

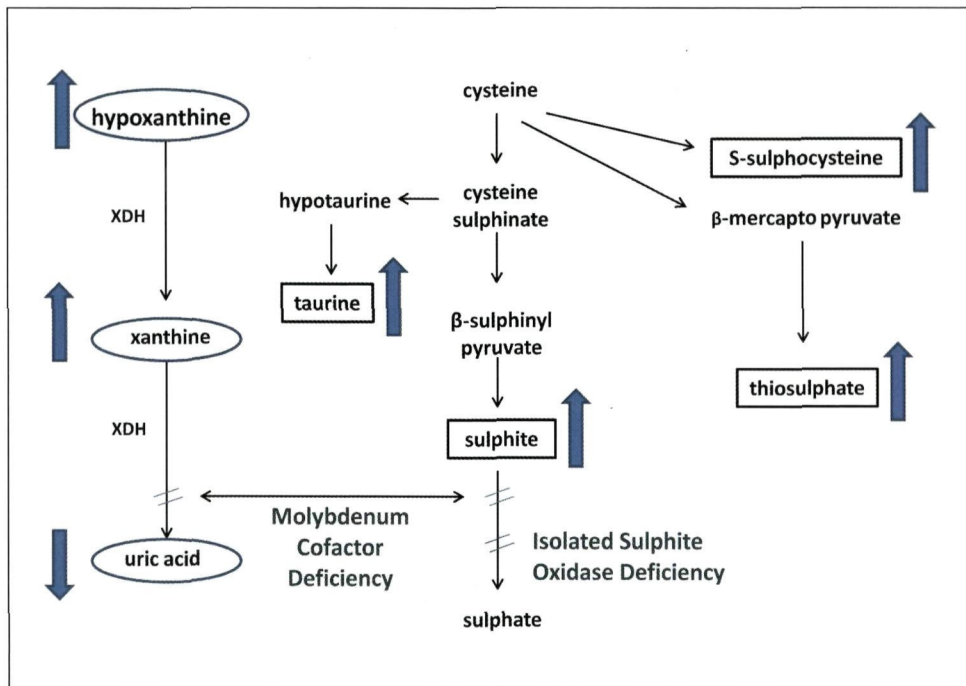


CANADIAN  
NEUROLOGICAL  
SCIENCES  
FEDERATION  
FÉDÉRATION  
DES SCIENCES  
NEUROLOGIQUES  
DU CANADA

# The journal

Canadian Journal of Neurological Sciences

Volume 40 Number 1 January 2013



## Preimplantation Genetic Diagnosis in Isolated Sulfite Oxidase Deficiency

Mustafa A. Salih, Thomas M. Bosley, Ibrahim A. Alorainy, Mohamed A. Sabry, Mohamed S. Rashed, Eiman A. Al-Yamani, Siham El-Akoum, Sarar H. Mohamed, Khaled K. Abu-Amero, Ali M. Hellani

*Brief Communications - Can J Neurol Sci. 2013; 40: 109-112*

**Figure:** ISOD and MOCOD biochemistry. Diagram outlining biochemical compounds related to sulfate metabolism. Isolated sulfite oxidase deficiency (ISOD) and Molybdenum Cofactor Deficiency (MOCOD) both interfere with the metabolism of sulfite to sulfate by sulfite oxidase. This results in elevated serum and urinary levels of sulfite, S-sulfocysteine, thiosulfate, and taurine as indicated. Molybdenum Cofactor Deficiency also interferes with the metabolism of xanthine to uric acid through xanthine dehydrogenase, resulting in increased levels of xanthine and hypoxanthine and decreased levels of uric acid in this disorder.

AN INTERNATIONAL JOURNAL PUBLISHED BY THE CANADIAN NEUROLOGICAL SCIENCES FEDERATION

The official Journal of: The Canadian Neurological Society, The Canadian Neurosurgical Society, The Canadian Society of Clinical Neurophysiologists, The Canadian Association of Child Neurology

## Early Committed Sponsors



The Canadian Neurological Sciences Federation is pleased to recognize those Sponsors who, as of November 1, 2012, have committed to supporting the 2013 Congress.

If you and your organization would like more information, or would like to discuss how you can partner with Canadian Neurological Sciences Federation and meaningfully connect with our Congress delegates, please call or email Jennifer Saunders, Congress and Sponsorship Coordinator at (403) 229-9544 or [jennifer-saunders@cnsfederation.org](mailto:jennifer-saunders@cnsfederation.org).

