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Classification as autonomic versus sensory seizures

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CONFLICT OF INTEREST

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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 system¹. 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.

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