

Minerva Access is the Institutional Repository of The University of Melbourne

Author/s:

Fisher, RS;Cross, H;D'Souza, C;French, JA;Haut, S;Higurashi, N;Hirsch, E;Jansen, FE;Peltola, J;Moshe, SL;Perucca, E;Lagae, L;Roulet-Perez, E;Schulze-Bonhage, A;Scheffer, IE;Somerville, E;Sperling, MR;Wiebe, S;Yacubian, EM;Zuberi, S

Title:

Classification as autonomic versus sensory seizures

Date:

2019-09-01

Citation:

Fisher, R. S., Cross, H., D'Souza, C., French, J. A., Haut, S., Higurashi, N., Hirsch, E., Jansen, F. E., Peltola, J., Moshe, S. L., Perucca, E., Lagae, L., Roulet-Perez, E., Schulze-Bonhage, A., Scheffer, I. E., Somerville, E., Sperling, M. R., Wiebe, S., Yacubian, E. M. & Zuberi, S. (2019). Classification as autonomic versus sensory seizures. *Epilepsia*, 60 (9), pp.2003-2005.
<https://doi.org/10.1111/epi.16308>.

Persistent Link:

<https://hdl.handle.net/11343/286213>

DR. ROBERT S. FISHER (Orcid ID : 0000-0003-0287-613X)

DR. JACQUELINE FRENCH (Orcid ID : 0000-0003-2242-8027)

PROF. EMILIO PERUCCA (Orcid ID : 0000-0001-8703-223X)

PROF. ERNEST R SOMERVILLE (Orcid ID : 0000-0001-8789-1122)

DR. SAMUEL WIEBE (Orcid ID : 0000-0002-1061-9099)

Article type : Letter

Classification as autonomic versus sensory seizures

Robert S. Fisher¹ | Helen Cross² | Carol D'Souza³ | Jacqueline A. French⁴ | Sheryl Haut⁵ |

Norimichi Higurashi⁶ | Edouard Hirsch⁷ | Floor E. Jansen⁸ | Jukka Peltola^{9,10} |

Solomon L. Moshe¹¹ | Emilio Perucca¹² | Lieven Lagae¹³ | Eliane Roulet-Perez¹⁴ |

Andreas Schulze-Bonhage¹⁵ | Ingrid E. Scheffer¹⁶ | Ernest Somerville¹⁷ |

Michael R. Sperling¹⁸ | Samuel Wiebe¹⁹ | Elza Marcia Yacubian²⁰ | Sameer Zuberi^{21,22}

¹ Stanford Department of Neurology and Neurological Sciences, Stanford University, Stanford, California

² University College London Institute of Child Health and Great Ormond Street Hospital for Children, London, UK

³ Bombay Epilepsy Society, Mumbai, India

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/EPI.16308](https://doi.org/10.1111/EPI.16308)

This article is protected by copyright. All rights reserved

4 Department of Neurology, New York University Langone School of Medicine, New York, New York

5 Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, New York

6 Department of Pediatrics, Jikei University School of Medicine, Tokyo, Japan

7 Unite Francis Rohmer, Strasbourg, France

8 Department of Pediatric Neurology, University Medical Center Utrecht Brain Center, Utrecht, the Netherlands

9 Faculty of Medicine and Health Technology, Tampere University, Tampere, Finland

10 Department of Neurology, Tampere University Hospital, Tampere, Finland

11 Saul R. Korey Department of Neurology, Department of Pediatrics, and Dominick P. Purpura, Department Neuroscience, Montefiore Medical Center, Bronx, New York

12 Department of Internal Medicine and Therapeutics, University of Pavia and IRCCS Mondino Foundation, Pavia, Italy

13 Pediatric Neurology, University Hospitals KU Leuven, Leuven, Belgium

14 University of Lausanne and Pediatric Neurology and Neurorehabilitation Unit, University Hospital, Lausanne, Switzerland

15 Epilepsy Center, University Medical Center Freiburg, Freiburg, Germany

16 Florey Institute and University of Melbourne, Austin Health and Royal Children's Hospital, Melbourne, Victoria, Australia

17 Prince of Wales Clinical School, Faculty of Medicine, University of New South Wales, Sydney, New South Wales, Australia

18 Jefferson Comprehensive Epilepsy Center, Department of Neurology, Thomas Jefferson University, Philadelphia, Pennsylvania