### PLATINUM



THE EPILEPSY COMPANY®

### GOLD

# GRIFOLS

### SILVER



### BRONZE



Merck Frosst Canada Ltd., Kirkland, Quebec

### SUPPORTER



Neurological Sciences  
Foundation of Canada



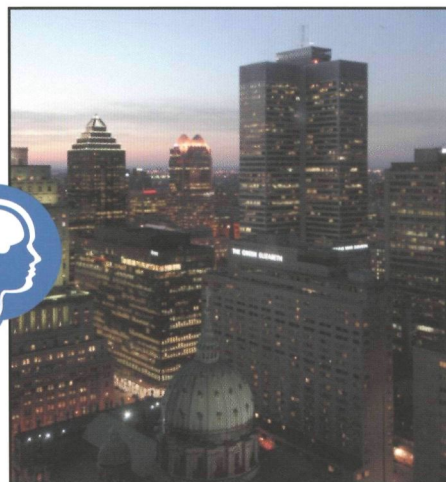
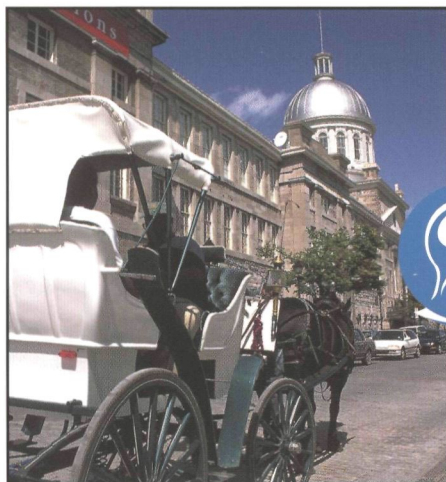
CNSF 2013 Congress | Fairmont Queen Elizabeth Hotel - Montreal, Quebec | June 12-14, Pre-Congress June 11th

The CNSF Congress is a uniquely Canadian Neurosciences meeting, planned by volunteer representatives from the four CNSF member societies.

We thank our Members and the greater neurological community for their ongoing attendance and support of the CNSF Congress.

We look forward to seeing you at the Fairmont Queen Elizabeth Hotel in Montreal, June 11th to 14th !

More information available at: <http://congress.cnsfederation.org/>



Canadian Neurological Society (CNS) | Canadian Association of Child Neurology (CACN) | Canadian Neurosurgical Society (CNSS) | Canadian Society of Clinical Neurophysiologists (CSCN)



## EDITORIALS

- 1** Non-Motor Symptoms and Parkinsonism  
*Oksana Suchowersky*

## REVIEW ARTICLES

- 3** Recurrent Encephalopathy: NAGS (N-Acetylglutamate Synthase) Deficiency in Adults  
*A. Cartagena, A.N. Prasad, C.A. Rupa, M. Strong, M. Tuchman, N. Ah Mew, C. Prasad*
- 10** Genetic Testing of Epileptic Encephalopathies of Infancy: An Approach  
*Suvasini Sharma, Asuri N. Prasad*

## ORIGINAL ARTICLES

- 17** Tissue Window in Stroke Thrombolysis Study (TWIST): A Safety Study  
*Michael D. Hill, Carol Kenney, Imanuel Dzialowski, Jean-Martin Boulanger, Andrew M. Demchuk, Philip A. Barber, Timothy W.J. Watson, Nicolas U. Weir, Alastair M. Buchan for the Calgary Stroke Program*
- 21** When Dementia is in the House: Needs Assessment Survey for Young Caregivers  
*Katherine R. Nichols, David Fam, Cheryl Cook, Michelle Pearce, Gail Elliot, Sylvia Baago, Kenneth Rockwood, Tiffany W. Chow*
- 29** Establishing a Canadian Registry of Patients with Amyotrophic Lateral Sclerosis  
*L. Korngut, A. Genge, M. Johnston, T. Benstead, P. Bourque, H. Briemberg, A. Casey, M. D'Amour, N. Dupré, D. Figlewicz, W. Hader, W. Johnston, S. Kalra, M. Melanson, C. O'Connell, G. Rouleau, C. Shoosmith, J. Wee, L. Zinman*
- 36** Nonmotor Symptoms in Drug-Induced Parkinsonism and Drug-Naïve Parkinson Disease  
*Ji Sun Kim, Jinyoung Youn, Hyeun Shin, Jin Whan Cho*

