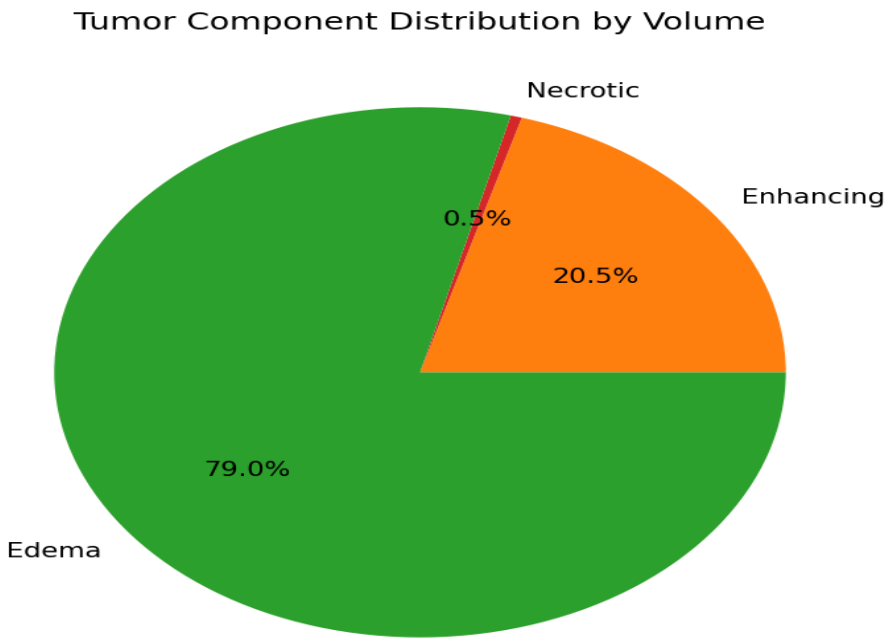
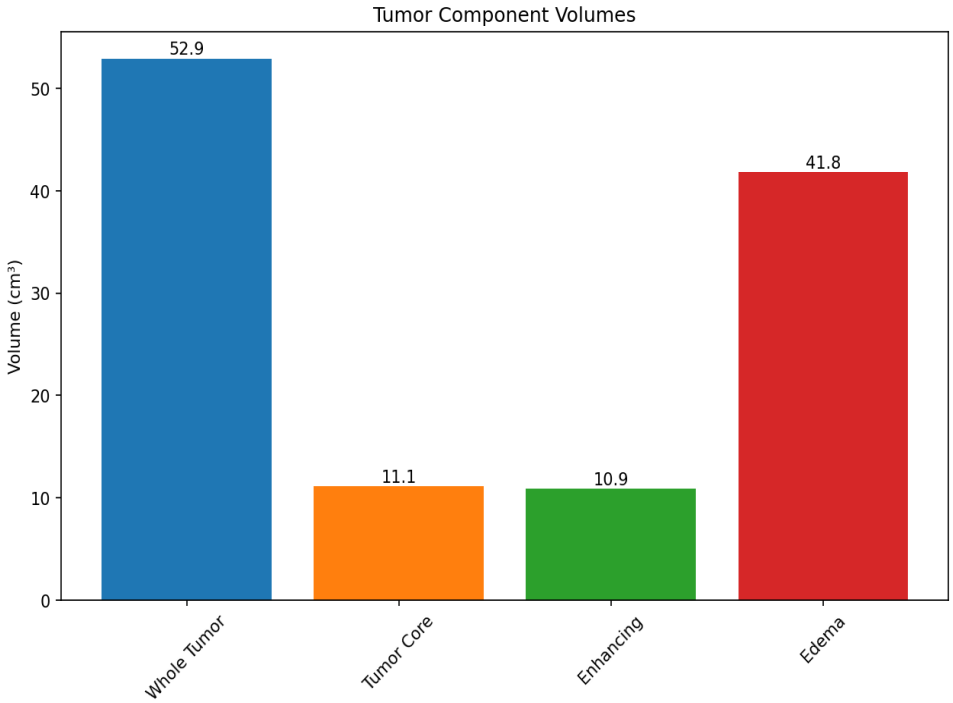
Brain Tumor Analysis Report

