

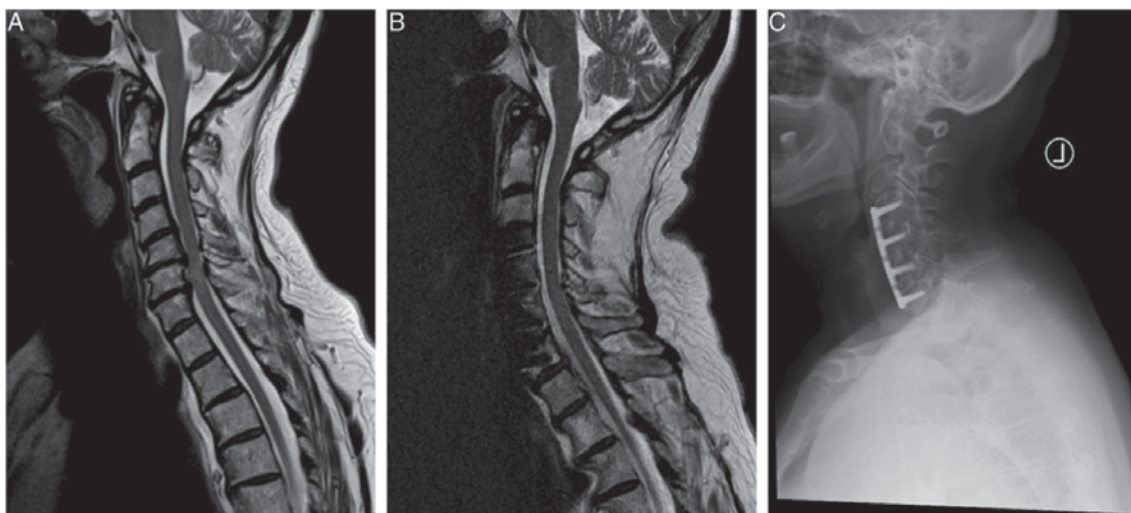


Canadian Journal of  
Neurological Sciences



Journal Canadien des  
Sciences Neurologiques

Volume 49    Number 6    November 2022



The official Journal of  
**The Canadian Neurological Sciences Federation:**

Canadian Neurological Society  
Canadian Neurosurgical Society  
Canadian Society of Clinical Neurophysiologists  
Canadian Association of Child Neurology  
Canadian Society of Neuroradiology  
Canadian Stroke Consortium



**CAMBRIDGE**  
UNIVERSITY PRESS



# Kesimpta<sup>®</sup> ofatumumab

## POWER TO TREAT ACTIVE RRMS

defined by clinical and imaging features<sup>1</sup>

KESIMPTA<sup>®</sup> (ofatumumab injection) is indicated for the treatment of adult patients with relapsing remitting multiple sclerosis (RRMS) with active disease defined by clinical and imaging features.

**CHOOSE KESIMPTA<sup>®</sup> FOR YOUR  
ADULT PATIENTS WITH ACTIVE RRMS.**

## FLEXIBILITY OF SELF-ADMINISTERED INJECTIONS<sup>1</sup>

- The first injection should be performed under the guidance of an experienced health professional.
- Self-administered subcutaneous injections for trained patients\*
- The initial dose is 20 mg SC at weeks 0, 1 and 2, with subsequent monthly dosing of 20 mg SC at week 4.

**Consult the KESIMPTA<sup>®</sup> Product Monograph for complete dosing considerations, including assessments before every injection and premedication.**



Novartis Pharmaceuticals Canada Inc.  
385 Bouchard Blvd.  
Dorval (Quebec) H9S 1A9  
www.novartis.ca  
Tel: 514-631-6775 Fax: 514-631-1867  
Medical Information Tel: 1-800-363-8883

© 2022 Novartis Pharmaceuticals Canada Inc.  
All rights reserved.  
® KESIMPTA is a registered trademark.  
March/2022 - 106672-1E

Please consult the Product Monograph at [www.novartis.ca/kesimptamonograph](http://www.novartis.ca/kesimptamonograph) for important information related to contraindications, warnings, precautions, adverse reactions, drug interactions, dosing, and conditions of clinical use which have not been discussed in this piece. The Product Monograph is also available by calling 1-800-363-8883 or by email at [medinfo.canada@novartis.com](mailto:medinfo.canada@novartis.com).

Reference: 1. KESIMPTA<sup>®</sup> product monograph. Novartis. April 22, 2021.