- 42** Prevalence of Lifestyle Risk Factors in Myotonic Dystrophy Type 1  
*Cynthia Gagnon, Maud-Christine Chouinard, Luc Laberge, Diane Brisson, Daniel Gaudet, Mélissa Lavoie, Nadine Leclerc, Jean Mathieu*
- 48** Depth Electrodes in Pediatric Epilepsy Surgery  
*Janani Kassiri, Jeff Pugh, Sharon Carline, Laura Jurasek, Thomas Snyder, Matt Wheatley, D. Barry Sinclair*
- 56** One Versus Double Burr Holes for Treating Chronic Subdural Hematoma Meta-Analysis  
*Sirajeddin Belkhair, Gwynedd Pickett*
- 61** Diversity of ARSACS Mutations in French-Canadians  
*I. Thiffault, M.J. Dicaire, M. Tetreault, K.N. Huang, J. Demers-Lamarche, G. Bernard, A. Duquette, R. Larivière, K. Gehring, A. Montpetit, P.S. McPherson, A. Richter, G.A. Mitchell, N. Dupré, C. Prévost, J.P. Bouchard, J. Mathieu, B. Brais*
- 67** Multiple Sclerosis Disease-Modifying Therapy Prescribing Patterns in Ontario  
*James J. Marriott, Muhammad Mamdani, Gustavo Saposnik, Tara Gomes, Michael Manno, Paul W. O'Connor*
- 73** Serum Urate and the Risk of Parkinson's Disease: Results From a Meta-Analysis  
*Chunhong Shen, Yi Guo, Wei Luo, Chen Lin, Meiping Ding*
- 80** Association of Serum Bilirubin with Stroke Severity and Clinical Outcomes  
*Tian Xu, Jintao Zhang, Tan Xu, Wenqing Liu, Yan Kong, Yonghong Zhang*

## CLINICAL NEUROPATHOLOGICAL CONFERENCE

- 85** 45-Year-Old Female with a 25 Year History of Seizures  
*Fahd M. AlSufiani, Jorge G. Burneo, Richard S. McLachlan, David M. Pelz, David A. Steven, Robert R. Hammond*

## NEUROIMAGING HIGHLIGHTS

- 89** Benign Post-Partum Reversible Restricted Diffusion Lesion of the Splenium  
*Rachel Curtis, Toni Winder, James Scott, Michael D. Hill*

## BRIEF COMMUNICATIONS

- 91** GABAergic Changes in <sup>11</sup>C-Flumazenil PET in the Drug-Naïve Stiff-Person Syndrome  
*Mi-Jung Kim, Young-Min Lim, Jae Seung Kim, Kwang Kuk Kim*
- 94** Social Support in Normal Pressure Hydrocephalus: Unmet Tangible Social Support  
*Alexander McGirr, Michael D. Cusimano*
- 97** Where are Cortical Lesions Responsible for Opercular Syndrome?  
*Jun-fa Wu, Yi Wu, Feng Zhang, Han-qiu Liu, Yong-shan Hu*
- 101** Hemiparkinsonism Due to Coiled Posterior Cerebral Artery Aneurysm  
*Hrishikesh Kumar, Shakya Bhattacharjee, Mona Tiwari, Sampat Mallick*
- 104** Primary Spinal Malignant Melanoma of Spinal Cord and Conus Medullaris  
*Gordan Grahovac, Tonko Marinovic, Damir Tomac, Smiljka Lambasa*
- 106** Wearable Video Display Allowing Freedom in Head Positioning for Brain Mapping  
*Aria Fallah, Lakshmikummar Venkat Raghavan, Taufik A. Valiante*

- 109** Preimplantation Genetic Diagnosis in Isolated Sulfite Oxidase Deficiency

*Mustafa A. Salih, Thomas M. Bosley, Ibrahim A. Alorainy, Mohamed A. Sabry, Mohamed S. Rashed, Eiman A. Al-Yamani, Siham El-Akoum, Sarar H. Mohamed, Khaled K. Abu-Amero, Ali M. Hellani*

## CANP MEETING ABSTRACTS

- 113** Canadian Association of Neuropathologists ABSTRACTS  
*Abstracts and unknown cases presented at the 52nd Annual Meeting in Mont-Tremblant, Quebec, Canada*