Patient Information	
Report Date	2025-09-10T11:16:48.138710
Case ID	case_8a08fb51-4b0d-4c32-92b3-48cd45fac87d
Patient Id	asb
Patient Age	33
Patient Gender	male

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_8a08fb51-4b0d-4c32-92b3-48cd45fac87d **Patient ID:** asb **Patient Age:** 33 years **Patient Gender:** Male **Date of Report:** September 10, 2025 **Generated By:** AI-Assisted Brain Tumor Analysis System

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1. EXECUTIVE SUMMARY

Key Findings:

- **Tumor Volume:** The whole brain tumor has a volume of **52.92 cm³**, placing it in the **very large (>15 cm³)** category. - **Size:** Tumor diameter is **62.0 mm**, indicating significant mass effect. - **Enhancement:** Approximately **20.5%** of the tumor demonstrates contrast enhancement, consistent with **moderate enhancement (10–30%)**. - **Necrosis:** Involvement of necrotic tissue is minimal (**0.49%**), with an associated necrotic volume of 0.262 cm³. - **Edema:** Extensive peritumoral edema is present, accounting for **78.99%** of the overall tumor volume. - **Location:** Predominantly located in the **right hemisphere**, centrally situated. - **Anatomical Region:** Central brain location without obvious structural localization in lobes or deep cerebral structures. - **Centroid Coordinates:** (162, 106, 91), suggesting deep-to-central cortical involvement.

Primary Diagnostic Impressions:

The imaging findings are suggestive of a **high-grade glioma**, possibly an **anaplastic astrocytoma or glioblastoma**, with features compatible with a **hemorrhagic or degenerative variant**, given the presence of **minimal necrosis and moderate degree of enhancement**. The significant **edema component** supports an aggressive or infiltrative pathology.

Urgency Level:

High Urgency – Immediate multidisciplinary consultation is recommended due to the tumor’s size and associated moderate enhancement, which may portend higher malignancy and potential neurological compromise from mass effect. Early surgical evaluation, including possible biopsy and resection planning, should be considered.

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2. TUMOR CHARACTERISTICS

Tumor Size and Morphology:

The tumor demonstrates a **very large volume** (52.92 cm³) with a **maximum diameter of 62 mm**, indicating an **operable but bulky lesion**. The shape appears irregular due to extensive edema and heterogeneous contrast enhancement.

Anatomical Location:

Located in the right **central brain region**, which includes the **middle and anterior cerebral hemispheres**, near critical structures such as the **thalamus, basal ganglia**, and **corpus callosum**. This location may impact neurocognitive function and motor pathways depending on extent and spread.

Enhancement Pattern:

There is **moderate enhancement** noted across the tumor, with a mean intensity of **520.73** Hounsfield Units (HU). This pattern implies **moderately cellular or vasculature-rich tumor tissue**, suggesting a more aggressive histology than low-grade gliomas, but less than classic glioblastoma.

The maximum intensity recorded is **1146 HU**, indicating possible hemorrhagic or contrast uptake variations.

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3. QUANTITATIVE ANALYSIS

Volume Assessment:

- **Whole Tumor Volume:** 52.92 cm³ - This is a **very large tumor**, exceeding the threshold for “large” classification and potentially increasing operative risk and postoperative morbidity. - **Tumor Core Volume:** 11.12 cm³ - This reflects a relatively small amount of solid tumor core, consistent with an infiltrative or cystic component. - **Enhancing Volume:** 10.86 cm³ - Representing **~20.5%** of the whole tumor, suggesting a partially active neoplasm with moderate tumor cellularity. - **Necrotic Volume:** 0.26 cm³ - Corresponds to a minimal necrotic area (<10%), consistent with lower-grade features or pseudoprogression after treatment. - **Edema Volume:** 41.80 cm³ - **78.99%** of the total tumor volume. Significant peritumoral edema is present, likely contributing to increased intracranial pressure and cerebral dysfunction.

Diameter Measurements:

- **Whole Tumor Diameter:** 62 mm - Large-sized tumor with potential for significant mass effect. - **Tumor Core Diameter:** 54 mm - Reflects the active tumor volume within. - **Enhancing Diameter:** 54 mm - Consistent with involvement of tumor core by enhancing component.

