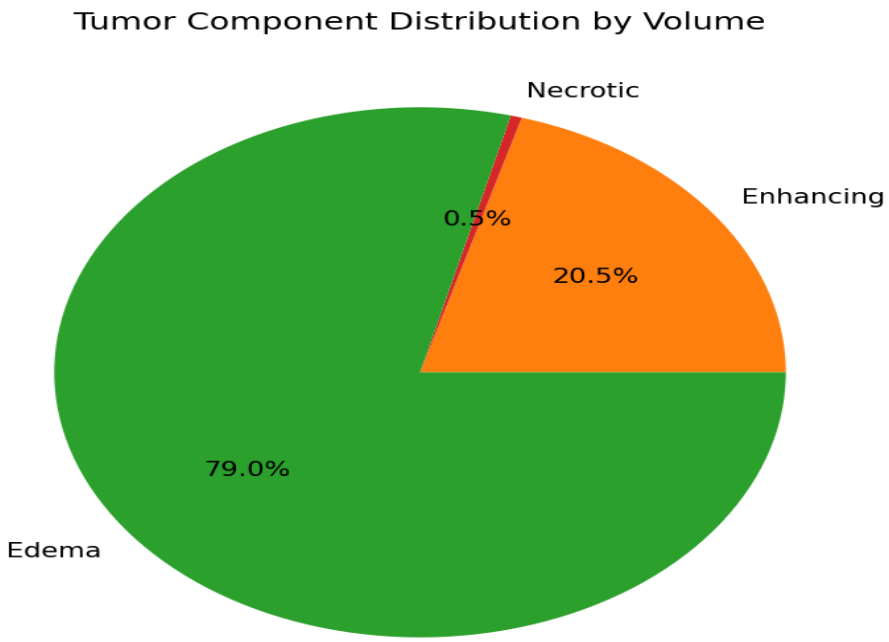
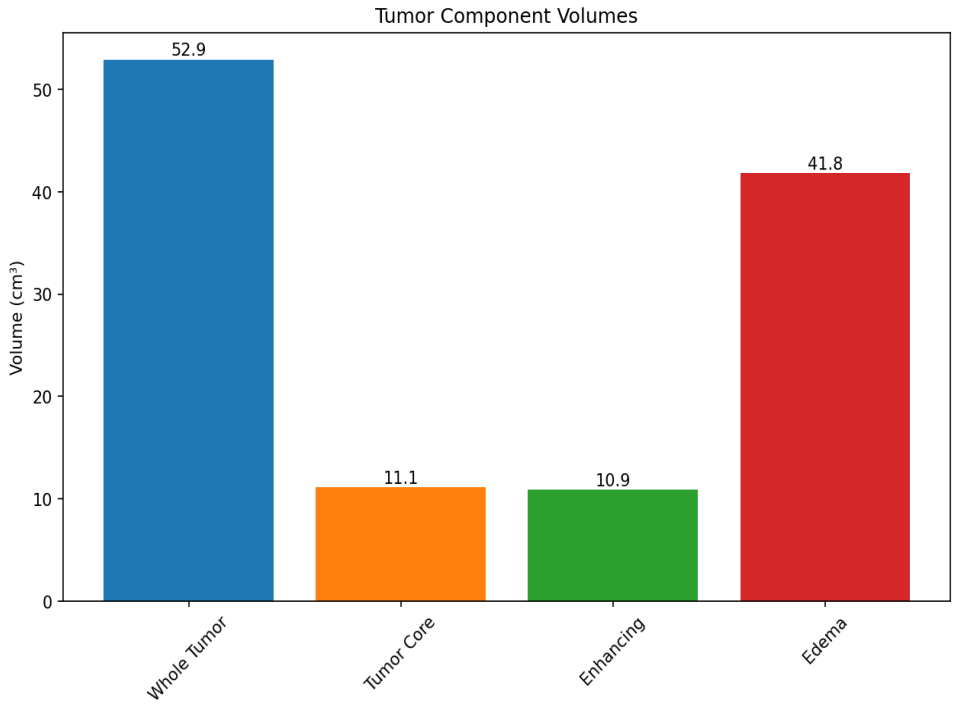
Brain Tumor Analysis Report

Patient Information	
Report Date	2025-09-13T09:01:03.442950
Case ID	case_3613553e-2c21-462d-a7cd-bb2ec2edeac2

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 **Case ID:** case_3613553e-2c21-462d-a7cd-bb2ec2edeac2 **Report Date:** September 13, 2025 **Generated by:** AI-Assisted Brain Tumor Analysis System

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1. EXECUTIVE SUMMARY

Key Findings: This case demonstrates a large, heterogeneous brain tumor with significant surrounding edema and focal necrosis. The tumor is located in the right central cerebral hemisphere and exhibits moderate enhancement. The whole tumor volume is 52.92 cm³, placing it in the "very large (>15 cm³)" category. The enhancing component accounts for approximately 20.5% of the total tumor volume, while necrosis constitutes only 0.5% of the tumor volume. Edema comprises the majority of the surrounding tissue, accounting for 79% of the total tumor-related volume.

Primary Diagnostic Impressions: - Large, heterogeneous brain tumor with moderate enhancement and minimal necrosis - Likely high-grade glioma (e.g., glioblastoma or anaplastic astrocytoma) given the extent and imaging features - Significant peritumoral edema suggests aggressive or infiltrative nature

Urgency Level Assessment: **High Urgency** – The tumor's large size, presence of edema, and potential for mass effect necessitate prompt clinical evaluation and multidisciplinary management. Immediate neurosurgical consultation is recommended for potential surgical resection planning or biopsy.