## LETTERS TO THE EDITOR

- 123** To the Editor - Screening for Adhesive Capsulitis in the Timely Diagnosis of Parkinson's Disease  
*Abdul Qayyum Rana, Maliha Khara, Mansoor Wasim, Tahreen Dogar, Bashir Alenazi, Nour Qa'aty*
- 125** To the Editor - Parinaud's Syndrome Due to Migraine  
*Odai K. Jumma, Hisham M. Hamdalla*
- 126** To the Editor - Delirium After Gabapentin Withdrawal. Case Report  
*Roberto Di Fabio, Cecilia D'Agostino, Giulio Baldi, Francesco Pierelli*
- 127** To the Editor - Ciprofloxacin Induced Acute Small Fibre Neuropathy. Case Report  
*Odai K. Jumma, Jeremy Dick, Andrew Marshall, Katy Mellor*
- 129** To the Editor - ATTR Amyloidosis Complicated by Phrenic Nerve Palsy  
*Teruhiko Sekiguchi, Hiroyuki Tomimitsu, Yoichiro Nishida, Takashi Irioka, Akira Inaba, Yoshinobu Hoshii*

131  
A-7, A-8  
A-8

BOOKS RECEIVED/BOOKS REVIEWED  
Information for Authors  
Advertisers Index

A-9, A-18  
IFC

Classified Ads  
CNSF Sponsors



REFER YOUR PATIENTS TO  
**LYRICA.CA**



\*Fictitious patient. May not be representative of all cases.

## FACED WITH PAIN<sup>1,2\*</sup>

IN HIS STRUGGLE WITH NEUROPATHIC PAIN

Pregabalin: first-line treatment for chronic  
**neuropathic pain<sup>4</sup>**

First treatment indicated in Canada for adults  
for the management of pain associated with  
**fibromyalgia<sup>3</sup>**

### Demonstrated powerful, rapid and sustained pain relief<sup>3,5</sup>

**In neuropathic pain (NeP):** Rapid and sustained pain relief (starting at week 2 for LYRICA 150-600 mg/day, n=141;  $p < 0.05$  vs. placebo, n=65) was demonstrated throughout a 12-week study in patients with DPN or PHN<sup>5</sup>.

### Demonstrated effective in relieving pain-related sleep difficulties<sup>3</sup>

**In NeP:** LYRICA reduced sleep disturbances across several studies in DPN and PHN, of 8-12 weeks duration<sup>3</sup>.

### Flexible dosing across all indications<sup>3†</sup>

LYRICA (pregabalin) is indicated for the management of neuropathic pain associated with diabetic peripheral neuropathy, postherpetic neuralgia and spinal cord injury in adults. LYRICA is indicated for the management of pain associated with fibromyalgia in adults. The efficacy of LYRICA in the management of pain associated with fibromyalgia for up to 6 months was demonstrated in a placebo-controlled trial in patients who had initially responded to LYRICA during a 6-week open-label phase.

LYRICA is contraindicated in patients who are hypersensitive to pregabalin or to any ingredient in the formulation or component of the container.

The most commonly observed adverse events ( $\geq 5\%$  and twice the rate as that seen with placebo) in the recommended dose range of 150 mg/day to 600 mg/day in PHN and DPN patients were: dizziness (9.0-37.0%), somnolence (6.1-24.7%), peripheral edema (6.1-16.2%), and dry mouth (1.9-14.9%) and were dose related; in SCI patients: somnolence (41.4%), dizziness (24.3%), asthenia (15.7%), dry mouth (15.7%), edema (12.9%), constipation (12.9%), amnesia (10.0%), myasthenia (8.6%), amblyopia (8.6%), and thinking abnormal (8.6%); in fibromyalgia patients: dizziness (37.5%), somnolence (18.6%), weight gain (10.6%), dry mouth (7.9%), blurred vision (6.7%), and

peripheral edema (6.1%). In LYRICA-treated fibromyalgia patients, the most commonly observed dose-related adverse events were: dizziness (22.7-46.5%), somnolence (12.9-20.7%), weight gain (7.6-13.7%), peripheral edema (5.3-10.8%). The most commonly observed adverse events in the PHN, DPN, SCI and fibromyalgia patients were usually mild to moderate in intensity. Discontinuation rates due to adverse events for LYRICA and placebo, respectively, were 9% and 4% in DPN, 14% and 7% in PHN, 21% and 13% in SCI, and 20% and 11% in fibromyalgia. There was a dose-dependent increase in rate of discontinuation due to adverse events in DPN, PHN and fibromyalgia patients.

