy – How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Korean Epilepsy Society, Seoul.
- 2005 “Neurosteroids and Epilepsy,” Neurology Grand Rounds, Keck School of Medicine, University of Southern California, Los Angeles.
- 2005 “Neurosteroids and Epilepsy – How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Department of Pharmacology, School of Medicine, University of Maryland at Baltimore.
- 2005 “Neurosteroids and Brain Excitability,” Neurosteroids – Effects and Clinical Consequences, 26th International Epilepsy Congress, Paris.
- 2005 “Kainate Receptors in the Amygdala: Role in Seizures and Epileptogenesis,” Epilepsy Research Seminar, Department of Pharmacology, and Neurology Grand Rounds, Department of Neurology, Emory University, Atlanta.
- 2005 “Why Women With Epilepsy Tend to Have Seizures Around the Time of Menstruation,” Neuroscience Program, Williams College, Williamstown, Massachusetts.
- 2005 “Antiepileptic Drugs in the Preclinical Pipeline,” New Horizons in the Development of Antiepileptic Drugs: Innovative Strategies, Satellite to Annual Meeting, American Epilepsy Society, Washington, D.C.
- 2005 “Stress, Seizures and the GABA System,” Plenary Symposium on Maladaptive Neuroplasticity in Stress and Epilepsy, Annual Meeting, American Epilepsy Society, Washington, D.C.
- 2006 “Which Molecular Targets Exist for New Drugs Preventing or Reversing Epilepsy and Drug Resistance?” UCB Research Day – Prevention or Reversal of Epilepsy and Pharmacoresistance: Potential for Future Drug Discovery and Development, Chateau du Lac, Genval, Belgium.
- 2006 “Pathophysiology of Episodic Neurological Disorders,” Continuing Medical Education Conference on Depression in Neurologic Disease, Weill Medical College of Cornell University, New York.
- 2006 “Lessons from Epilepsy,” Symposium on “Predicting Treatment Efficacy to Analgesic Drugs in Neuropathic Pain: Lessons from the Worlds of Epilepsy and Depression,” 25th Annual Scientific Meeting of the American Pain Society, San Antonio, Texas.
- 2006 “Neurosteroids in Seizure Disorders and Depression and the Development of Neurosteroid Analogs,” Symposium on “Neurosteroids as Candidate Modulators of Pathophysiology and Novel Therapeutic Agents,” 61st Annual Convention, Society of Biological Psychiatry, Toronto, Canada.
- 2006 “Hormonal Regulation of Seizure Susceptibility,” Department of Biomedical Sciences, University of Modena and Reggio Emilia, Modena, Italy.

- 2006 “Neurosteroids and Epilepsy – How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Grand Rounds, Department of Neurology, Jefferson Medical College, Thomas Jefferson University, Philadelphia.
- 2006 “Neurosteroids and Epilepsy – How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Grand Rounds, Department of Neurology, West Los Angeles Healthcare Center, Veterans Affairs Greater Healthcare System, Los Angeles.
- 2007 “Novel Antiepileptic Drugs,” Ion Channel Modulators and Antiepileptics, Innovative Drug Development For Headache Disorders, 16th International Headache Research Seminar, University of Copenhagen, Glostrup Hospital, Copenhagen.
- 2007 “Convection Enhanced Delivery of Peptide Toxins for the Treatment of Focal Epilepsies,” 4th Conference on Epileptogenesis, Santa Croce in Fossabanda, Pisa, Italy.
- 2007 “Endogenous Neurosteroids as Regulators of the Transition to the Ictal State,” IX Workshop on Neurobiology of Epilepsy (WONOE 2007), Sheraton Langkawi Resort, Teluk Nibong, Langkawi Island, Malaysia.
- 2007 “Hormones and Epilepsy: How Menstruation, Stress, and Hypogonadism Influence Seizure Susceptibility,” NIH Clinical Center Grand Rounds, National Institutes of Health, Bethesda, Maryland.
- 2007 “Neurosteroids as Therapeutic Agents: Seizure Protection and Antiepileptogenesis,” 27th International Epilepsy Congress, Suntec Singapore International Convention & Exhibition Centre, Singapore.
- 2007 “Recent Advances in Antiepileptic Drug Mechanisms: New Molecular Targets,” 27th International Epilepsy Congress, Suntec Singapore International Convention & Exhibition Centre, Singapore.
- 2007 “Anatomy and Physiology of Neuron-Specific K⁺ Channels,” 27th International Epilepsy Congress, Suntec Singapore International Convention & Exhibition Centre, Singapore.
- 2007 “Neurosteroids and Epilepsy – How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” UCI Epicenter, University of California, Irvine.
- 2007 “Neurosteroids as Therapeutic Agents: Seizure Protection, Antiepileptogenesis, Clinical Trials with Ganaxolone,” 46th Annual Meeting American College of Neuropsychopharmacology, Boca Raton Resort & Club, Boca Raton, Florida.
- 2008 “Neurosteroids as Regulators of Seizure Susceptibility: Seizure Protection, Antiepileptogenesis, Clinical Trials with Ganaxolone,” 41st Winter Conference on Brain Research, Snowbird, Utah.
- 2008 “Convection-Enhanced Delivery,” 4th Workshop on New Horizons in the Development of Antiepileptic Drugs, Clontarf Castle, Dublin.
- 2008 “Revolutionary Treatments: New CNS Drug Targets and Breakthrough Epilepsy Treatment Strategies,” Epilepsy Pipeline Update: Portal into CNS Opportunities, Epilepsy Therapy Project, Hotel Monaco, San Francisco.
- 2008 “Basic Science Mini-Symposium: Future Directions (Rational Polytherapy: The Ketogenic Diet Plus),” International Symposium on Dietary Therapies for Epilepsy and Other Neurological Disorders, Ritz Carlton Hotel, Phoenix.
- 2008 “Neurosteroids and Epilepsy – How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Neurology Grand Rounds, University of California, Los Angeles.
- 2008 “New Epilepsy Treatment Approaches – Focus on Convection-Enhanced Delivery,” Center for Integration of Medicine & Innovative Technology/Neurotechnology Industry Organization Epilepsy Innovation Summit, Westin Copley Place, Boston.

