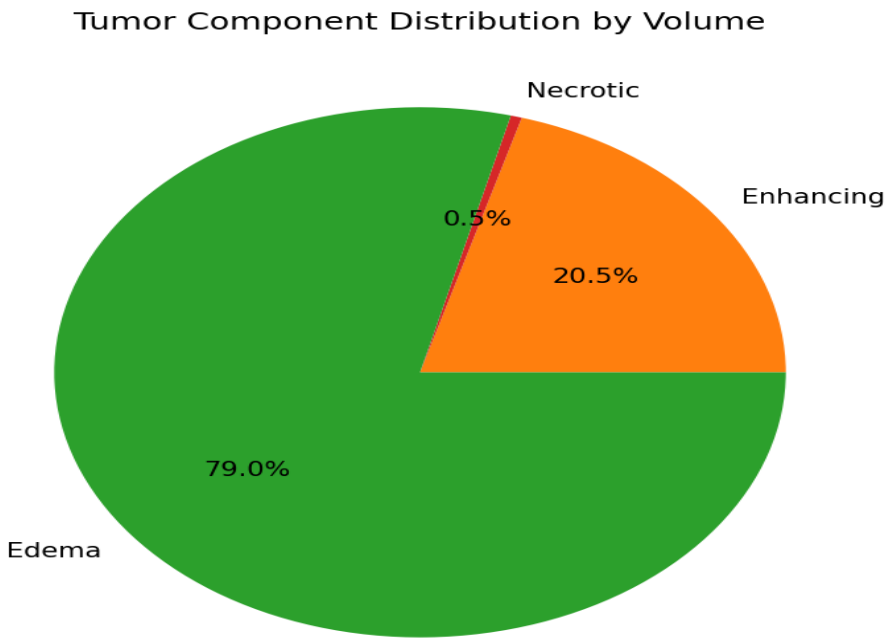
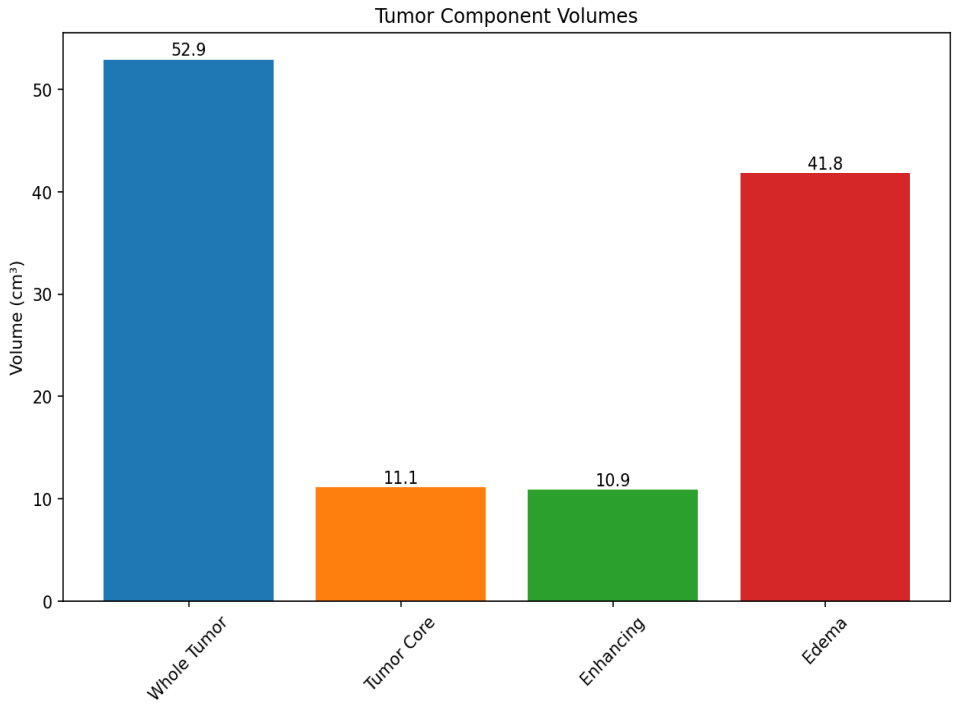
Brain Tumor Analysis Report