There have been post-marketing reports of angioedema in patients, some without reported previous history/episodes, including life-threatening angioedema with respiratory compromise. Caution should be exercised in patients with previous history/episodes of angioedema and in patients who are taking other drugs associated with angioedema.

In clinical trials and in post-marketing experience, there have been reports of patients, with or without previous history, experiencing renal failure alone or in combination with other medications. Caution is advised when prescribing to the elderly or those with any degree of renal impairment.

There have been post-marketing reports of events related to reduced lower gastrointestinal tract function (e.g., intestinal obstruction, paralytic ileus, and constipation) in patients, some without reported previous history/episode(s), during initial/acute and chronic treatment with LYRICA, primarily in combination with other medications that have the potential to produce constipation. Some of these events were considered serious and required hospitalization. In a number of instances, patients were taking opioid analgesics including tramadol. Caution should be exercised when LYRICA and opioid analgesics are used in combination, and measures to prevent constipation may be considered, especially in female patients and elderly as they may be at increased risk of experiencing lower gastrointestinal-related events.

**Dosage reduction is required in patients with renal impairment (creatinine clearance <60 mL/min) and in some elderly patients as LYRICA is primarily eliminated by renal excretion.**

Please see Prescribing Information for complete Warnings and Precautions, Adverse Reactions, Dosage and Administration and patient selection criteria.

†Please consult Prescribing Information for complete Dosage and Administration instructions.



Working together for a healthier world™

©2012  
Pfizer Canada Inc.  
Kirkland, Quebec  
H9J 2M5

TM Pfizer Inc., used under license  
LYRICA © C.P. Pharmaceuticals International C.V.,  
owner/Pfizer Canada Inc., Licensee



**LYRICA**<sup>®</sup>  
PREGABALIN



See prescribing information and study parameters on page A-14, A-15





VIMPAT® (lacosamide) is indicated as adjunctive therapy in the management of partial-onset seizures in adult patients with epilepsy (≥18 years of age) who are not satisfactorily controlled with conventional therapy. The clinical experience with VIMPAT® in elderly patients with epilepsy (≥65 years of age) is limited. Caution should be exercised during dose titration and age-associated decreased renal clearance should be considered in elderly patients. The safety and efficacy of VIMPAT® in pediatric patients (<18 years of age) have not been established and its use in this patient population is not indicated.

VIMPAT® is contraindicated in patients who are hypersensitive to the active substance or to any of the excipients and in patients with a history of, or presence of, second- or third-degree atrioventricular (AV) block.

Second degree or higher AV block has been reported in post-marketing experience. Patients should be made aware of the symptoms of second-degree or higher AV block (e.g. slow or irregular pulse, feeling of lightheadedness and fainting), and told to contact their physician should any of these symptoms occur. VIMPAT® should be used with caution in patients with known conduction problems (e.g. marked first-degree AV block, sick sinus syndrome without pacemaker), or with a history of severe cardiac disease such as myocardial ischemia or heart failure. In such patients, obtaining an ECG before beginning VIMPAT®, and after VIMPAT® is titrated to steady-state, is recommended. Caution should especially be exerted when treating elderly patients as they may be at increased risk of cardiac disorder or when VIMPAT® is given with other drugs that prolong the

PR interval (e.g. carbamazepine, pregabalin, lamotrigine, beta-blockers, and class I antiarrhythmic drugs), as further PR prolongation is possible. In clinical trials of healthy subjects and patients with epilepsy, VIMPAT® treatment was associated with PR interval prolongation in a dose-dependent manner. VIMPAT® administration may predispose to atrial arrhythmias (atrial fibrillation or flutter), especially in patients with diabetic neuropathy and/or cardiovascular disease. Patients should be made aware of the symptoms of atrial fibrillation and flutter (e.g. palpitations, rapid or irregular pulse, shortness of breath) and told to contact their physician should any of these symptoms occur. Atrial fibrillation and flutter have been reported in open-label epilepsy trials and in postmarketing experience.

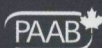
Multiorgan hypersensitivity reactions (also known as Drug Rash with Eosinophilia and Systemic Symptoms, or DRESS), Stevens-Johnson Syndrome (SJS) and Toxic Epidermal Necrolysis (TEN) have been reported with anticonvulsants. If any of these hypersensitivity reactions are suspected, VIMPAT® should be discontinued and alternative treatment started.

