

Cerebrospinal fluid cytology in subacute subarachnoid hemorrhage

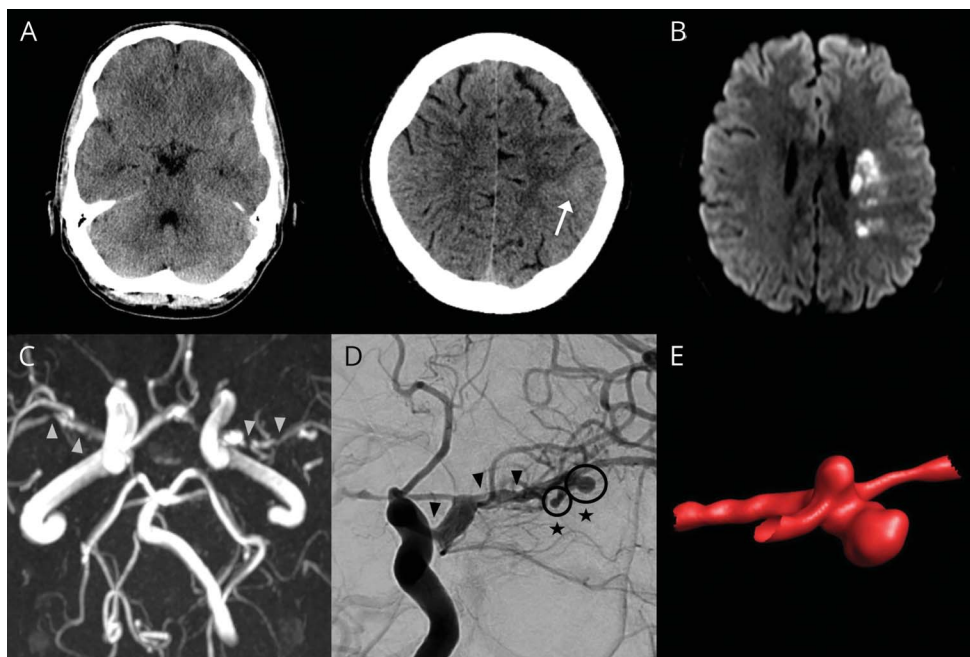
Leonie Müller-Jensen, MD, Elie Diamandis, MD, Anja Osterloh, MD, Klemens Ruprecht, MD, and Christoph Leithner, MD

Neurology® 2020;95:699-700. doi:10.1212/WNL.0000000000010713

Correspondence

Dr. Müller-Jensen
leonie.mueller-jensen@charite.de

Figure 1 Subacute subarachnoid hemorrhage (SAH) causing vasospasm-induced ischemic stroke



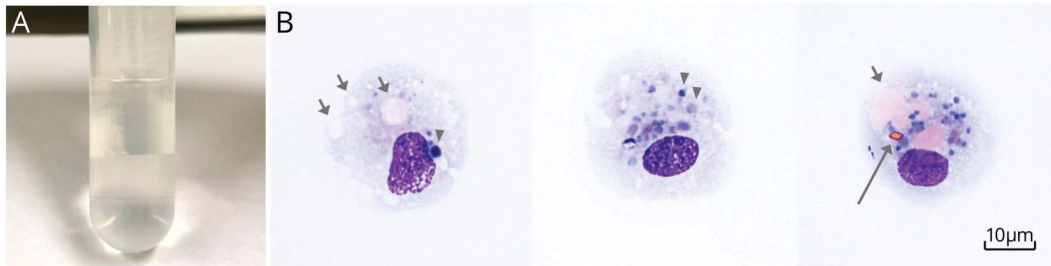
(A) Brain CT: no SAH in basal cisterns, but hyperdense signal in left middle cerebral artery (MCA) territory sulcus (arrow). (B) Brain MRI: diffusion-weighted imaging shows acute stroke in left MCA territory. (C) Magnetic resonance angiography reveals bilateral vasospasms. (D) Digital subtraction angiography reveals left MCA aneurysms (asterisks) and vasospasms (arrowheads). (E) 3D reconstruction of left MCA aneurysm.