19 Department of Clinical Neurosciences, University of Calgary, Calgary, Alberta, Canada

20 Department of Neurology and Neurosurgery, Epilepsy Research and Treatment Unit, UNIFESP, Sao Paulo, Brasil

21 Pediatric Neurosciences Research Group, Royal Hospital for Children, Glasgow, UK

22 College of Medical, Veterinary, and Life Sciences, University of Glasgow, Glasgow, UK

Robert S. Fisher <https://orcid.org/0000-0003-0287-613X>

Ernest Somerville <https://orcid.org/0000-0001-8789-1122>

Ingrid Scheffer <https://orcid.org/0000-0002-2311-2174>

Helen Cross <https://orcid.org/0000-0001-7345-4829>

Correspondence

Robert S. Fisher, Stanford Department of Neurology and Neurological Sciences, Stanford University Medical Center, 213 Quarry Road, Room 4865, Palo Alto, CA 94304-5979.
Email: robert.fisher@stanford.edu

Funding information

NIH, Grant/Award Number: U54 NS100064 and NS43209; US Department of Defense, Grant/Award Number: W81XWH-13-1-0180; Heffer Family; Segal Family Foundations; Abbe Goldstein/Joshua Lurie and Laurie Marsh/Dan Levitz families

CONFLICT OF INTEREST

R.S.F. holds stock or options in Zeto, Cerebral Therapeutics, Avails Medical, and Smart-Monitor and consults for Medtronic. J.F. has received New York University (NYU) salary support from the Epilepsy Foundation; has received compensation for consulting work and/or attending scientific advisory boards on behalf of the Epilepsy Study Consortium for Acadia, Adamas, Addex, Aeonian, Anavex, Axcella Health, Axovant, Biogen, BioMotiv/Koutif, Blackfynn, Bloom Science, BridgeValley, Cavion, Cerebral Therapeutics, Cerevel, Crossject, CuroNZ, Eisai, Empatica, Engage Therapeutics, Epitel, GW Pharma, Idorsia, Impax, Ionis, J&J Pharmaceuticals, Marinus, Neurelis, Novartis, Otsuka Pharmaceutical Development, Ovid Therapeutics, Pfizer, Pfizer-Neusentis, Praxis, Redpin Therapeutics, Sage, Sancillio, Shire, SK Life Sciences, Springworks, Stoke, Sunovion, Supernus, Takeda, UCB, Ultragenyx, Vyera, West Therapeutic Development, Xenon Pharmaceuticals, Xeris, Zogenix, and Zynerva; has received research grants from Biogen, Cavion, Eisai, Engage, GW Pharma, Lundbeck, Neurelis, Ovid, SK Life Sciences, Sunovion, UCB, Zogenix, the Epilepsy Research Foundation, the Epilepsy Study Consortium, and the National Institute of Neurological Disorders and Stroke; is on the editorial boards of *Lancet Neurology* and *Neurology Today*; is scientific officer for the Epilepsy Foundation, for which NYU receives salary support; and has received travel reimbursement related to research, advisory meetings, or presentation of results at scientific meetings from the Epilepsy Study Consortium, the Epilepsy Foundation, Adamas, Axovant, Biogen, Blackfynn, Crossject, CuroNz, Engage, Idorsia, Neurelis, Novartis, Otsuka, Ovid, Pfizer, Redpin, Sage, SK Life Science, Takeda, and UCB. L.L. has received speaker honoraria from and is participating on advisory boards for Zogenix, Livanova, UCB, Eisai, Novartis, NEL, and Epihunter. S.L.M. is the Charles Frost Chair in Neurosurgery and Neurology; is partially funded by grants from the National Institutes of Health (U54 NS100064 and NS43209), US Department of Defense (W81XWH-13-1-0180), Heffer Family and Segal Family Foundations, and Abbe Goldstein/Joshua Lurie and Laurie Marsh/Dan Levitz families; is serving as Associate Editor of *Neurobiology of Disease*; is on the editorial boards of *Brain and Development*, *Pediatric Neurology*, and *Physiological Research*; receives from Elsevier an annual compensation for his work as Associate Editor of *Neurobiology of Disease* and royalties from two books he coedited; has received consultancy fees from Mallinckrodt and UCB; and has no conflicts of interest in regard to this article. J.P. has participated in clinical trials for Eisai, UCB, and Bial; has received research grants from Eisai, Medtronic, UCB, and Cyberonics; has received speaker honoraria from Cyberonics, Eisai, Medtronic, Orion Pharma, and UCB; has received support for travel congresses from Cyberonics, Eisai, Medtronic, and UCB; and has participated on advisory boards for Cyberonics, Eisai, Medtronic, UCB, and Pfizer. E.P. has received speaker and/consultancy fees from Biogen, Eisai, GW Pharma, Sanofi, Takeda, and UCB. I.E.S. has

