THE CHALLENGE OF ACCURATE ASSESSMENT

Accurate characterization of tumors and neurovascular conditions is essential for guiding treatment decisions and improving outcomes. In oncology, early assessment of tumor metabolism can influence survival rates, while in diseases such as Alzheimer's, Parkinson's, and Moyamoya, timely evaluation of perfusion and metabolism is critical for tracking progression and tailoring treatment.

Because abnormal vascular structures affect blood flow and function, advanced imaging provides vital insights for early detection, prognosis, and therapeutic guidance.

PERFUSION AUTOMATION

Enhancing Diagnostic Speed and Accuracy

Perfusion imaging plays a key role in diagnosing tumor vascularization, brain hypoperfusion, and perfusion deficits in diseases like Moyamoya. However, achieving reliable, automated quantification of perfusion parameters across these conditions remains a significant challenge.

At Cercare Medical, our advanced solutions automatically generate perfusion maps, streamlining the diagnostic workflow and enhancing consistency. This fully automated process minimizes manual errors and variability, empowering clinicians to make informed decisions with confidence.

KEY FEATURES OF PERFUSION AUTOMATION

> **Streamlined Workflow:** Automated processing reduces the time from image acquisition to analysis, which is particularly valuable in time-sensitive conditions.

> **Enhanced Precision:** Automatically generated maps provide reliable, standardized results, essential for managing complex cases in oncology and neurovascular diseases.

> **Configurable Fused Series:** Users can fuse any anatomical series with a perfusion map such as T1 contrast with a CBV overlay.

CERCARE MEDICAL'S PROPRIETARY
BIOMARKERS

Deliver advanced, detailed maps that provide critical insights into tumor behavior, brain perfusion characteristics, and the distinction between true progression and pseudoprogression. *

OEF
Model-based Oxygen Extraction Fraction
Reflects the efficiency of oxygen utilization by the tissue.

CTH
Capillary Transit time Heterogeneity.
Shows microvascular flow heterogeneity.

COV
Coefficient Of Variance. (COV = CTH/MTT)
Shows the variability of flow heterogeneity in the brain tissue.

CMRO2
Cerebral Metabolic Rate of Oxygen (CMRO2 = OEF x CBF)
Represents the rate at which oxygen is consumed by the brain tissue.

Leakage
Specific to DSC-Perfusion. Shows the extravasation of contrast agent in a particular voxel (i.e. in case of disrupted Blood Brain Barrier).

LOI
Lack Of Information. Quality check map. Shows the lack of information for each voxel. Areas with no vascularization are expected to have high LOI, such as CSF and necrotic tissue.

*Park et al., 2023, ASAN Center, Seoul, South Korea
Prediction of pseudoprogression in post-treatment glioblastoma using dynamic susceptibility contrast-derived oxygenation and microvascular transit time heterogeneity measures - doi.org/10.1007/s00330-023-10324-9
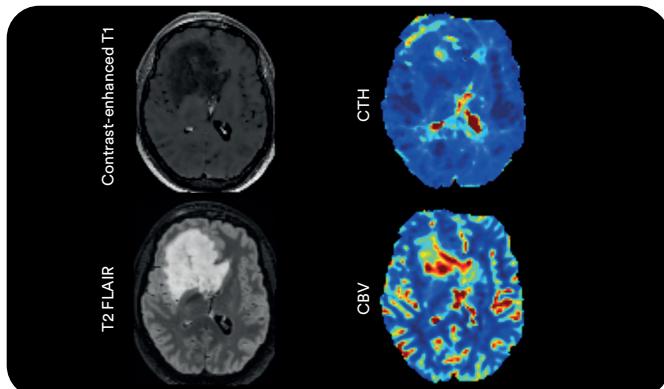
Example of enhanced precision, as CTH may assist in selecting the best location for biopsy, which is not as clear on CBV.