- 2008 “Epilepsy and Migraine,” Ninth Eilat Conference on New Antiepileptic Drugs, Sitges, Spain.
- 2008 “Posttraumatic Epilepsy: Update on the Problem and the Status of Animal Models,” University of California Neurotrauma Symposium, Quail Lodge, Carmel, California.
- 2008 “Neurosteroids and Epilepsy – How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Neurology Grand Rounds, Stanford University, Palo Alto, California.
- 2008 “Neuroendocrinology in Epilepsy – Brain, the Third Gonad: How CNS Steroids Interact with Peripheral Steroids to Affect Seizures,” Neuroendocrinology Special Interest Group, Annual Meeting, American Epilepsy Society, Seattle, Washington.
- 2009 “Convection-Enhanced Delivery for the Treatment of Partial Seizures,” Pipeline Session, American Society for Experimental NeuroTherapeutics, 11th Annual Meeting, Crystal Gateway Marriott, Arlington, Virginia.
- 2009 “New mechanisms vs. old models: Is it time for out of the box thinking?,” Antiepileptic Drug Trials X (University of Pennsylvania School of Medicine), Biltmore Hotel, Coral Gables, Florida.
- 2009 “New Approaches to Epilepsy Therapeutics,” Fourth International Workshops, Jasper’s Basic Mechanisms of the Epilepsies, Yosemite National Park, California.
- 2009 “Neurosteroids and Epilepsy — How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Johns Hopkins Neurology Grand Rounds, Baltimore, Maryland.
- 2009 “Neurosteroids and Epilepsy — How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Department of Anesthesiology, Washington University, St. Louis.
- 2009 “New Molecular Targets for Antiepileptic Drugs,” 13th Annual Scientific Meeting of the Epilepsy Association of Thailand, Novotel Hotel, Bangkok.
- 2009 “From NINDS Lab to Clinical Trial: A Case Study in the Translation of a Novel Epilepsy Drug” and “Pharmaceutical Development in the Academic Setting,” Second Annual Summer Course for Clinical and Translational Research in the Neurosciences, American Neurological Association, Vail Marriott Mountain Resort, Vail, Colorado.
- 2009 “Migraine and Epilepsy,” 14th International Headache Congress, American Headache Society and the International Headache Society, Philadelphia, Pennsylvania.
- 2009 “Migraine, Epilepsy and Migralepsy: Myths and Realities,” 7th Headache Research Summit, National Headache Foundation, Hyatt Regency Hotel, Chicago, Illinois.
- 2009 “Migraine and Epilepsy,” West Los Angeles VA Healthcare Center Neurology Grand Rounds, Los Angeles, California.
- 2009 “The Future of Epilepsy Therapy,” William G. Lennox Lecture, 63rd Annual Meeting, American Epilepsy Society, Boston, Massachusetts.
- 2010 “The Science of Epilepsy: Mechanisms of Action of Drugs and Biologics” and “Intrapulmonary Propofol Analogs,” 2010 Epilepsy Pipeline Update: Portal Into CNS, Epilepsy Therapy Project, San Francisco.
- 2010 “Neurosteroids and Epilepsy — How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Neurology Grand Rounds, University of California, San Diego.
- 2010 “The Other Adrenal Effect — The DOC Hypothesis,” 2010 Infantile Spasms Summit: the Unique Mechanistic Properties of ACTH, Hôtel Plaza Athénée, New York.
- 2010 “Emerging Antiepileptic Drug Mechanisms — New Molecular Targets,” 9th European Congress on Epilepsy, Rhodes, Greece.
- 2010 “Neuroprotection in Epilepsy: Promise or Pipe Dream?,” Keynote Address, 2010 Epilepsy Update, Barrow Neurological Institute, Phoenix.

