

Cerebral blood volume index

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- [Association between Cerebral Blood Volume Index and Excellent Reperfusion in Acute Ischemic Stroke Patients Undergoing Mechanical Thrombectomy](#)
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Cerebral Blood Volume Index (CBVI) is a quantitative imaging biomarker used to assess the volume of blood within a given amount of brain tissue, typically expressed in milliliters of blood per 100 grams of brain tissue (mL/100g).

Difference between Cerebral Blood Volume (CBV) and Cerebral Blood Volume Index (CBVI)

Feature	Cerebral Blood Volume (CBV)	Cerebral Blood Volume Index (CBVI)
Type	Absolute	Relative / Normalized
Units	mL/100 g of brain tissue	Unitless ratio or percentage
Definition	Volume of blood within a given mass of brain tissue	Normalized CBV relative to a reference region
Measurement	Directly from perfusion imaging (CT or MRI)	CBV in ROI divided by CBV in reference region (e.g. contralateral)
Normalization	☐ No normalization	☐ Normalized
Clinical Use	Identifies ischemic core, tumor vascularity	Enables inter-patient or inter-regional comparison
Example Use Case	Low CBV = infarct core	CBVI = 1.5 → 50% higher blood volume than reference tissue
Limitation	Varies between individuals and brain regions	Removes variability; standardizes interpretation

Summary

- **CBV** is an **absolute** perfusion metric.
- **CBVI** is a **normalized** or **indexed** version of CBV, designed to allow standardization across individuals or brain regions.

- CBVI improves **comparability**, especially in clinical trials and multi-center studies involving perfusion imaging.

□ Definition

Cerebral Blood Volume Index (CBVI) refers to the standardized measure of cerebral blood volume (CBV) that accounts for individual variation and allows for comparison across patients or regions. It is often normalized to a reference region (like the contralateral hemisphere or white matter) to improve reproducibility and detect pathological changes.

□ Clinical Context

Derived from [CT perfusion](#) or MRI perfusion imaging.

Elevated CBVI may reflect hyperemia, luxury perfusion, or tumoral neovascularization.

Reduced CBVI may indicate ischemia, hypoperfusion, or vascular steal.

⚖ Importance in Stroke and Neuro-oncology

In ischemic stroke, CBVI helps delineate:

Infarct core (low CBVI, low CBF)

Penumbra (preserved CBVI, low CBF)

In brain tumors, elevated CBVI often correlates with tumor grade and angiogenesis.

□ Calculation

CBVI is usually obtained using software that processes dynamic contrast-enhanced imaging, integrating time-concentration curves and using deconvolution algorithms to isolate the blood volume component.

In a [retrospective cohort study](#) Asimos et al. from Atrium Health, Charlotte (Emergency Medicine, Neurosciences Institute, Quality Analytics, Radiology, Neurosurgery, Neurology) published in the [Interventional Neuroradiology Journal](#) to assess whether [hypoperfusion](#) intensity ratio (HIR) and [cerebral blood volume index](#) (CBVI) measured via [CT perfusion](#) at referring non-thrombectomy centers predict favorable 90-day outcomes post-transfer for [thrombectomy](#) in [anterior circulation large vessel occlusion](#) (ACLVO). CBVI—as a continuous measure and specifically > 0.7 —correlated with functional independence ($mRS \leq 2$) at 90 days both overall and in recanalized patients. In contrast, HIR

thresholds and combined collateral scores were not predictive ¹⁾.

Critical Review

Strengths

Excellent [sample size](#) (n = 497), with high treatment prevalence (93% thrombectomy) supporting real-world relevance.

Rigorous adjustment for confounders in multivariable models enhances validity.

Weaknesses

Retrospective and single-center design at a large referral system may limit external [generalizability](#).

No direct comparisons to other perfusion metrics like Tmax or ischemic core volumes—makes it difficult to situate CBVI within broader CTP prognostication tools.

HIR binary thresholds (0.4–0.6) may lack granularity; their univariate non-association could stem from arbitrary cutoffs rather than biological irrelevance.

Unclear reproducibility or inter-observer reliability of CBVI quantification across centers or software versions.

Statistical note

Adjusted OR of 1.73 for CBVI > 0.7 is clinically meaningful, but [confidence interval](#) (1.13–2.65) suggests moderate precision.

Final Verdict

Rating: 6.5 / 10

Takeaway for practitioners: CBVI from CT perfusion at referring centers could offer a pragmatic predictor of functional independence after thrombectomy, especially when > 0.7. However, its standalone prognostic value remains uncertain until validated prospectively and benchmarked against established perfusion metrics.

Bottom line: CBVI appears promising as a simple, transportable predictor of favorable outcome in ACLVO, but further multi-center, prospective validation and comparison studies are needed before adoption into routine transfer decision-making.

Categories: Retrospective Studies, Stroke Imaging, Thrombectomy Outcomes

Tags: CT perfusion, CBVI, HIR, collateral perfusion, stroke prognostication, thrombectomy, anterior circulation LVO

¹⁾

Asimos AW, Yang H, Strong D, Teli KJ, Clemente JD, DeFilipp G, Bernard J, Stetler W, Parish JM, Hines A, Rhoten JB, Karamchandani RR. Association of [hypoperfusion intensity ratio](#) and [cerebral blood volume Index](#) with good [outcome](#) in patients transferred for [thrombectomy](#). Interv Neuroradiol. 2025

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