Debate: Silent DWI MRI Brain Lesions (Small Infarcts) After CEA/CAS Don't Matter

VEITH Symposium 51st Annual Symposium on Vascular and Endovascular Issues

Thomas G. Brott, MD

Friday, November 22nd, 2024

MAYO CLINIC

Disclosures

None.

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REVIEW ARTICLES

Kakra Hughes, MD, PhD, SECTION EDITOR

Check for updates

An international, multispecialty, expert-based Delphi Consensus document on controversial issues in the management of patients with asymptomatic and symptomatic carotid stenosis

Kosmas I. Paraskevas, MD,[a] Dimitri P. Mikhailidis, MD, FFPM, FRCP, FRCPath,[b] Peter Arthur Ringleb, MD

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Paraskevas, KI, et al. *J Vasc Surg*, 2024.

tion: "Are new ischemic brain lesions after carotid endarterectomy (CEA) or carotid artery stenting (CAS) associated with long-term cognitive impairment?"

	Rounds 1 & 2, No. (%)	Round 3, No. (%)
Yes	23 (37.7)	15 (24.6)
Probably yes	11 (18.0)	16 (26.2)
Possibly yes	5 (8.2)	7 (11.5)
Uncertain/unknown/unproven/no opinion	12 (19.7)	15 (24.6)
Probably no	3 (4.9)	–
Possibly no	–	1 (1.6)
No	7 (11.5)	7 (11.5)
Total	61 (100)	61 (100)

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Why so much disagreement?

- Observational studies are fraught with bias.
- "…cognitive uncertainty principle…The more comprehensively a study tries to measure cognitive status (with lengthier testing requiring more trained and experienced testers), the less the study may be externally valid (due to healthy participant bias) and internally valid (due to higher drop-out rates). "

James F. Meschia AHA ISC Feinberg Award Lecture *Stroke*. 2024;55:2184–2192.

Cause ➡ Effect

Volume of DWI Lesions

Trial	Mean Total Volume of all lesions combined
ICSS, CAS	0.17 cc (IQR 0·06–0·58)
ICSS, CEA	0.19 cc (IQR 0·06–0·58)
PROOF, TCAR	0.17 cc (range 0.04-0.69)
911 stroke	50 cc
Lacunar infarct	0.2-3.4 cc

Cause ➡ Effect

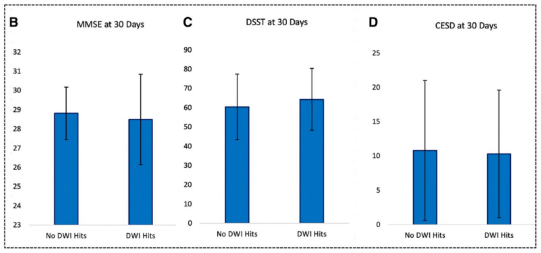
COMMENTS AND OPINIONS

Iatrogenic Diffusion-Weighted Imaging Lesions

What Is Their Impact and How Can It Be Measured?

- 147 patients undergoing elective coiling for unruptured intracranial aneurysms.
- Cognitive assessment at enrollment, 2 days, and 30-days.
- DWI lesions in 65%.

Cognitive Measures at 30-days



Stroke. 2021;52:1929–1936. DOI: 10.1161/STROKEAHA.120.033984

Cause ➡ Effect

RANDOMISED CLINICAL TRIAL

Editor's Choice – Effect of Carotid Endarterectomy on 20 Year Incidence of Recorded Dementia: A Randomised Trial

Alison Halliday [a,*,†], Mary Sneade [a,†], Martin Björck [b,†], Sarah T. Pendlebury [c], Richard Bulbulia [d], Sarah Parish [d], Rebecca Llewellyn-Bennett [d], Holly Pan [d], William Whiteley [d,e], Hongchao Pan [a,†], Anders Gottsäter [f], on behalf of the ACST-1 Trial Investigators

"Carotid surgery for tight asymptomatic carotid stenosis reduced long term stroke risk, but this study [ACST-1] has not shown that it reduces or increases the risk of dementia."

Cause ➡ **Effect**

DWI Lesions are associated with:

- COGNITIVE DYSFUNCTION
- Hypertension
- Diabetes and metabolic syndrome
- Smoking
- Subsequent STROKE
- plus Age(!), Afib, PFO, CHF, CKD, sleep apnea, et al

Search Labs | AI Overview

To prove a cause and effect relationship, you must meet three criteria:

Temporal precedence
The cause must occur before the effect. For example, smoking comes before developing lung cancer.

Correlation
There must be a statistical association between the cause and effect. This could be a positive or negative relationship.

Non-spuriousness
There must be no other variable that can explain the relationship between the cause and effect. For example, genetics or exposure to other carcinogens could not be a factor.

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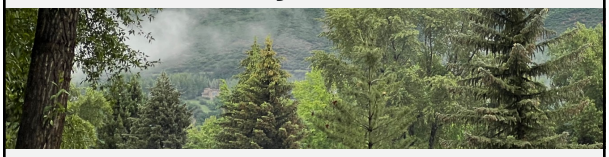
Cause ? **Effect**

Summary

- None of us wishes these lesions for our patients or ourselves.
- Yet, they are tiny, orders of magnitude smaller than even the “Minor Strokes” in the carotid trials.
- Whether they cause cognitive dysfunction or rather markers of cognitive dysfunction has not been established.

Thanks for your attention!



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Cause ➡ **Effect**

Anatomy

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Total Volume of DWI Lesions 1/30th of a teaspoon

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ICSS, CEA	0.19 cc (IQR 0·06–0·58)
PROOF, TCAR	0.17 cc (range 0.04-0.69)

Risk for Future Stroke not Impacted

Long-Term Stroke Risk in Patients With New Ischemic Brain Lesions on MRI After Carotid Revascularization

Simone J.A. Donners, MD; Marjolijn L. Rots, MD, PhD; Raechel J. Toorop, MD, PhD; Aad van der Lugt, MD, PhD; Leo H. Bonati, MD, PhD; Gert J. de Borst, MD, PhD

CONCLUSIONS: Based on our outcome analysis within the ICSS magnetic resonance imaging substudy, DWI lesions following carotid revascularization did not seem to have a relationship with long-term stroke risk.

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Stroke. 2023;54:2562–2568. DOI: 10.1161/STROKEAHA.123.043336

DWI Lesions Are Associated With:

- Hypertension
- Smoking
- Artherosclerotic artery disease
- Cerebral small vessel disease
- Other

So Cause And Effect Are Always To Be Questioned

Cause ➡ Effect

Cause ➡ Effect

Cause ➡ Effect