served on scientific advisory boards for UCB, Eisai, GlaxoSmithKline, BioMarin, Nutricia, and Xenon Pharmaceuticals; has served on editorial boards for *Annals of Neurology*, *Neurology*, and *Epileptic Disorders*; may accrue future revenue on pending patent WO61/010176 (filed: 2008; Therapeutic Compound); has received speaker honoraria from GlaxoSmithKline, Athena Diagnostics, UCB, BioMarin, and Eisai; has received funding for travel from Athena Diagnostics, UCB, Biocodex, GlaxoSmithKline, Biomarin, and Eisai; and has received research support from the National Health and Medical Research Council of Australia, National Institutes of Health, Australian Research Council, Health Research Council of New Zealand, CURE, and March of Dimes. E.S. has no disclosures relevant to this publication but has performed clinical trials for, consulted to, received speaker fees from, and/or received travel support from Eisai, UCB Pharma, Zynerva, SK Life Sciences, Sci-Gen, Marinus, Upsher-Smith, Bial, Novartis, the Epilepsy Study Consortium, the New South Wales Ombudsman, and the National Transport Commission of Australia. M.R.S. has consulted for Medtronic, Eisai, and NeurologyLive and has research contracts with SK Life Science, UCB Pharma, Eisai, Neurelis, Medtronic, Takeda, Cavion, and Engage. S.M.W. has received unrestricted educational grants from UCB Pharma and Eisai. E.M.Y. has received speaker fees from Abbott and UCB. None of the other authors has any conflict of interest to disclose.

We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

Common symptoms of focal seizures include hot or cold skin sensations or a “rising sense” through the body. Both of these are sometimes, but not always, mediated by the autonomic nervous system ¹. The 2017 ILAE Classification of seizures ^{2,3} does not clarify whether these sensations indicate a focal autonomic or focal sensory seizure. Therefore, the ILAE task force on classification of seizures has issued the following clarification.

Some sensations, particularly a rising sensation or diffuse hot-cold sensations, may be classified either as autonomic or sensory. These symptoms often are associated with other autonomic symptoms or signs, such as nausea, vomiting, flushing, piloerection or palpitations, marking them clearly as autonomic. In the absence of accompanying autonomic symptoms, it is

acceptable to classify the seizure as either focal autonomic or focal sensory, depending upon the clinical context.

1. Foldvary-Schaefer N, Unnwongse K. Localizing and lateralizing features of auras and seizures. *Epilepsy Behav* 2011;20:160-166.
2. Fisher RS, Cross JH, French JA, et al. Operational classification of seizure types by the International League Against Epilepsy: Position Paper of the ILAE Commission for Classification and Terminology. *Epilepsia* 2017;58:522-530.
3. Fisher RS, Cross JH, D'Souza C, et al. Instruction manual for the ILAE 2017 operational classification of seizure types. *Epilepsia* 2017;58:531-542.

robert.fisher@stanford.edu; h.cross@ucl.ac.uk; carold_souza@hotmail.com;
Jacqueline.french@nyumc.org; shaut@montefiore.org ; higijh.n@gmail.com; edouard.hirsch@chru-strasbourg.fr; F.E.Jansen@umcutrecht.nl; jukka.peltola@pshp.fi; solomon.moshe@einstein.yu.edu;
emilio.perucca@unipv.it; lieven.lagae@uzleuven.be; Eliane.Roulet-Perez@chuv.ch; andreas.schulze-bonhage@uniklinik-freiburg.de; scheffer@unimelb.edu.au;
e.somerville@unsw.edu.au; Michael.Sperling@jefferson.edu; swiebe@ucalgary.ca;
yacubian@terra.com.br; sameer.zuberi@nhs.net