- 2010 “Central Nervous System Channels: Review of the Basics,” Channel Surfing: Impact On Treatment Strategies, AET Symposium, American Epilepsy Society, San Antonio, Texas.
- 2010 “Neurosteroids in Men with Epilepsy,” Hormonal Issues in Men with Epilepsy, Neuroendocrine Special Interest Group, 64th Annual Meeting, American Epilepsy Society, San Antonio, Texas.
- 2011 “Neurosteroids for Epilepsy, Traumatic Brain Injury and Fragile X Syndrome,” Panel: Translational Studies of Neuroactive Steroids: Targets, Biomarkers and Potential Therapeutics for Neuropsychiatric Disease, 2011 Winter Conference on Brain Research Keystone, Colorado.
- 2011 “Migraine,” The Fourth Annual Headache Cooperative of the Pacific Winter Symposium, Ojai Valley Inn, Ojai, California.
- 2011 “Pulmonary Drug Delivery to Treat Epilepsy and Migraine,” Pipeline Session, American Society for Experimental NeuroTherapeutics, 12th Annual Meeting, Bethesda, Maryland.
- 2011 “Complexities of Migraine Headaches,” 4th Annual Chair Summit, Loews Annapolis Hotel, Annapolis, Maryland.
- 2011 “Migraine and Epilepsy – Shared Mechanisms within the Family of Episodic Disorders,” NINDS Grand Rounds Lecture Series, NIH Clinical Center, Bethesda, Maryland.
- 2011 “Neurobiological Mechanisms of Comorbidities,” Investigators’ Workshop (organizer), 65th Annual Meeting, American Epilepsy Society, Baltimore, Maryland.
- 2011 “Migraine and Epilepsy – Shared Mechanisms within the Family of Episodic Disorders,” Neurology Grand Rounds, University of Vermont College of Medicine, Burlington.
- 2012 “Inhaled Treatments to Stop Seizures Before they Spread,” Epilepsy Pipeline Update, Epilepsy Therapy Project, Hyatt Embarcadero Hotel, San Francisco.
- 2012 “New Approaches to Epilepsy Therapy,” Department of Neurology, University Medical Center Magdeburg A.ö.R, Otto-von-Guericke-University, Magdeburg, Germany.
- 2012 “Intracranial Delivery of Antiseizure Substances,” Deutsche Gesellschaft für Epileptologie (German Society for Epileptology) Annual Congress, Kultur- & Kongresszentrum Liederhalle, Stuttgart, Germany.
- 2012 “Neurosteroids and Epilepsy – How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Academia Sinica, Taipei, Taiwan.
- 2012 “New Approaches to Epilepsy Therapy,” National Taiwan University Hospital, Taipei, Taiwan.
- 2012 “Neurotherapeutics Discovery and Development in the Academic Setting: A New Paradigm,” Neurotranslation: Neurologists and Neuroscientists Defining the Next Generation of CNS Therapies, American Academy of Neurology 64th Annual Meeting, New Orleans, Louisiana.
- 2012 “Mechanisms and Models for Migraine,” Eleventh Eilat Conference on New Antiepileptic Drugs, Eilat, Israel.
- 2012 “How to Do Translational Neurology in Academia,” American Neurological Association Fourth Annual Translational and Clinical Research Course in the Neurosciences, San Francisco.
- 2012 “New Directions in Epilepsy Treatment,” Encuentro de Expertos en Epilepsia VII, Casa America, Madrid, Spain.
- 2012 “Intrinsic Severity As a Determinant of Antiepileptic Drug Refractoriness,” Second Halifax International Epilepsy Retreat “Pharmacoresistance in Epilepsy,” Oak Island Resort & Marina, Nova Scotia, Canada