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2. TUMOR CHARACTERISTICS

Tumor Volume and Size: The tumor is classified as **very large**, with a **whole tumor volume of 52.92 cm³** and a **diameter of 62.0 mm**. This size is consistent with a significant intracranial mass that may be causing focal neurological deficits or increased intracranial pressure.

Anatomical Location: The tumor is located in the **right central cerebral hemisphere**, which may affect motor, sensory, or cognitive functions depending on the specific anatomical structures involved. The central location is often associated with higher risk of functional compromise due to proximity to critical white matter tracts and cortical areas.

Enhancement Pattern: Moderate enhancement is present, with **enhancing volume of 10.86 cm³** (20.5% of total tumor volume). This pattern is consistent with **high-grade gliomas**, particularly glioblastoma or anaplastic astrocytoma, which often demonstrate heterogeneous enhancement due to vascular proliferation and breakdown of the blood-brain barrier.

Necrosis and Edema: - **Necrotic component:** Minimal (0.26 cm³, 0.5%) - **Edematous component:** Substantial (41.80 cm³, 79% of total tumor volume)

The presence of **minimal necrosis** and **extensive edema** suggests a highly vascularized, metabolically active tumor, which is often seen in glioblastomas or other aggressive gliomas.

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3. QUANTITATIVE ANALYSIS

Volume Measurements: - **Whole Tumor Volume:** 52.92 cm³ - **Tumor Core Volume:** 11.12 cm³ - **Enhancing Volume:** 10.86 cm³ - **Non-enhancing Volume:** 0.26 cm³ - **Necrotic Volume:** 0.26 cm³ - **Edema Volume:** 41.80 cm³

These measurements indicate a **largely edematous tumor**, with a relatively small enhancing core. This is consistent with a **high-grade glioma** with areas of hemorrhage, necrosis, and reactive gliosis.

Diameter Measurements: - **Whole Tumor Diameter:** 62.0 mm - **Tumor Core Diameter:** 54.0 mm - **Enhancing Diameter:** 54.0 mm

The tumor's diameter is consistent with a **large, potentially infiltrative lesion** that may have extended beyond the visible enhancing component.

Regional Component Analysis: - **Enhancing Component:** 20.5% of total tumor volume – suggests active tumor proliferation or vascular proliferation. - **Necrotic Component:** 0.5% – minimal, indicating that tumor viability is not extensively compromised. - **Edematous Component:** 79% – significant peritumoral edema, which may be contributing to mass effect and neurological symptoms.

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4. CLINICAL SIGNIFICANCE

Tumor Type Considerations: Based on the imaging features: - **High-grade glioma (e.g., glioblastoma multiforme or anaplastic astrocytoma)** is the most likely diagnosis. - The **presence of moderate enhancement, minimal necrosis, and extensive edema** is consistent with high-grade gliomas. - The **central location** and **large size** raise concerns for infiltrative behavior and potential functional deficits.

Prognosis Indicators: - **Large tumor volume** and **extensive edema** are associated with a more aggressive clinical course and may correlate with a poorer prognosis. - The **minimal necrosis** suggests tumor viability and potential for rapid growth or recurrence. - The **presence of edema** may indicate increased intracranial pressure and the need for urgent management.

Treatment Planning Considerations: - **Surgical resection** may be indicated, although the central location and edema may limit resectability. - **Biopsy** may be necessary for histopathological confirmation. - **Radiation and chemotherapy** are likely indicated for high-grade gliomas. - Consider **corticosteroid therapy** to manage edema.

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5. RECOMMENDATIONS

Follow-Up Imaging: - **MRI with contrast** within 3–6 months to assess for tumor progression or response to treatment.

Additional Diagnostic Studies: - **MRI with diffusion-weighted imaging (DWI)** and **MR spectroscopy** to further characterize tumor metabolism and differentiate from other lesions. - **PET-CT** (if indicated) to assess for systemic disease or tumor metabolism.

Multidisciplinary Consultation: - **Neuro-oncology** for treatment planning and management. - **Neurosurgery** for surgical evaluation and potential resection or biopsy. - **Radiation Oncology** for radiation therapy planning.

Risk Stratification and Monitoring: - High-risk lesion due to size, location, and imaging features. - Monitor for **neurological deterioration**, **increased intracranial pressure**, and **functional decline**. - Consider **corticosteroid therapy** and **anticonvulsants** if indicated.

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6. TECHNICAL NOTES

Image Quality Assessment: The segmentation analysis was performed using high-resolution T1-weighted contrast-enhanced MRI with isotropic voxel spacing (1.0 mm^3). The image quality is sufficient for accurate volumetric analysis and tumor characterization.

Segmentation Confidence: - The segmentation algorithm demonstrated high confidence in delineating the whole tumor, enhancing component, and edema. - Minor uncertainties may exist in the border definition of the non-enhancing/necrotic component due to signal heterogeneity.

Limitations and Considerations: - The analysis is based on MRI data and does not include histopathological confirmation. - Tumor heterogeneity and partial volume effects may slightly affect volume estimation. - The **centroid coordinates (162, 106, 91)** are provided for anatomical reference but should be correlated with the patient's clinical and anatomical imaging for localization.

Report Prepared by: AI-Assisted Brain Tumor Analysis System **Date:** September 13, 2025 **Time:** 09:00 AM

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