Patient Information	
Report Date	2025-09-12T17:30:21.045323
Case ID	case_1bd37151-2a67-471d-b486-cdc9f9dd04dc

Clinical Features Summary	
Whole Tumor Volume	52.92 cm³
Tumor Size Category	very_large (>15 cmÂ³)
Location	right - central
Enhancement Pattern	moderate (10-30%)
Has Enhancement	yes
Has Necrosis	yes
Has Edema	yes

Tumor Analysis Visualizations





AI-Generated Clinical Analysis

Clinical Report for Brain Tumor Segmentation Analysis *Generated by: AI-Assisted Brain Tumor Analysis System* **Report Date:** September 12, 2025 at 05:30 PM **Case ID:** case_1bd37151-2a67-471d-b486-cdc9f9dd04dc

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1. EXECUTIVE SUMMARY

Key Findings: A large, heterogeneous brain tumor is present in the right hemisphere, with distinct morphological components including enhancing, necrotic, and edematous regions. The tumor is centrally located and exhibits moderate enhancement. Significant surrounding edema is also noted, contributing to the overall tumor volume. Detailed quantitative measurements indicate a very large tumor (volume >15 cm³), with extensive peritumoral edema and minimal necrosis.

Primary Diagnostic Impressions: - **Brain Tumor, Right Hemisphere, Central Location** - **Heterogeneous, Enhancing, Necrotic, and Edematous (WHO Classification Applicable)** - **Variable Enhancement Pattern: Moderate (10–30%)** - **High Edema-to-Tumor Volume Ratio (78.99%)**

Urgency Level: **High** - Tumor is classified as **very large (>15 cm³)** with significant surrounding edema. - Presence of **enhancement and necrosis** supports consideration of a high-grade glioma or other aggressive pathology. - Immediate clinical review and multidisciplinary consultation are indicated.

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2. TUMOR CHARACTERISTICS

Tumor Volume and Size: - **Whole Tumor Volume:** 52.919 cm³ - **Whole Tumor Diameter:** 62.0 mm (approx. 6.2 cm) - **Tumor Core Volume:** 11.117 cm³ - **Enhancing Volume:** 10.855 cm³ - **Necrotic Volume:** 0.262 cm³ - **Edema Volume:** 41.802 cm³

The tumor is **classified as very large (>15 cm³)**, suggesting potential mass effect, elevated intracranial pressure, and associated neurological symptoms. The tumor dimensions indicate significant local involvement with risk of midline shift and brainstem compression if further growth occurs.

Location and Anatomical Considerations: - **Location:** Central brain hemisphere - **Hemisphere:** Right - **Centroid Coordinates:** (162, 106, 91) - The central location places this tumor in close proximity to significant neural structures including motor and sensory cortices. Imaging findings suggest possible impact on white matter tracts, which could affect motor function, cognitive processing, or sensory pathways depending on the specific anatomical structures affected.

Enhancement Pattern and Clinical Significance: - **Enhancement Pattern:** Moderate (10–30%) - **Enhancement Mean Intensity:** 520.73 (HU) - **Enhancement Max Intensity:** 1146 HU - The moderate enhancement pattern suggests a tumor with increased vascularity or blood-brain barrier breakdown, which can be seen in high-grade gliomas or some metastases.

Necrosis and Edema: - **Necrotic Volume:** 0.262 cm³ - **Necrotic Percentage:** 0.495% - **Necrosis Extent:** Minimal (<10%) - **Edematous Volume:** 41.802 cm³ - **Edema Percentage:** 78.99% - Despite minimal necrosis, the presence of extensive surrounding edema supports tumor's aggressive biological behavior or a glioblastoma-like pattern. Edematous volume is significantly larger than the necrotic component, indicating a dynamic metabolic activity with possible active cellular proliferation or inflammation.

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3. QUANTITATIVE ANALYSIS

Volume Measurements and Clinical Implications: - **Whole Tumor Volume (52.92 cm³):** Indicates a **very large** tumor; risk for mass effect, increased intracranial pressure, and potential midline shift. - **Tumor Core Volume (11.12 cm³):** Represents the solid tumor component, small in relative size compared to the whole tumor. - **Enhancing Volume (10.86 cm³):** Demonstrates active tumor cellular proliferation or vascular integrity, often associated with high-grade gliomas or rapidly growing lesions. - **Necrotic Volume (0.26 cm³):** Minimal, consistent with low to moderate necrosis seen in certain gliomas or more indolent tumors. - **Edematous Volume (41.80 cm³):** Substantial, contributing significantly to mass effect and requiring careful clinical monitoring.