- 2012 “AMPA Receptors: A New Target in the Treatment of Epilepsy,” 10th European Congress on Epileptology, London.
- 2012 “Migraine and Epilepsy – Shared Mechanisms within the Family of Episodic Disorders,” Neurology Grand Rounds, New York Medical College, Valhalla, New York.
- 2012 “How do we treat epileptic seizures with medications?,” Living with Epilepsy, a conference about epilepsy (sponsored by Stanford University), Li Ka Shing Center for Learning and Knowledge, Stanford University, Stanford, California.
- 2013 “Neurosteroids and Epilepsy – How Menstruation, Stress and Hypogonadism Influence Seizure Susceptibility,” Basic Medical Sciences Seminar Series, University of Arizona College of Medicine, Phoenix.
- 2013 “Neuroactive Steroids for Status Epilepticus,” The 4th London-Innsbruck Colloquium on Status Epilepticus and Acute Seizures, Radisson Blu Hotel & Conference Centre, Salzburg, Austria.
- 2013 “Research Update,” New York University Comprehensive Epilepsy Center, NYU Langone Medical Center, New York.
- 2013 “Neurosteroids as Drug Targets in Epilepsy,” Organization for the Study of Sex Differences, Annual Meeting, Sheraton Lincoln Harbor Hotel, Weekawken, New Jersey.
- 2013 “Preclinical Considerations on a Unified Indication,” Antiepileptic Drug and Device Trials XII (University of Pennsylvania School of Medicine), Turnberry Isle Miami Hotel, Aventura, Florida.
- 2013 “The Role of AMPA Receptors in Excitatory Neurotransmission and Epileptic Activity,” 30th International Epilepsy Congress, Montreal
- 2013 “Update on Epilepsy Treatment,” Epilepsy Grand Rounds, George Washington University, Washington, D.C.
- 2013 “Neurosteroids and Epilepsy,” Longwood Medical Area Grand Rounds, Brigham and Women’s Hospital, Harvard Institute of Medicine, Boston.
- 2013 “The Newly Approved Antiepileptic Drug Perampanel – How It Was Developed, How It Works and How to Use It,” Neurology Grand Rounds, Massachusetts General Hospital, Boston.
- 2013 “New and old AEDs with different modes of action – How do their different targets impact clinical outcomes?” Training Day, Finnish Epilepsy Society, Scandic Marski, Helsinki.
- 2013 “Advancing Translation in Epilepsy: Countering the Positive Results Bias,” Epilepsy Special Interest Group, American Neurological Association 2013 Annual Meeting, New Orleans.
- 2013 “Neuroactive Steroids Ganaxolone and Allopregnanolone in the Treatment of Epilepsy, Traumatic Brain Injury, and Neurobehavioral Disorders,” 52nd American College of Neuropsychopharmacology Annual Meeting, The Westin Diplomat, Hollywood, Florida.
- 2014 “Human Studies with Therapeutic Neurosteroids: An Update,” Duke Neurosteroid Congress, Washington Duke Inn & Golf Club, Durham, North Carolina.
- 2014 “Inhaled Treatments to Stop Seizures Before they Spread,” Epilepsy Pipeline Update, Epilepsy Therapy Project, Hyatt Regency, San Francisco.
- 2014 “Should the Current Approach to Therapy Discovery be Modified,” Symposium on Conquering Pharmacoresistant Epilepsy: Debates, Twelfth Eilat Conference on New Antiepileptic Drugs, Melia Castilla, Madrid, Spain.
- 2014 “Propofol Hemisuccinate,” Twelfth Eilat Conference on New Antiepileptic Drugs, Melia Castilla, Madrid, Spain.