Treatment with VIMPAT® has been associated with dizziness and ataxia, which could increase the occurrence of accidental injury or falls. Accordingly, patients should be advised not to drive a car or to operate other complex machinery or perform hazardous tasks until they are familiar with the effects of VIMPAT® on their ability to perform such activities.

In controlled trials in patients with partial-onset seizures, VIMPAT® treatment was associated with vision-related adverse events such as blurred vision and diplopia. Patients should be informed



THE EPILEPSY COMPANY®



VIMPAT® is a registered trademark used under license from Harris FRC Corporation. VIMPAT logo™ is a trademark used under license from Harris FRC Corporation. UCB The Epilepsy Company® is a registered trademark of the UCB Group of Companies. © 2012, UCB Canada Inc. All rights reserved. VIM-12-173 Date of preparation: March 2012



# When seizure control is still an issue for your patient

## Bring VIMPAT® into the picture

### Efficacy in patients inadequately controlled on 1 to 3 AEDs\*†1

- ◆ Significant median **36-39% reduction in seizure frequency** per 28 days from baseline to maintenance phase\*1
  - ◆ VIMPAT® 400 mg/day vs. placebo: Ben-menachem, *et al.* (39% vs. 10%,  $p \leq 0.01$ ); Chung, *et al.* (37.3% vs. 20.8%,  $p \leq 0.01$ ); Halász, *et al.* (36.4% vs. 20.5%,  $p \leq 0.05$ )\*1

### Generally well tolerated when added to common concomitant therapy

- ◆ Some of the most frequently reported **adverse reactions** with VIMPAT® 400 mg/day were dizziness (30%), nausea (11%), and vision-related events, including diplopia (10%) and blurred vision (9%)

The recommended starting dose for VIMPAT® is 50 mg twice a day which should be increased to an initial therapeutic dose of 100 mg twice a day after one week. Depending on patient response and tolerability, the maintenance dose of VIMPAT® can be increased by 50 mg twice daily every week, to a **maximum recommended dose of 400 mg/day**.<sup>1</sup>

Please consult product monograph for complete dosing and administration instructions.

## POWER for added control.

that if visual disturbances occur, they should notify their physician promptly. If visual disturbance persists, further assessment, including dose reduction and possible discontinuation of VIMPAT®, should be considered.

More frequent assessments should be considered for patients with known vision-related issues or those who are already routinely monitored for ocular conditions.

Suicidal ideation and behaviour have been reported in patients treated with antiepileptic agents in several indications. All patients treated with antiepileptic drugs, irrespective of indication, should be monitored for signs of suicidal ideation and behaviour and appropriate treatment should be considered. Patients (and caregivers of patients) should be advised to seek medical advice should signs of suicidal ideation or behaviour emerge.

There are no studies with VIMPAT® in pregnant women. Since the potential risk for humans is unknown, VIMPAT® should not be used during pregnancy unless the benefit to the mother clearly outweighs the potential risk to the foetus. It is unknown whether VIMPAT® is excreted in human breast milk. Because many drugs are excreted into human milk, a decision should be made whether to discontinue nursing or to discontinue VIMPAT®, taking into account the importance of the drug to the mother.

As with all antiepileptic drugs, VIMPAT® should be withdrawn gradually (over a minimum of 1 week) to minimize the potential of increased seizure frequency.

In controlled clinical trials in patients with partial-onset seizures, some of the most frequently

reported adverse reactions with VIMPAT® treatment were dizziness (16% and 30% for 200 mg and 400 mg treatment groups, respectively, vs. 8% placebo), nausea (7% and 11% vs. 4%), and vision related events (diplopia (6% and 10% vs. 2%) and blurred vision (2% and 9% vs. 3%)). They were dose-related and usually mild to moderate in intensity. The adverse events most commonly leading to discontinuation were dizziness, coordination abnormal, vomiting, diplopia, nausea, vertigo, and vision blurred.

Please see the VIMPAT® Product Monograph for full prescribing information.

