

# Letter to the Editor

Stroke welcomes Letters to the Editor and will publish them, if suitable, as space permits. Letters must reference a Stroke published-ahead-of-print article or an article printed within the past 4 weeks. The maximum length is 750 words including no more than 5 references and 3 authors. Please submit letters typed double-spaced. Letters may be shortened or edited.

## Response by Liberman et al to Letter Regarding Article, “Misdiagnosis of Cerebral Vein Thrombosis in the Emergency Department”

### In Response:

We thank Zhao et al for their interest in our study. We agree that the variable clinical manifestations of cerebral vein thrombosis (CVT) make it a particularly challenging disease to diagnose. It is possible that our rate of probable CVT misdiagnosis (3.6% [95% CI, 1.1–4.1]) is an underestimation as we did not include patients who initially presented with conditions other than seizure or headache.<sup>1</sup> However, headache is the most common manifestation and usually the first symptom in patients with CVT, including those with isolated cortical vein thrombosis.<sup>2–4</sup>

We limited our definition of probable CVT misdiagnosis to include only patients discharged from an emergency department (ie, treat-and-release visit) in the 14 days before CVT hospitalization.<sup>1</sup> Our rate of probable CVT misdiagnosis thus does not account for patients initially admitted to the hospital with clinical symptoms or signs of an uncertain cause who were eventually diagnosed with a CVT. As Zhao et al note, studies about the role of neurological symptoms other than headache and seizure, including nonspecific symptoms such as nausea and vomiting, on CVT diagnostic accuracy are warranted. We used the SPADE (Symptom-Disease Pair Analysis of Diagnostic Error) method to identify probable CVT misdiagnosis, future researchers may use different strategies.<sup>5</sup>

The multistate, administrative claims data set that we used to identify our CVT cohort does not allow evaluation of detailed radiographic information; we could not identify specific thrombus location including whether thrombus was in a cerebral sinus or cortical vein. Furthermore, the data set does not include modified Rankin Scale at discharge or any post-discharge outcomes. We fully agree with Zhao et al that future studies of CVT misdiagnosis should include patients' functional disability status and their residual symptoms, including headache.

## Sources of Funding

Dr Merkler is supported by National Institutes of Health (NIH) grant KL2TR0002385 and the Leon Levy Foundation in Neuroscience. Dr Bakradze is supported by NIH grant U10NS08653.

## Disclosures

None.

**Ava L. Liberman, MD**

**Ekaterina Bakradze, MD**

*Department of Neurology*

*Montefiore Medical Center*

*Albert Einstein College of Medicine*

*Bronx, NY*

**Alexander E. Merkler, MD**

*Clinical and Translational Neuroscience Unit*

*Feil Family Brain and Mind Research Institute*

*Weill Cornell Medicine*

*New York, NY*

## References

1. Liberman AL, Gialdini G, Bakradze E, Chatterjee A, Kamel H, Merkler AE. Misdiagnosis of cerebral vein thrombosis in the emergency department. *Stroke*. 2018;49:1504–1506. <http://stroke.ahajournals.org/content/49/6/1504>. Accessed June 13, 2018.
2. Coutinho JM, Gerritsma JJ, Zuurbier SM, Stam J. Isolated cortical vein thrombosis: systematic review of case reports and case series. *Stroke*. 2014;45:1836–1838. doi: 10.1161/STROKEAHA.113.004414
3. Coutinho JM, Stam J, Canhão P, Barinagarrementeria F, Boussier MG, Ferro JM; ISCVT Investigators. Cerebral venous thrombosis in the absence of headache. *Stroke*. 2015;46:245–247. doi: 10.1161/STROKEAHA.114.007584
4. Ferro JM, Canhão P, Stam J, Boussier MG, Barinagarrementeria F; ISCVT Investigators. Prognosis of cerebral vein and dural sinus thrombosis: results of the International Study on Cerebral Vein and Dural Sinus Thrombosis (ISCVT). *Stroke*. 2004;35:664–670. doi: 10.1161/01.STR.0000117571.76197.26
5. Liberman AL, Newman-Toker DE. Symptom-disease pair analysis of diagnostic error (SPADE): a conceptual framework and methodological approach for unearthing misdiagnosis-related harms using big data. *BMJ Qual Saf*. 2018;27:557–566. doi: 10.1136/bmjqs-2017-007032

# Stroke

JOURNAL OF THE AMERICAN HEART ASSOCIATION



## Response by Liberman et al to Letter Regarding Article, "Misdiagnosis of Cerebral Vein Thrombosis in the Emergency Department" Ava L. Liberman, Ekaterina Bakradze and Alexander E. Merkler

*Stroke*. published online July 5, 2018;  
*Stroke* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231  
Copyright © 2018 American Heart Association, Inc. All rights reserved.  
Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://stroke.ahajournals.org/content/early/2018/07/03/STROKEAHA.118.022219.citation>

**Permissions:** Requests for permissions to reproduce figures, tables, or portions of articles originally published in *Stroke* can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the [Permissions and Rights Question and Answer](#) document.

**Reprints:** Information about reprints can be found online at:  
<http://www.lww.com/reprints>

**Subscriptions:** Information about subscribing to *Stroke* is online at:  
<http://stroke.ahajournals.org/subscriptions/>