Figure A: Glioblastoma (high CTH, high COV)

Figure B: Astrocytoma Grade 2 (low CTH, low COV)

TUMOR GRADING

Precision in Oncology Diagnosis

In oncology, accurate tumor grading is critical for determining cancer aggressiveness, guiding treatment decisions, and predicting outcomes. Traditional imaging methods often fail to provide detailed insights into tumor vascularization and metabolic activity—key factors in understanding tumor behavior.

Cercare Medical's proprietary biomarkers, integrated into perfusion imaging, offer advanced tools for evaluating:

> **Tumor Vascularization:** Mapping the blood supply to the tumor, essential for understanding its aggressiveness.

> **Metabolic Activity:** Quantifying oxygen consumption and metabolic demand, supporting clinicians to grade and assess.

> **Longitudinal Brain Tumor Lesion Analysis*:** Automatically tracks tumor changes over time to support progression assessment and grading.

> **Longitudinal Brain Tumor VOI Analysis*:** Automatically measures perfusion changes within tumor regions over time to support treatment evaluation.

> **ROI Histogram Analysis*:** Shows value distribution within a selected region to support better tumor evaluation.

These biomarkers provide more advanced, detailed maps of tumors, offering a clearer picture of their biological behavior, which is crucial for accurate grading and treatment planning.

*Pending CE/FDA. For Research Only. Not for Clinical Use.

UNLOCKING NEW INSIGHTS

Grading and predicting time to progression of glioma patients using both CBV and CTH outperformed the use of CBV alone.†

†Tietze et al. 2015 - PLOS ONE - See figure A and B
Perfusion MRI Derived Indices of Microvascular Shunting and Flow Control Correlate with Tumor Grade and Outcome in Patients with Cerebral Glioma


ONCOLOGY

CEREBRAL SMALL VESSEL DISEASE

MOYAMOYA

ACUTE STROKE

STENOSIS

ALZHEIMER'S

COVID-19

INTRACEREBRAL HEMORRHAGE

TRAUMATIC BRAIN INJURY

C
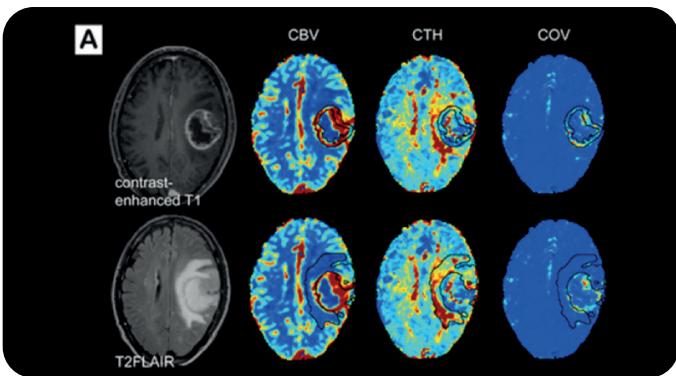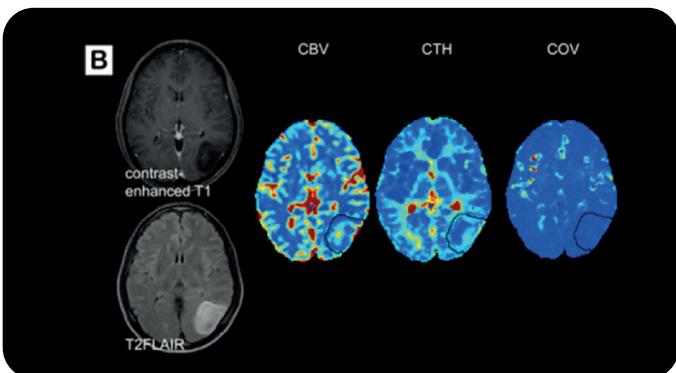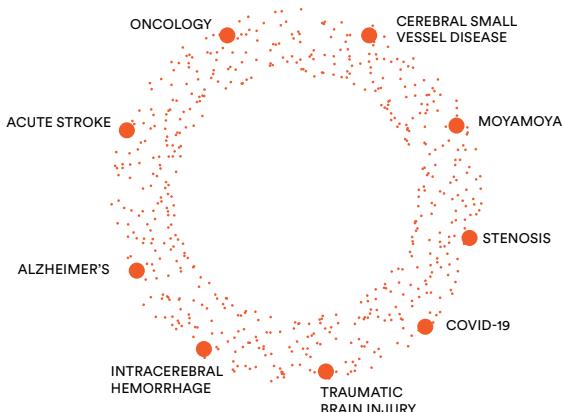
PROGRESSION VS. PSEUDOPROGRESSION