\* 3 randomized, double-blind, placebo-controlled, multicentre trials studying VIMPAT® (lacosamide) as adjunctive therapy in adult patients with POS with or without secondary generalization. In the studies, patients were to have been taking a stable dosage regimen of one to three AEDs, with or without vagal nerve stimulation in the 4 weeks before enrollment and during the baseline period. Following the 8-week baseline phase, subjects were randomized and up-titrated by initiating treatment at 100 mg/day, and increased in weekly increments of 100 mg/day to the target dose. The titration phase lasted 4-6 weeks. Patients then entered a 12-week maintenance phase period.<sup>2,3,4</sup>

† AED=anti-epileptic drug

References: 1. VIMPAT® Product Monograph, UCB Canada Inc., October 6, 2011. 2. Ben-Menachem E, Biton V, Jatuzis D, *et al.* Efficacy and safety of oral lacosamide as adjunctive therapy in adults with partial-onset seizures. *Epilepsia* 2007; 48(7):1308-1317. 3. Chung S, Sperling MR, Biton V *et al.* Lacosamide as adjunctive therapy for partial onset seizures: A randomized controlled trial. *Epilepsia* 2010; 51(6):958-967. 4. Halász P, Kalvainen R, Mazurkiewicz-Beldzinska M, *et al.* Adjunctive lacosamide for partial-onset seizures: Efficacy and safety results from a randomized controlled trial. *Epilepsia* 2009; 50(3):443-453.



POWER for Added Control



**Editor-in-Chief/Rédacteur en chef**

G. Bryan Young LONDON, ON

**Associate Editors/Rédacteurs associés**

J. Max Findlay EDMONTON, AB  
Mark Sadler HALIFAX, NS  
Mike Poulter LONDON, ON  
Serge Gauthier VERDUN, QC  
Robert Hammond LONDON, ON  
Mary Connolly VANCOUVER, BC

**Past Editors/Anciens rédacteurs en chef**

Douglas W. Zochodne CALGARY, AB  
James A. Sharpe TORONTO, ON  
Robert G. Lee CALGARY, AB  
Robert T. Ross WINNIPEG, MB  
(Emeritus Editor, Founding Editor)

**Editorial Board/Comité éditorial**

Jorge Burneo LONDON, ON  
Richard Desbiens QUEBEC CITY, QC  
David Fortin SHERBROOKE, QC  
Mark Hamilton CALGARY, AB  
Hans-Peter Hartung DUSSELDORF, GERMANY  
Michael Hill CALGARY, AB  
Alan C. Jackson WINNIPEG, MB  
Daniel Keene OTTAWA, ON  
James Perry TORONTO, ON  
Oksana Suchowersky CALGARY, AB  
Brian Toyota VANCOUVER, BC  
Brian Weinschenker ROCHESTER, MN, USA  
Samuel Wiebe CALGARY, AB  
Elaine Wirrell ROCHESTER, MN, USA

**SECTION EDITORS/CONSEIL DE RÉDACTION**

**Neuroimaging Highlight/Neuroimagerie**

David Pelz LONDON, ON

**Neuropathological Conference/Conférence  
sur la neuropathologie**

Robert Hammond LONDON, ON

**Book Review/Critiques de livres  
Reflections/Reflets**

Andrew Kirk SASKATOON, SK

**Critically Appraised Topic Summaries  
(CATS)**

Jorge Burneo LONDON, ON  
Mary Jenkins LONDON, ON

**Editorial Review Board/Comité de lecture**

Donald Brunet KINGSTON, ON  
Jodie Burton CALGARY, AB  
Lionel Carmant MONTREAL, QC  
Colin Chalk MONTREAL, QC  
K. Ming Chan EDMONTON, AB  
Robert Chen TORONTO, ON  
Joseph Dooley HALIFAX, NS  
Paolo Federico CALGARY, AB  
Daryl Fourney SASKATOON, SK  
Hannah Glass SAN FRANCISCO, CA, USA  
Alan Goodridge ST. JOHN'S, NL  
Ian Grant HALIFAX, NS  
Alan Guberman OTTAWA, ON  
John Hurlbert CALGARY, AB  
Manouchehr Javidan VANCOUVER, BC  
Patrick McDonald WINNIPEG, MB  
Martin McKeown VANCOUVER, BC  
Joseph Megyesi LONDON, ON  
Vivek Mehta EDMONTON, AB  
Steven Miller TORONTO, ON  
Neelan Pillay CALGARY, AB  
Christopher Power EDMONTON, AB  
Alex Rajput SASKATOON, SK  
Jean Raymond MONTREAL, QC  
Gary Redekop VANCOUVER, BC  
Harvey Sarnat CALGARY, AB  
John Stewart VANCOUVER, BC  
Jeanne Teitelbaum MONTREAL, QC  
Eve Tsai OTTAWA, ON  
Shannon Venance LONDON, ON  
Matt Wheatley EDMONTON, AB  
Jerome Yager EDMONTON, AB