SC = subcutaneous

\* Administration should be performed by an individual who has been trained to administer the product.





REVIEW ARTICLES

- 729** Degenerative Cervical Myelopathy: Towards a Personalized Approach  
*Nader Hejrati, Ali Moghaddamjou, Nandan Marathe, Michael G. Fehlings*
- 741** Neuroprotection in Acute Ischemic Stroke: A Brief Review  
*Alastair M. Buchan, David M. Pelz*
- 746** Is General Anesthesia for Endovascular Thrombectomy Helpful or Harmful?  
*E. L. Harrison, Michael D. Hill*

COMMENTARY

- 761** The N<sup>th</sup> Wave of COVID-19: Will It Be Alzheimer's?  
*Donald F. Weaver*
- 764** Trickle-Down Therapeutics: Entitlement and Deprivation in the Treatment of Alzheimer's Disease  
*Donald F. Weaver*

ORIGINAL ARTICLES

- 767** Determinants of Leptomeningeal Collateral Status Variability in Ischemic Stroke Patients  
*Alexander D. Rebchuk, Thalia S. Field, Michael D. Hill, Mayank Goyal, Andrew Demchuk, Jessalyn K. Holodinsky, Enrico Fainardi, Jai Shankar, Mohamed Najm, Marta Rubiera, Alexander V. Khaw, Wu Qiu, Bijoy K. Menon*
- 774** The Clinical and Cognitive Spectrum of Artery of Percheron Infarction: 1-Year Follow-Up  
*Fatma Ece Çetin, Emre Kumral, Birgül Dere*
- 781** Cannabinoid Use in a Tertiary Headache Clinic: A Cross-Sectional Survey  
*Alexander N. Melnyshyn, Farnaz Amoozegar*

NEUROIMAGING HIGHLIGHTS

- 791** Posterior Reversible Encephalopathy Syndrome in Acute COVID-19 Pneumonia  
*Laura Donaldson, Edward Margolin*
- 793** Reversible Cerebral Vasoconstriction with Quadrigeminal Cistern Subarachnoid Hemorrhage  
*Emily Mostofi, Kirsten Sjonnesen, Michael T. Kryshchalskyj, Garnette R. Sutherland, Carlos R. Camara-Lemarroy*
- 795** Higher Visual Function Deficits Post Stroke  
*Laura Donaldson, Edward Margolin*
- 797** Suprasellar Mature Teratoma/Dermoid Cyst with the Poké Ball Sign  
*Artur Ramos Sarmet dos Santos, Danilo Alves de Araujo, Ananda Altoé, Diogo Goulart Corrêa*
- 799** Radio-Pathologic Correlation of the "Pig's Snout" Sign in Osmotic Demyelination Syndrome  
*Adrian Budhram, Lee-Cyn Ang, Derek B. Debicki*
- 801** Traumatic Intracranial Hypotension Due to a Calcified Thoracic Disc Herniation  
*Sami Obaid, Bilal Tarabay, Daniel Shédid, Sung-Joo Yuh*

BRIEF COMMUNICATIONS

- 804** Spectrum of Movement Disorders of Late-Onset Niemann-Pick Disease Type C  
*Jasmine Parihar, Deepa Dash, Bhawana Aggarwal, Madhulika Kabra, Roopa Rajan, Deepti Vibha, Rajesh Kumar Singh, Rohit Bhatia, Neerja Gupta, Manjari Tripathi*
- 809** Clinical Significance of Applause Sign in Patients with Progressive Supranuclear Palsy  
*Koustav Chatterjee, Supriyo Choudhury, Santosh Trivedi, Purba Basu, Hrishikesh Kumar*



- 813** Validity of ICD-10 Codes for Cerebral Venous Thrombosis Depends on Clinical Context

*Lily W. Zhou, Amy Y. X. Yu, William Hall, Michael D. Hill, Thalia S. Field*

- 817** Is Virtual Team-Based Learning Feasible and Effective in Teaching Neurolocalisation?