Monitoring Treatment Response

A key challenge in cancer treatment is distinguishing between true tumor progression and pseudoprogression—a temporary increase in tumor size caused by treatment-related changes rather than actual growth. This distinction is critical, especially in patients undergoing radiation therapy and immunotherapy, where treatment response can be difficult to gauge through traditional imaging alone.

Cercare Medical's solutions provide information that can support the clinician in differentiating between progression and pseudoprogression using advanced perfusion and metabolic imaging, offering clinicians critical insights into treatment effectiveness. This is achieved through:

> **Perfusion Biomarkers:** Providing real-time insights into vascular changes in the tumor.

> **Metabolic Biomarkers:** Evaluating tumor oxygenation and metabolism to support in determining whether the tumor is growing or responding positively to treatment.

By improved distinction between progression and pseudo-progression, clinicians may optimize treatment decisions, preventing both over and under treatment of patients, though achieving this distinction remains a challenge.

Pseudoprogression

Progression

SVD-based CBV and **Vascular Model-Based CBV** offer different approaches to perfusion measurement. The vascular model-based CBV includes leakage correction, essential for assessing tumor patients, as blood-brain barrier disruptions often cause abnormal contrast leakage. This correction enhances accuracy in perfusion measurements, improving tumor grading reliability and treatment planning.
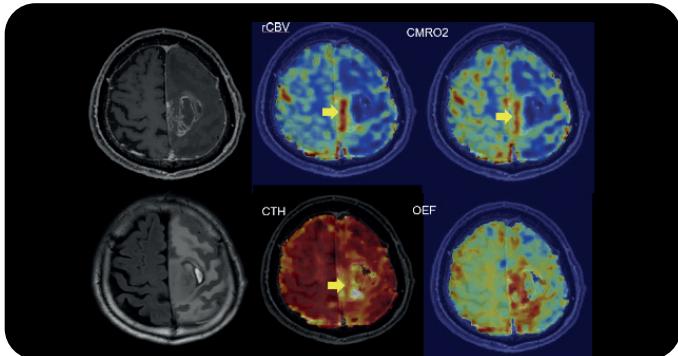
UNLOCKING NEW INSIGHTS

A study showed that using CBV together with CTH and OEF improves distinction between pseudoprogression and tumor progressing compared to using CBV alone (sensitivity and specificity improved from 55% and 65% to 88% and 69% respectively)

*Park et al., 2023, European Radiology
Prediction of pseudoprogression in post-treatment glioblastoma using dynamic susceptibility contrast-derived oxygenation and microvascular transit time heterogeneity measures.

CERCARE MR NEURO ADVANCED

The Solution for Oncology, Neurodegenerative Diseases and Moyamoya

Cercare MR Neuro Advanced is a fully automated, vendor-agnostic perfusion processing application designed to generate high-quality perfusion maps based on MR DSC Perfusion.

This solution includes standard SVD markers and advanced Vascular Model-Based perfusion markers, offering unprecedented clarity for managing oncology, neurodegenerative diseases, and neurovascular conditions like Moyamoya.

ONCOLOGY
AND NEURODEGENERATIVE DISEASES

C

GLIOBLASTOMA CASE

THE VASCULAR MODEL
Enhancing Diagnostic Clarity

The Vascular Model (VM) is central to Cercare Medical's imaging solutions, offering:

> **Enhanced Visualization of Tumor Vascularization and Brain Hypoperfusion:** The VM provides clearer insights into tumor perfusion and hypoperfused brain regions, enabling clinicians to make more informed treatment decisions.*

> **Improved Diagnostic Alignment:** Research shows that lesions and abnormalities identified with the VM align more closely with true disease progression, improving diagnostic reliability.**

The imaging markers enable a unique assessment of perfusion capacity in brain tissue and allow for the evaluation of potential capillary dysfunction.