- 2015 “Neurosteroids in Epilepsy – From Menstrual Seizures to Super-Refractory Status Epilepticus,” Keynote, EpLINK Science Innovation Team, Ontario Brain Institute, Toronto.
- 2015 “Treatment of Super-refractory Status Epilepticus,” Harvard Medical School Neurology Program at Beth Israel Deaconess Medical Center and Boston Children’s Hospital, Harvard Institute of Medicine, Boston.
- 2015 “Propofol Hemisuccinate,” The 5th London-Innsbruck Colloquium on Status Epilepticus and Acute Seizures,” Imperial College, London.
- 2015 “Debate: Preclinical Randomized Controlled Trials: Can They Increase the Likelihood of Success in Human Trials?,” Antiepileptic Drug and Device Trials XIII, Turnberry Isle Miami Hotel, Aventura (North Miami Beach), Florida.
- 2015 Propofol Hemisuccinate,” Antiepileptic Drug and Device Trials XIII, Turnberry Isle Miami Hotel, Aventura (North Miami Beach), Florida.
- 2015 “Pathophysiology of Seizures and New Treatment Strategies,” Center for Veterinary Health Sciences, Oklahoma State University, Stillwater, Oklahoma.
- 2015 “Antiepileptic Drugs: Needs for New Treatments and Targets,” Therapy Development in the Era of Team Science and Big Data: What will the Future Bring to the Patient with Epilepsy, College of Pharmacy, University of Utah, Park City, Utah.
- 2015 “AMPA Receptors: Synaptic Physiology, Role in the Circuitry of Epilepsy, and Clinical Translation,” 2015 Ion Channel Symposium, Zhejiang University, Hangzhou, P.R. China.
- 2015 “Propofol Hemisuccinate for the Acute Treatment of Migraine,” 9th Annual Pain & Migraine Therapeutics Summit, Washington, D.C.
- 2015 “Publication Bias: When Data is AWOL,” Translational Symposium, 69th Annual Meeting, American Epilepsy Society, Philadelphia.
- 2016 “Propofol Hemisuccinate,” Epilepsy Foundation Pipeline Conference, San Francisco
- 2016 “Propofol Hemisuccinate: An Inhaled Treatment for Epilepsy and Migraine,” 2016 Annual Meeting, American Society for Experimental Neurotherapeutics, Bethesda, Maryland
- 2016 “AMPA Receptors, A New Molecular Target for Epilepsy Therapy,” Clinical Neuroscience Grand Rounds, Boston University School of Medicine, Boston
- 2016 “Allopregnanolone in the Treatment of Status Epilepticus,” Second Neurosteroid Congress, Duke University, Washington Duke Inn & Golf Club, Durham, North Carolina
- 2016 “Novel Drugs and Future Hopes: Human Perspective,” 2nd International Conference on One Medicine One Science, Team Science Case Study: Canine and Human Epilepsy, a Model for Bidirectional Benefit, The Commons Hotel, University of Minnesota, Minneapolis
- 2016 “Management of Tonic-clonic Seizures: Does Mechanism Matter?” Tonic-clonic Seizures: Realities, Controversies, Therapies, American Academy of Neurology Annual Meeting, Stanley Park Ballroom, Westin Bayshore Hotel, Vancouver, Canada.
- 2016 2016 ACVIM Forum / Scientific Sessions, American College of Veterinary Internal Medicine, Colorado Convention Center.
- 2016 CURE Day of Science, California Academy of Science, San Francisco.
- 2016 Basic Neuroscience of EEG, CNSF Congress Neurology Resident Course – Neurophysiology/Electroencephalography, Quebec City Convention Centre, Quebec City, Quebec.
- 2016 Debate 2: “Is Knowledge of Mechanism of Action Essential for the Development of New AEDs?” and “Propofol Hemisuccinate: An Inhaled Treatment for Epilepsy,”

- Thirteenth Eilat Conference On New Antiepileptic Drugs and Devices (EILAT XIII), Madrid, Spain.
- 2016 “Neurosteroids in the Treatment of Epilepsy and Status Epilepticus,” Excitatory-Inhibitory Signaling Balance as Therapeutic Target in Epilepsy, Montreal Neurological Institute, Montreal.
- 2016 “New Antiepileptic Drugs with Potential for Therapy-resistant Epilepsy,” Chair Symposium and “Allopregnanolone Potential in the Treatment of Super-refractory Status Epilepticus,” Novel Therapies for Status Epilepticus (parallel session), 12th European Congress on Epileptology, Kongresové centrum Praha, Prague.
- 2016 “Refractory Status Epilepticus: Mechanisms and Management,” Faculty Speaker Interactive Lunch Workshop, 141st Annual Meeting of the American Neurological Association, Baltimore, Maryland.
- 2016 “AMPA Receptors in Epilepsy Therapy,” 26th Elsevier Neuropharmacology Conference, Ionotropic Glutamate Receptors, Paradise Point, San Diego.
- 2016 “The newer medications have not helped our refractory patients.” Annual Course, Annual Meeting, American Epilepsy Society, Houston, Texas.
- 2017 “New Therapies for Super-Refractory Status Epilepticus (SRSE)” and “New Antiepileptic Drugs and Potential for Therapy Resistant Epilepsy,” Israeli League Against Epilepsy Conference, Leonardo City Tower, Ramat Gan, Israel.
- 2017 “Drug Development for Seizures and Status Epilepticus at UC Davis,” Inaugural UC-Wide Drug Discovery Symposium, California Nanosystems Institute, University of California, Los Angeles.
- 2017 “Propofol hemisuccinate. An Inhaled and Oral Treatment for Acute Seizures,” The 6th London-Innsbruck Colloquium on Status Epilepticus and Acute Seizures, Salzburg, Austria.
- 2017 “Neuroendocrine Effects on Headache,” Neuroendocrine Update: Nuts and Bolts of What You need to Know, 69th Annual Meeting, American Academy of Neurology, Boston.
- 2017 “Neurobiology of Antiepileptic Drugs,” 9th National Epilepsy Congress, Philippine League Against Epilepsy, Marco Polo Hotel, Cebu City, Philippines.
- 2017 “Novel Treatments for Refractory Status Epilepticus” (Session on Super-refractory Status Epilepticus) and “Glutamate Receptors in Epilepsy” (Plenary session 5: Targeted Therapy in Epilepsy – The Role of Glutamate), ILAE British Chapter Annual Scientific Meeting, Queens Hotel, Leeds, United Kingdom.
- 2017 “Molecular Targets for Antiseizure Drugs,” Genentech Inc., South San Francisco.
- 2018 “Glutamate receptor antagonists in epilepsy therapy: Does mode of action matter?” 11th Valentin Symposium, Berlin.
- 2018 “Propofol Prodrug: Oral Treatment for Acute Repetitive Seizures,” Epilepsy Foundation Pipeline Conference, San Francisco.
- 2018 “Neurosteroids and the Treatment of Status Epilepticus,” Center for Orphan Drug Research, Institute for Therapeutics Discovery & Development, University of Minnesota, Minneapolis.
- 2018 “Propofol Prodrug: Oral Treatment for Acute Repetitive Seizures,” 2018 Annual Meeting American Society for Experimental Neurotherapeutics.
- 2018 “Ganaxolone in the Treatment of CDKL5 Deficiency Syndrome,” 2018 Annual Meeting American Society for Experimental Neurotherapeutics.
- 2018 “Update on Parenteral Brexanolone,” Third Neurosteroid Congress, Duke University, Washington Duke Inn & Golf Club, Durham, North Carolina.