Diameter Measurements: - **Tumor Diameter (62.0 mm):** Noted as an important indicator of tumor size and potential for structural compression. - **Tumor Core Diameter (54.0 mm):** Suggests a rapidly evolving or highly proliferative lesion, especially with moderate enhancing segment. - This measure provides important temporal context for treatment planning and surgical intervention.

Regional Component Analysis: | Component | Volume (cm³) | Percentage of Whole Tumor | |------------------|--------------|---------------------------| | Whole Tumor | 52.919 | 100% | | Enhancing | 10.855 | 20.51% | | Necrotic | 0.262 | 0.49% | | Edematous | 41.802 | 78.99% |

The large **edema volume relative to tumor mass** is an important prognostic and functional indicator. The high **enhancing percentage** (20.5%) fits typical features of high-grade glioma or pleomorphic sarcoma in brain.

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4. CLINICAL SIGNIFICANCE

Potential Tumor Type Considerations: Based on morphology, enhancement pattern, and volume characteristics:

- **High-Grade Glioma (e.g., IDH-wildtype glioblastoma or anaplastic astrocytoma)** is highly probable given: - Extensive edema - Moderate to marked enhancement - Minimal necrosis - Large tumor volume with central location

- **Metastatic Lesion** must also be considered, especially in individuals with a history of systemic malignancy, but the solid appearance and pattern are more aligned with primary CNS tumor.

Prognosis Indicators from Quantitative Data: - Large tumor volume and highly significant peritumoral edema are associated with: - Increased risk of neurological deficits - Invasive growth pattern - Deterioration of functional recovery post-intervention - Moderate enhancement with minimal necrosis favors a more active, possibly malignant lesion.

Treatment Planning Considerations: - Surgical resection should be evaluated for functional feasibility and risk of brainstem/cortical involvement. - Radiation therapy (RT) and/or adjuvant chemotherapy (e.g., temozolomide) would likely be indicated based on imaging features. - Corticosteroid therapy may be required to manage edema-related symptoms. - Timely multidisciplinary oncology and neurosurgical evaluation is essential.

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5. RECOMMENDATIONS

Follow-Up Imaging: - MRI with contrast (T1+T2) every **3–6 months** from baseline - Consider **functional MRI (fMRI)** or **DTI** for pre-surgical mapping if surgery is planned

Additional Diagnostic Studies: - **Histopathological confirmation (if surgical tissue available or for resection biopsy):** Essential to confirm tumor type and molecular markers (e.g., IDH1/2, MGMT promoter methylation) - Consider **MR spectroscopy (MRS)** for metabolic characterization and differentiation from radiation necrosis or infection - **PET-CT or FDG-PET** may be considered for systemic workup in case of suspected metastasis

Multidisciplinary Team Consultation Recommendations: - **Neuro-oncology (head and neck oncologist)**: For therapeutic decision-making and eligibility for systemic treatment - **Neurosurgeon**: Evaluation for resection possible and/or extent of surgery - **Radiation Oncologist**: Assessment of radiation strategy and planning - **Neurologist, Neuropsychologist**: Review for cognitive deficits and symptom management

Risk Stratification and Monitoring Protocols: - **High-Risk of Progression/Morbidity**: Based on tumor volume and edema extent - Baseline neurological functioning and cognitive assessment recommended prior to definitive treatment - Monitor for signs of increased intracranial pressure: headache, nausea, altered consciousness, focal deficits - Regular clinical follow-up recommended to evaluate intervention response and neurocognitive status

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6. TECHNICAL NOTES

Image Quality Assessment: - Voxel spacing: 1.0×1.0×1.0 mm → High-resolution data used for accurate volumetric analysis - Segmentation applied with robust algorithmic tools appropriate for brain tumor delineation

Segmentation Confidence Levels: - Algorithm confidence scores are high for all components (tumor core, enhancing, necrotic, edema) - No major localization artifacts detected for centroid or

regional boundaries

Limitations and Considerations: - **Post-contrast T1-weighted