The Vascular Model produces perfusion maps with improved SNR and less sensitive to artifacts and less bias (e.g. from macrovascular effects) compared to standard methodologies such as Singular Value Decomposition (SVD).*

*Tietze et al., 2015 – PLOS ONE
Perfusion MRI Derived Indices of Microvascular Shunting and Flow Control Correlate with Tumor Grade and Outcome in Patients with Cerebral Glioma

**Park et al., 2023 - Springer Link
Prediction of Pseudoprogression in Post Treatment Glioblastoma Using Dynamic Susceptibility Contrast Derived Oxygenation and Microvascular Transit Time Heterogeneity Measures
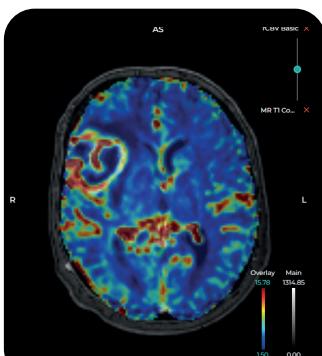
T1 contrast with non corrected CBV
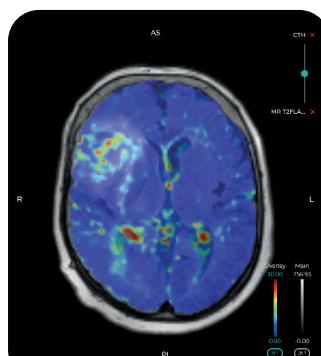
T2 FLAIR with CTH overlay
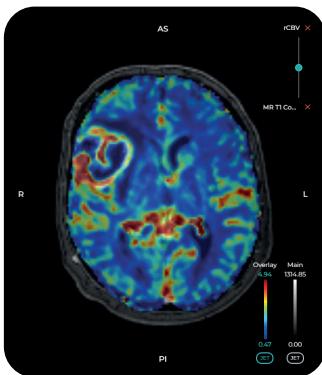
T1 contrast with corrected CBV
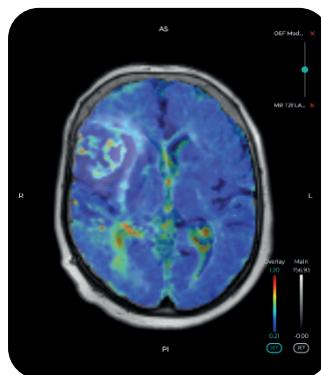
T2 FLAIR with OEF overlay

PRODUCT OVERVIEW - CERCARE MR NEURO ADVANCED IS A PART OF CERCARE MEDICAL NEUROSUITE

NEURO **MR**

CERCARE MR NEURO ADVANCED

Fully automated and vendor neutral perfusion processing application calculating high-quality perfusion maps based on MR DCE and MR DSC Perfusion including the standard SVD markers and unique Vascular Model perfusion markers.

CE	FDA CLEARED	
✓	✓	**DIFFUSION** Mean DWI, B0, ADC
✓	✓	**SVD-BASED DSC PERFUSION MAPS** CBF, CBV, MTT, Tmax, MinIP, TTP
✓	✓	**VASCULAR MODEL-BASED DSC PERFUSION MAPS** CBF, CBV, MTT, Delay, CTH, COV, OEF, CMRO2, Leakage, LOI
✓		**DCE PERFUSION MAPS** Ktrans, Ve, Vp, Kep, Delay, CBF, MaxIP, TTP
		RESEARCH - NO CE/FDA Clearance AI-based brain tumor segmentation and longitudinal analysis

Cercare Medical |

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Request a demo and explore how Cercare Medical Neurosuite supports both research and clinical care.