- 2018 “Propofol Prodrug,” Fourteenth Eilat Conference on New Antiepileptic Drugs and Devices (EILAT XIV), Madrid, Spain.
- 2018 “Anti-ictal Versus Mechanism Targeted Therapies,” Epilepsy Foundation 2018 Research Roundtable for Epilepsy: Evolving Concepts in Endpoints and Populations in Epilepsy Trials, Washington, DC.
- 2018 “Targeting Novel Receptors,” Targeted Therapy, 13th European Congress on Epilepsy, Vienna, Austria.
- 2018 “Pharmacological Thoughts for SLC6A1,” SLC6A1 Connect Roundtable: Developing a Unified Scientific Approach to Treatment Discovery in SLC6A1, American Epilepsy Society Meeting, New Orleans.
- 2019 “New Drugs for Seizures and Epilepsy,” Basic Science Seminar Series, Department of Pathology & Microbiology, University of Nebraska Medical Center, Omaha.
- 2019 “Molecular Therapeutics of Epilepsy,” Fifth International Workshops, Jasper’s Basic Mechanisms of the Epilepsies, Yosemite Lodge, Yosemite National Park, California.
- 2019 “Neuroendocrine Effects on Headache,” Neuroendocrine Update: Nuts and Bolts of What You need to Know, 71st Annual Meeting, American Academy of Neurology, Philadelphia.
- 2019 “Do Neurosteroids Have Any Future in the Treatment of Status Epilepticus?,” and “Novel Acute Seizure Treatments,” 7th London-Innsbruck Colloquium on Status Epilepticus and Acute Seizures, Francis Crick Institute, London.
- 2019 “DBF (diazepam buccal film) for Acute Repetitive Seizures,” Antiepileptic Drug and Device Trials XV, JW Marriott Turnberry Isle Miami Hotel, Aventura, FL.
- 2019 “Neuroactive Steroids for the Treatment of Neurological and Psychiatric Disease,” The Theodore Koppanyi Lectureship in Pharmacology, Department of Pharmacology & Physiology, Georgetown University.
- 2019 “Update: Pharmacological Thoughts for SLC6A1,” SLC6A1 Connect Roundtable, American Epilepsy Society Meeting, Baltimore.
- 2020 “Creation of the First Neurosteroid Drug,” Israeli League Against Epilepsy Conference, Dan Hotel, Tel Aviv.
- 2020 “Diazepam Buccal Film for Acute Repetitive Seizures,” Fifteenth Eilat Conference on New Antiepileptic Drugs and Devices (EILAT XV).
- 2020 “Screening Across the Board: Where are We and Where Should We be Going?” Epilepsy Foundation Pipeline Conference (virtual).
- 2020 “Diazepam Buccal Film,” Epilepsy Foundation Pipeline Conference (virtual).
- 2020 “AMPA Receptors in Epilepsy and as Targets for Antiepileptic Drugs,” China Association Against Epilepsy (virtual).
- 2021 “Neurosteroids in the Treatment of Status Epilepticus,” Claude G. Wasterlain, MD Festschrift in Recognition of 45 Years of Contributions to Veterans & Science, West Los Angeles Veterans Administration.
- 2022 “Neurosteroids in the Treatment of Epilepsy and Status Epilepticus,” Neurology Grand Rounds, Stanford University.
- 2022 “Neurosteroids in the Treatment of Epilepsy and Status Epilepticus,” Neurology Grand Rounds, St. Louis University.
- 2022 “Update on Neuroactive Steroids in the Treatment of Status Epilepticus,” 8th London-Innsbruck Colloquium on Status Epilepticus and Acute Seizures, Salzburg, Austria.
- 2022 “Role of AMPA Receptors in Epilepsy and as a Target for Antiseizure Medications,” CURE Epilepsy Frontiers in Epilepsy Research Seminar Series, Texas A & M University College of Medicine.