**Journal Staff/Effectif du journal**

Dan Morin CALGARY, AB

**Chief Executive Officer**

Cindy Leschyshyn CALGARY, AB

**Editorial Coordinator**

Maggie McCallion CALGARY, AB

**Designer/Production Coordinator**

**Advertising representative/  
Représentant de publicité**

Dan Morin, Chief Executive Officer  
Tel (403) 229-9544 Fax (403) 229-1661  
E-mail: dan-morin@cnsfederation.org

**Printer/Imprimeur**

Unicom Graphics, 4501 Manitoba Road SE  
Calgary, Alberta T2G 4B9

**The official journal of: / La revue officielle de :**

**The Canadian Neurological Society  
La Société Canadienne de Neurologie**

**The Canadian Neurosurgical Society  
La Société Canadienne de Neurochirurgie**

**The Canadian Society of Clinical Neurophysiologists  
La Société Canadienne de Neurophysiologie Clinique**

**The Canadian Association of Child Neurology  
L'Association Canadienne de Neurologie Pédiatrique**

The permanent secretariat for the four societies and the Canadian Neurological Sciences Federation is at:  
Le secrétariat des quatre associations et de la Fédération des sciences neurologiques du Canada est situé en permanence à :

7015 Macleod Trail SW, Suite 709  
Calgary, Alberta, Canada T2H 2K6  
CNSF (403) 229-9544 / CJNS (403) 229-9575  
Fax (403) 229-1661

The Canadian Journal of Neurological Sciences is published bi-monthly. The annual subscription rate for Individuals (print and online) are: C\$178.00 (Canada), C\$208.00 (US), C\$292.00 (International). Subscription rates for Institutions (print and online) are C\$198.00 (Canada), C\$228.00 (US), C\$312.00 (International). "Online Only" - C\$160.00 (Individual), C\$180.00 (Institutional). See [www.cjns.org](http://www.cjns.org) for full details including taxes. Single copies C\$35.00 each plus C\$25.00 shipping and handling. E-mail: [journal@cjns.org](mailto:journal@cjns.org). COPYRIGHT © 2013 by THE CANADIAN JOURNAL OF NEUROLOGICAL SCIENCES INC. All rights reserved. No part of this journal may be reproduced in any form without the prior permission of The Canadian Journal of Neurological Sciences. Postage paid at Calgary, Alberta.

Le Journal Canadien des Sciences Neurologiques est publié tous les deux mois. Voici les prix d'abonnement pour les personnes (imprimé et en ligne) : 178,00 \$ CA (Canada), 208,00 \$ CA (É.-U.), 292,00 \$ CA (international). Voici les prix d'abonnement pour les institutions (imprimé et en ligne) : 198,00 \$ CA (Canada), 228,00 \$ CA (É.-U.), 312,00 \$ CA (international). « En ligne seulement » 160,00 \$ CA (personnes), 180,00 \$ CA (institutions). Visiter [www.cjns.org](http://www.cjns.org) pour tous les détails incluant les taxes. Exemplaires uniques : 35,00 \$ CA l'unité, plus 25,00 \$ CA en frais de port et de manutention. Courriel : [journal@cjns.org](mailto:journal@cjns.org). COPYRIGHT © 2013 du THE CANADIAN JOURNAL OF NEUROLOGICAL SCIENCES INC. Tous droits réservés. Aucune partie de ce journal ne peut être reproduite sous quelque forme que ce soit sans la permission préalable du Journal Canadien des Sciences Neurologiques. Frais de port payés à Calgary, en Alberta.

This journal is indexed by / Cette revue est indexée par :  
Adis International, ArticleFirst, BIOBASE, BioAb, BioSci, BIOSIS Previews, Centre National de la Recherche Scientifique, CSA, CurAb, CurCont, De Gruyter Saur, E-psyche, EBSCO, Elsevier, EMBASE, FRANCIS, IBZ, Internationale Bibliographie der Rezensionen Geistes-und Sozialwissenschaftlicher Literatur, MEDLINE, MetaPress, National Library of Medicine, OCLC, PE&ON, Personal Alert, PsycFIRST, PsycINFO, PubMed, Reac, RefZh, SCI, SCOPUS, Thomson Reuters, TOCpremier, VINITI RAN, Web of Science.

ISSN 0317 - 1671