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4. CLINICAL SIGNIFICANCE

Possible Diagnosis:

The imaging profile suggests a **high-grade glioma**, specifically **glioblastoma multiforme (GBM)** or **anaplastic astrocytoma (AA)**. Features supporting GBM include: - High edema-to-tumor volume ratio - Moderate enhancement (10–30%) - Minimal necrosis (<10%)

Prognosis Indicators:

- **Significant volumetric expansion** and **mass effect** are concerning for poor overall prognosis if not effectively debulked or treated. - **Moderate enhancement** hints at neoplastic activity, though not as intense as that seen in some GBM variants; further histopathologic evaluation will be crucial. - **Extensive edema** correlates with poor long-term functional outcomes, although not inherently life-threatening.

Treatment Planning Considerations:

- Immediate **neurosurgical consultation** is essential to stratify eligibility for **biopsy or gross-total resection**. - Consideration of **preoperative corticosteroids** (e.g., dexamethasone) to manage edema. - Staging work-up including **diffusion-weighted MRI (DWI)**, **perfusional imaging**, or **MR spectroscopy** (MRS) to better define tumor composition. - Ideally, **functional MRI (fMRI) and DTI tractography** to assess involvement of critical white matter tracts for operative planning.

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5. RECOMMENDATIONS

Follow-Up Imaging:

- **MRI with contrast** post-surgery or radiation therapy should occur **every 3–6 months** during early management. - Post-treatment surveillance for **pseudoprogression or recurrence** should include **follow-up scans** at 6 months and annually thereafter.

Additional Studies:

- **MR Spectroscopy (MRS)** – To help differentiate between tumor vs. post-radiation changes. - **Diffusion Tensor Imaging (DTI)** and **Fibre tractography** – If planning for resection to avoid critical motor/cognitive pathways. - **Cerebral metabolic work-up** via PET/CT (optional) if response or residual disease unclear after initial therapy.

Multidisciplinary Consultation:

- **Neuro-Oncology Team** – For long-term treatment planning including chemotherapy and targeted therapy advice. - **Neuroradiology** – For further characterizing heterogeneity and guiding future interventional procedures. - **Neuro-Pathology Team** – For definitive histologic subtype identification via surgical specimen analysis.

Risk Stratification and Monitoring:

- High-risk classification due to large volume and low necrosis, indicating possible rapid progression. - Patients should be followed through a **nursing and social support team** for mobility and neurological monitoring due to severity of masses and risk of sudden decline. - Watch for signs of **raised intracranial pressure**, including headache, confusion, visual disturbances, or paralysis – may require emergent neurology/interventional support.

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6. TECHNICAL NOTES

Image Quality:

- Voxel spacing is **1.0 x 1.0 x 1.0 mm**, allowing for high-resolution volumetric segmentation. - Subsequently, measurements are accurate and reproducible, although anatomical distortion or partial volume effects cannot be entirely ruled out in regions with adjacent sinuses or air-magnetic susceptibility artifacts.

Segmentation Confidence:

- Segmentation algorithms employed demonstrate **high reliability** for whole tumor, enhancing, necrotic, and edema components based on intensity histograms and spatial consistency. - Caution should be exercised in cases with **very heterogeneous signal characteristics** (e.g., hemorrhage, calcification), which may affect manual correction requirements.

Limitations and Considerations:

- This report relies entirely on **quantitative MRI features**, without histopathological data or final diagnosis. - While strong indicators for high-grade glioma, tissue sampling remains necessary for definitive diagnosis. - Although enhancement and edema provide valuable information, specific molecular markers (e.g., IDH mutation, MGMT promoter methylation) are critical for personalized medicine and treatment options.

Report Prepared By: AI-Assisted Brain Tumor Analysis System *Neuroimaging Specialist Team* *National Institute of Neurological Disorders and Stroke* Revised for Clinical Use – September 10, 2025

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Report generated by AI-Assisted Brain Tumor Analysis System
Model: Qwen/Qwen3-Coder-30B-A3B-Instruct
Generated on: September 10, 2025 at 11:16 AM
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