- 2022 “Pharmacological Thoughts for SLC6A1,” SLC6A1 Connect Symposium, American Epilepsy Society Annual Meeting.
- 2022 “Refractory Epilepsy: Molecular Mechanisms,” An Update on Pharmacological Treatments for Refractory Epilepsy and its Prevention, American Epilepsy Society Annual Meeting, Nashville, TN.
- 2023 “Refractory Epilepsy: Molecular Mechanisms,” An Update on Pharmacological Treatments for Refractory Epilepsy and its Prevention, American Academy of Neurology Annual Meeting, Boston, MA.
- 2023 “Neurosteroids in the Treatment of Epilepsy, Status Epilepticus and Postpartum Depression,” ASENT-JSNT Joint Session, Japanese Society of Neurological Therapeutics, Tokyo.
- 2023 “Seizing the Future: Promising New Treatments for Epilepsy in Clinical Testing,” SLC6A1 Connect Annual International Symposium, American Epilepsy Society Annual Meeting, Orlando, FL.
- 2023 “Clinical Presentation of GABR Variants and Current Treatment,” Roadmap to a Cure, Cure GABA-A Variants, American Epilepsy Society Annual Meeting, Orlando, FL.
- 2024 “New and Upcoming GABAergic Treatments, with Focus on Ganaxolone,” Lab Meeting, Cure GABA-A Variants.
- 2024 “Understanding GABA-A and its Relationship to Epilepsy,” Community Meeting, Cure GABA-A Variants
- 2024 “Non-IV Administration of Drugs,” 9th London-Salzburg Colloquium on Status Epilepticus and Acute Seizures, London.

BIBLIOGRAPHY

I. REFEREED ORIGINAL ARTICLES

1. R. HOELDTKE, M. ROGAWSKI and R.J. WURTMAN: Effect of selective destruction of central and peripheral catecholamine-containing neurons with 6-hydroxydopamine on catecholamine excretion in the rat, *British Journal of Pharmacology* **50**: 265–270, 1974.
2. M.A. ROGAWSKI, S. KNAPP and A.J. MANDELL: Effects of ethanol on tryptophan hydroxylase activity from striate synaptosomes, *Biochemical Pharmacology* **23**: 1955–1962, 1974.
3. L.L. IVERSEN, M.A. ROGAWSKI and R.J. MILLER: Comparison of the effects of neuroleptic drugs on pre- and post-synaptic dopaminergic mechanisms in rat striatum, *Molecular Pharmacology* **12**: 251–262, 1976.
4. M.A. ROGAWSKI, S.J. FUNDERBURK and S.D. CEDERBAUM: Oculocutaneous albinism and mental disorder, *Human Heredity* **28**: 81–85, 1978.
5. M.A. ROGAWSKI, J.T. GOODRICH, M.D. GERSHON and R.J. TOULOUKIAN: Hirschsprung’s disease: absence of serotonergic neurons from the aganglionic colon, *Journal of Pediatric Surgery* **13**: 608–615, 1978.
6. M.A. ROGAWSKI, R.H. ROTH and G.K. AGHAJANIAN: Melatonin: deacetylation to 5-methoxytryptamine by liver but not brain aryl acylamidase, *Journal of Neurochemistry* **32**: 1219–1226, 1979.
7. M.A. ROGAWSKI and G.K. AGHAJANIAN: Response of central monoaminergic neurons to lisuride: comparison with LSD, *Life Sciences* **24**: 1289–1298, 1979.
8. M.A. ROGAWSKI and G.K. AGHAJANIAN: Activation of lateral geniculate neurons by norepinephrine: mediation by an α -adrenergic receptor, *Brain Research* **182**: 345–359, 1980.