A previously healthy 42-year-old man had sudden-onset severe headache resolving within days. Two weeks later, he noted acute right-sided hemiparesis. Brain CT, MRI, and digital subtraction angiography showed acute left hemispheric ischemic stroke, bilateral middle cerebral artery vasospasms, and intracerebral aneurysms (figure 1, A–E). The following day, CSF was obtained and appeared clear and without xanthochromia (figure 2A). CSF cytology proved past subarachnoid hemorrhage (SAH) by demonstrating macrophages with ingested erythrocytes, hemosiderin, and hematoidin crystals (figure 2B). CSF may be clear, but CSF cytology can prove SAH 2 weeks after aneurysm rupture leading to vasospasm and stroke.^{1,2}

From the Departments of Neurology (L.M.-J., K.R., C.L.), Neuroradiology (E.D.), and Neuropathology (A.O.), Charité-Universitätsmedizin Berlin, Corporate Member of Freie Universität Berlin, Humboldt-Universität zu Berlin, and Berlin Institute of Health, Germany.

Go to [Neurology.org/N](https://www.neurology.org/N) for full disclosures. Funding information and disclosures deemed relevant by the authors, if any, are provided at the end of the article.

Figure 2 CSF cytology proving subarachnoid hemorrhage (SAH)



(A) Clear CSF without xanthochromia. (B) Cytology of May-Grünwald-Giemsa stained CSF cytopspins showing macrophages with ingested erythrocytes (short arrows), hemosiderin (arrowheads), and hematoidin crystals (long arrow). Macrophages containing hemosiderin and hematoidin crystals appear ~3 and ~7 days, respectively, after SAH and can thereafter remain detectable for several months.

Study funding

No targeted funding reported.

Disclosure

No author reports any disclosures relevant to the manuscript. Go to Neurology.org/N for full disclosures.

Appendix Authors

Name	Location	Contribution
Leonie Müller-Jensen, MD	Department of Neurology, Charité Universitätsmedizin Berlin, Germany	Author
Elie Diamandis, MD	Department of Neuroradiology, Charité Universitätsmedizin Berlin, Germany	Coauthor

Appendix (continued)

Name	Location	Contribution
Anja Osterloh, MD	Department of Neuropathology, Charité Universitätsmedizin Berlin, Germany	Coauthor
Klemens Ruprecht, MD	Department of Neurology, Charité Universitätsmedizin Berlin, Germany	Coauthor
Christoph Leithner, MD	Department of Neurology, Charité Universitätsmedizin Berlin, Germany	Coauthor

References

1. Veuger AJ, Kortbeek LH, Booi AC. Siderophages in differentiation of blood in cerebrospinal fluid. *Clin Neurol Neurosurg* 1977;80:46–56.
2. Arora S, Swadron SP, Dissanayake V. Evaluating the sensitivity of visual xanthochromia in patients with subarachnoid hemorrhage. *J Emerg Med* 2010;39:13–16.

Visit the *Neurology*® Website at Neurology.org/N

- More article-based content on home pages
- Streamlined menus and navigation
- Enhanced blog sections for specialty areas
- Same experience on desktop, tablet, and mobile devices
- Improved article reading experience; links more evident (pdf, analytics, social media)
- *Neurology*® *Clinical Practice* initiative “Practice Current” global surveys will be accessible across sites

f Find *Neurology*® on Facebook: <http://tinyurl.com/neurologyfan>

t Follow *Neurology*® on Twitter: <https://twitter.com/GreenJournal>

Neurology®

Cerebrospinal fluid cytology in subacute subarachnoid hemorrhage

Leonie Müller-Jensen, Elie Diamandis, Anja Osterloh, et al.

Neurology 2020;95;699-700 Published Online before print August 26, 2020

DOI 10.1212/WNL.0000000000010713

This information is current as of August 26, 2020

Updated Information & Services	including high resolution figures, can be found at: http://n.neurology.org/content/95/15/699.full
References	This article cites 2 articles, 0 of which you can access for free at: http://n.neurology.org/content/95/15/699.full#ref-list-1
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): All Cerebrovascular disease/Stroke http://n.neurology.org/cgi/collection/all_cerebrovascular_disease_stroke Cerebrospinal Fluid http://n.neurology.org/cgi/collection/cerebrospinal_fluid Subarachnoid hemorrhage http://n.neurology.org/cgi/collection/subarachnoid_hemorrhage
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.neurology.org/about/about_the_journal#permissions
Reprints	Information about ordering reprints can be found online: http://n.neurology.org/subscribers/advertise

Neurology® is the official journal of the American Academy of Neurology. Published continuously since 1951, it is now a weekly with 48 issues per year. Copyright © 2020 American Academy of Neurology. All rights reserved. Print ISSN: 0028-3878. Online ISSN: 1526-632X.