*Kim Yao Ong, Adelia Shin Ping Gan, Preman Rajalingam, Nigel C.K. Tan, Kevin Tan*

#### OBITUARY

- 820** Warren Thomas Blume, OC, MD, FRCPC

*G. Bryan Young, Richard S. McLachlan*

#### LETTERS TO THE EDITOR

- 821** Ontario Newborn Screening for Spinal Muscular Atrophy: The First Year

*Kristin D. Kernohan, Hugh J. McMillan, Ed Yeh, Melanie Lacaria, Michael Kowalski, Craig Campbell, James J. Dowling, Hernan Gonorazky, Janet Marcadier, Mark A. Tarnopolsky, Jiri Vajsar, Alex Mackenzie, Pranesh Chakraborty*

- 824** Ataxia-Myoclonus Syndrome in Patients with SARS-CoV-2 Infection

*Anna Francesca Guerra, Ilaria Martinelli, Vittorio Rispoli, Matteo Marcacci, Francesco Cavallieri, Silvia Nizzoli, Franco Valzania, Paolo Ventura, Stefano Meletti, Antonello Pietrangelo*

- 826** A Story That Begins Too Soon: A Girl with Untreated Anti-N-Methyl-D-Aspartate Receptor Encephalitis for 14 Years

*Sean Leonard, Adrian Budhram, Michael Shevell, Maryam Nabavi Nouri*

- 828** New Daily Persistent Headache Responsive to Peripheral Nerve Blocks

*Tommy Lik Hang Chan*

#### ERRATUM

- 831** Extended Window Thrombolysis in Acute Spinal Cord Ischemia – ERRATUM

*Ahmad Almutlaq, Abdulrahman Alkhalifa, Olena Bereznyakova*

#### COVER IMAGE

Degenerative Cervical Myelopathy: Towards a Personalized Approach

*Nader Hejrati, Ali Moghaddamjou, Nandan Marathe, Michael G. Fehlings*

See pages 737



# Canadian Journal of Neurological Sciences



## Journal Canadien des Sciences Neurologiques

Volume 49 / Number 6 / November 2022

### *Editor-in-Chief/Rédacteur en chef*

Robert Chen TORONTO, ON

### *Associate Editors/Rédacteurs associés*

Robert Hammond LONDON, ON  
Philippe Hout MONTREAL, QC  
Mahendranath Moharir TORONTO, ON  
Tejas Sankar EDMONTON, AB  
Manas Sharma LONDON, ON  
Richard Wennberg TORONTO, ON  
Amy Yu TORONTO, ON

### *Past Editors/Anciens rédacteurs en chef*

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

### *Social Media Editor*

Mark A. MacLean, HALIFAX, NS

### *Editorial Board/Comité éditorial*

Jorge Burneo, LONDON, ON  
Jodie Burton, CALGARY, AB  
Colin Chalk, MONTREAL, QC  
K. Ming Chan, EDMONTON, AB  
Thalia Field, VANCOUVER, BC  
Alan Goodridge, ST. JOHN'S, NL  
Mark Hamilton, CALGARY, AB  
Michael Hill, CALGARY, AB  
Alan C. Jackson, WINNIPEG, MB  
Draga Jichici, HAMILTON, ON  
Suneil Kalia, TORONTO, ON  
Daniel Keene, OTTOWA, ON  
Julia Keith, TORONTO, ON  
Nir Lipsman, TORONTO, ON  
Stephen Lownie, LONDON, ON  
Jian-Qiang Lu, HAMILTON, ON  
Patrick McDonald, VANCOUVER, BC  
Joseph Megyesi, LONDON, ON  
Tiago Mestre, OTTOWA, ON

Sarah Morrow, LONDON, ON  
Michael Nicolle, LONDON, ON  
Ian Parney, ROCHESTER, MN  
Narayan Prasad, LONDON, ON  
Alex Rajput, SASKATOON, SK  
Kesh Reddy, HAMILTON, ON  
Larry Robinson, TORONTO, ON  
Ramesh Sahpaul, NORTH VANCOUVER, BC  
Dipanka Sarma, TORONTO, ON  
Jai Shankar, WINNIPEG, MB  
Madeleine Sharpe, MONTREAL, QC  
Ashkan Shoamanesh, HAMILTON, ON  
Sean Symons, TORONTO, ON  
Brian Toyota, VANCOUVER, BC  
Brian Weinshenker, ROCHESTER, MN  
Sam Wiebe, CALGARY, AB  
Jefferson Wilson, TORONTO, ON  
Eugene Yu, TORONTO, ON

### *Journal Staff/Effectif du Journal*

Dan Morin CALGARY, AB  
*Chief Executive Officer*  
Donna Irvin CALGARY, AB  
*CNSF Membership Services /  
Communications Officer*  
Nicole Rozak CALGARY, AB  
*CNSF Administration*

### *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 Canadian Society of Neuroradiology  
La Société Canadienne de Neuroradiologie

Canadian Stroke Consortium  
Consortium Neurovasculaire Canadien

The permanent secretariat for the six societies and the  
Canadian Neurological Sciences Federation is at:

Le secrétariat des six associations et de la Fédération des sciences neu-  
rologiques du Canada est situé en permanence à :

143N – 8500 Macleod Trail SE  
Calgary, Alberta T2H 2N1 Canada  
CNSF (403) 229-9544  
Fax (403) 229-1661

The Canadian Journal of Neurological Sciences is published bi-monthly.  
The annual subscription rate for Individuals (electronic) is £157/US\$258. The  
annual subscription rate for Institutions (electronic) is £207/US\$344. See  
<[cambridge.org/cjn](http://cambridge.org/cjn)> for full details including taxes; e-mail: [subscriptions\\_newyork@cambridge.org](mailto:subscriptions_newyork@cambridge.org). Send address changes to Journals Fulfillment  
Department, Cambridge University Press, One Liberty Plaza, New York,  
NY 10006 USA; [usmemberservices@cambridge.org](mailto:usmemberservices@cambridge.org). The Canadian Journal of  
Neurological Sciences is included in the Cambridge Core service, which can be  
accessed at [cambridge.org/cjn](http://cambridge.org/cjn). For information on other Cambridge titles,  
visit [www.cambridge.org](http://www.cambridge.org). For advertising rates contact M. J. Mrvica Associates,  
2 West Taunton Avenue, Berlin, NJ 08009; Phone: 856-768-9360;  
Fax: 856-753-0064; Email: [mjmrivica@mrivica.com](mailto:mjmrivica@mrivica.com).

Le Journal Canadien des Sciences Neurologiques est publié tous les deux mois.  
Le prix d'abonnement annuel pour les individus (électronique) est 157\$/258US\$.  
Le prix d'abonnement annuel pour les établissements (électronique) est  
207\$/344US\$. Veuillez consulter <[cambridge.org/cjn](http://cambridge.org/cjn)> pour tous les détails,  
y compris les taxes; email: [subscriptions\\_newyork@cambridge.org](mailto:subscriptions_newyork@cambridge.org). Envoyer  
les changements d'adresses aux Journals Fulfillment Department, Cambridge  
University Press, One Liberty Plaza, New York, NY 10006 USA;  
[usmemberservices@cambridge.org](mailto:usmemberservices@cambridge.org). Le Journal canadien des sciences  
neurologiques est inclus dans le service Cambridge Journals Online, accessible  
à [cambridge.org/cjn](http://cambridge.org/cjn). Pour plus d'informations sur les titres disponible chez  
Cambridge, veuillez consulter [www.cambridge.org](http://www.cambridge.org). Pour les tarifs de publicité,  
contacter M. J. Mrvica Associates, 2 West Taunton Avenue, Berlin, NJ 08009;  
Téléphone: (1)856-768-9360; Email: [mjmrivica@mrivica.com](mailto:mjmrivica@mrivica.com).

This journal is indexed by / Cette revue est indexée par:  
*Adis International, ArticleFirst, BIOBASE, BioLab, BioSci, BIOSIS Previews, Centre  
National de la Recherche Scientifique, CSA, CtrAb, CtrCont, 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, TOCpreme, VINITI RAN, Web of Science.*

ISSN: 0317-1671  
EISSN: 2057-0155

COPYRIGHT © 2022 by CANADIAN NEUROLOGICAL SCIENCES  
FEDERATION All rights reserved. No part of this publication may be reproduced,  
in any form or by any means, electronic, photocopying, or otherwise, without  
permission in writing from Cambridge University Press. Policies, request forms and  
contacts are available at: <http://www.cambridge.org/about-us/rights-permissions>.  
Permission to copy (for users in the U.S.A.) is available from Copyright Clearance  
Center: <http://www.copyright.com>, email: [info@copyright.com](mailto:info@copyright.com).

COPYRIGHT © 2022 du CANADIAN NEUROLOGICAL SCIENCES  
FEDERATION Tous droits réservés.  
Aucune partie de cette publication ne peut être reproduite, sous quelque forme ou  
par quelque procédé que ce soit, électronique ou autre, y compris la photocopie,  
sans l'accord écrit de Cambridge University Press. Les politiques, les formulaires de  
demande et les contacts sont disponibles à: <http://www.cambridge.org/about-us/rights-permissions>. La permission de copier (pour les utilisateurs aux États-  
Unis) est disponible auprès Copyright Clearance Center: <http://www.copyright.com>,  
email: [info@copyright.com](mailto:info@copyright.com).