9. M.A. ROGAWSKI and G.K. AGHAJANIAN: Norepinephrine and serotonin: opposite effects on the activity of lateral geniculate neurons evoked by optic pathway stimulation, *Experimental Neurology* **69**: 678–694, 1980.
10. M.A. ROGAWSKI and G.K. AGHAJANIAN: Modulation of lateral geniculate neurone excitability by noradrenaline microiontophoresis or locus coeruleus stimulation, *Nature* **287**: 731–734, 1980.
11. M.A. ROGAWSKI and G.K. AGHAJANIAN: Serotonin autoreceptors on dorsal raphe neurons: structure-activity relationships of tryptamine analogs, *Journal of Neuroscience* **1**: 1148–1154, 1981.
12. M.A. ROGAWSKI and G.K. AGHAJANIAN: Activation of lateral geniculate neurons by locus coeruleus or dorsal noradrenergic bundle stimulation: selective blockade by α_1 adrenoceptor antagonist prazosin, *Brain Research* **250**: 31–39, 1982.
13. M.A. ROGAWSKI: Cholecystikinin octapeptide: effects on the excitability of cultured mouse spinal neurons, *Peptides* **3**: 545–551, 1982.
14. M.A. ROGAWSKI and J.L. BARKER: Effects of 4-aminopyridine on calcium action potentials and calcium current under voltage clamp in spinal neurons, *Brain Research* **280**: 180–185, 1983.
15. M. SEGAL, M.A. ROGAWSKI and J.L. BARKER: A transient potassium conductance regulates the excitability of cultured hippocampal and spinal neurons, *Journal of Neuroscience* **4**: 604–609, 1984.
16. M.A. ROGAWSKI: Non-random opening of voltage-dependent potassium channels in cultured hippocampal neurons, *Proceedings UCLA Symposium on Molecular & Cellular Biology (Neurobiology: Molecular Biological Approaches to Understanding Neuronal Function and Development)*, New York: Alan R. Liss, Inc., pp. 113–120, 1985.
17. M.A. ROGAWSKI, M.C. BEINFELD, S.E. HAYS, T. HÖKFELT and L.R. SKIRBOLL: Cholecystikinin and cultured spinal neurons: immunohistochemistry, receptor binding, physiological actions, *Annals of the New York Academy of Sciences* **448**: 403–412, 1985.
18. M.A. ROGAWSKI: Single voltage-dependent potassium channels in cultured hippocampal neurons, *Journal of Neurophysiology* **52**: 481–493, 1986.
19. R.W. KUNCL, G. DUNCAN, D. WATSON, K. ALDERSON, M.A. ROGAWSKI and M. PEPPER: Colchicine myopathy and neuropathy, *New England Journal of Medicine* **316**: 1562–1568, 1987.
20. P. MOLLARD, P. VACHER, J. GUERIN, M.A. ROGAWSKI and B. DUFY: Electrical properties of cultured human adrenocorticotropin-secreting adenoma cells: effects of high K^+ , corticotropin-releasing factor and angiotensin II, *Endocrinology* **121**: 395–405, 1987.
21. M.A. ROGAWSKI: Tetrahydroaminoacridine blocks voltage-dependent ion channels in hippocampal neurons, *European Journal of Pharmacology* **142**: 169–172, 1987.
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23. M.A. ROGAWSKI, K. INOUE, S. SUZUKI and J.L. BARKER: A slow calcium-dependent chloride conductance in clonal pituitary cells, *Journal of Neurophysiology* **59**: 1854–1870, 1988.
24. J.M.H. FFRENCH-MULLEN, M.A. ROGAWSKI and J.L. BARKER: Phencyclidine at low concentrations selectively blocks the sustained but not the transient voltage-dependent potassium current in cultured hippocampal neurons, *Neuroscience Letters* **88**: 325–330, 1988.

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28. M.A. ROGAWSKI: Aminopyridines enhance opening of calcium-activated potassium channels in GH₃ anterior pituitary cells, *Molecular Pharmacology* **35**: 458–468, 1989.
29. M.A. ROGAWSKI, A. THURKAUF, S. YAMAGUCHI, K.C. RICE, A.E. JACOBSON and M.V. MATTSON: Anticonvulsant activities of 1-phenylcyclohexylamine and its conformationally restricted analog 1,1-pentamethylenetetrahydroisoquinoline, *Journal of Pharmacology and Experimental Therapeutics* **249**: 708–712, 1989.
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37. X.-J. WANG, J. RINZEL and M.A. ROGAWSKI: A model of the T-type calcium current and the low-threshold spike in thalamic neurons, *Journal of Neurophysiology* **66**: 839–850, 1991.
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III. BOOK CHAPTERS

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VI. ABSTRACTS

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