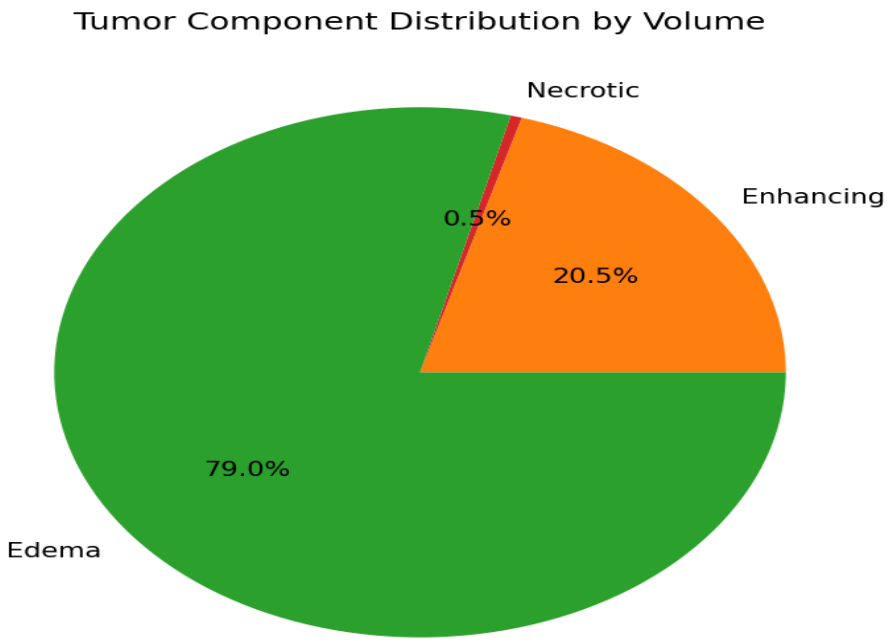
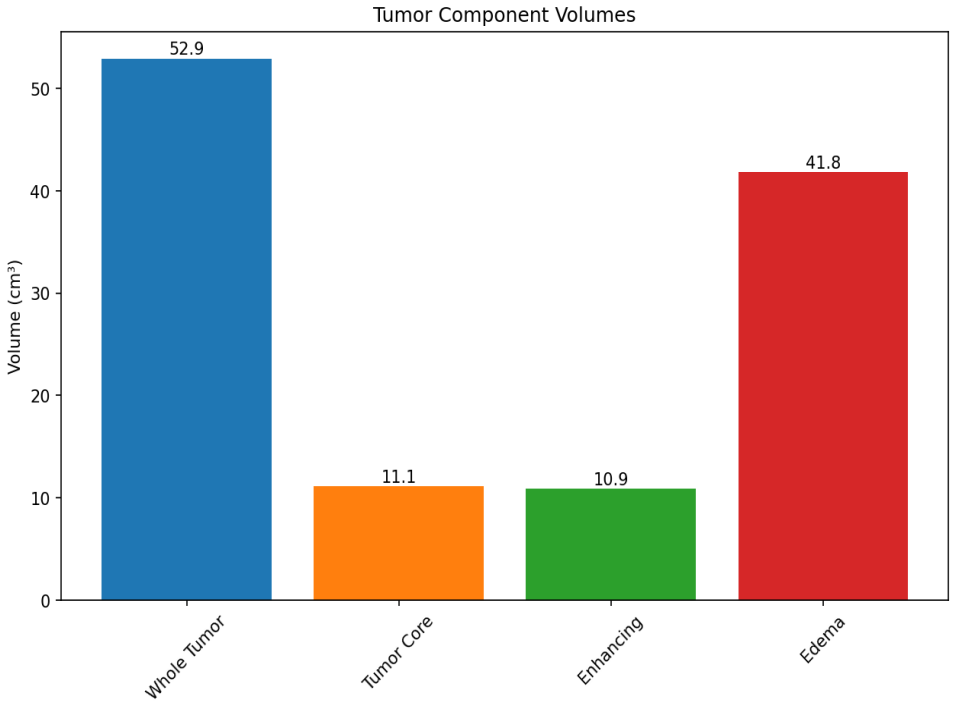
Brain Tumor Analysis Report

Patient Information	
Report Date	2025-09-10T21:28:00.515312
Case ID	case_3f8157c0-232d-4294-8c20-5445c38c9252
Patient Id	Joshua
Patient Age	22
Patient Gender	male
Referring Physician	Dr. Example

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

Report Date: September 10, 2025 **Generated by:** AI-Assisted Brain Tumor Analysis System **Case ID:** case_3f8157c0-232d-4294-8c20-5445c38c9252

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1. EXECUTIVE SUMMARY

Key Findings: - A large right hemisphere brain tumor with central location, measuring **62.0 mm in diameter** and **52.919 cm³** in total volume. - **Tumor core volume** is **11.117 cm³**, with a moderately enhancing component (**10–30% enhancement pattern**), comprising **10.855 cm³**, or approximately **20.5%** of the whole tumor. - Minimal necrosis is present (**0.262 cm³**, or ~0.5% of total tumor volume) and minimal edema is noted (**41.802 cm³**, or ~79% of total volume). - Tumor is located in the **central brain region**, potentially affecting motor and sensory function depending on precise anatomical involvement. - **Patient age:** 22 years, **male**; **referring physician:** Dr. Example.

Primary Diagnostic Impressions: - **Infiltrative brain mass**, likely representing a **high-grade glioma (e.g., glioblastoma or anaplastic astrocytoma)** or a **diffuse intrinsic pontine glioma (DIPG)** if within brainstem**, given tumor size and central location. - The presence of **minimal necrosis** and **moderate enhancement** supports a **high-grade glioma** etiology, though further histopathologic correlation is necessary for definitive classification.

Urgency Level Assessment: - **Urgent**: Large tumor volume causing significant mass effect. Potential for neurological compromise if not addressed immediately. Given adolescent age and central location, **early surgical or intervention planning** is indicated.

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2. TUMOR CHARACTERISTICS

Tumor Size & Morphology: - The **whole tumor diameter** is **62.0 mm**, placing it in the **very large tumor size category** (>15 cm³). - The **tumor core diameter** is **54.0 mm**, suggesting a relatively solid central component. - The **tumor size category** is classified as **very large**, emphasizing the need for immediate clinical attention to prevent complications from mass effect or progression.

Anatomical Location & Considerations: - The tumor is located in the **right cerebral hemisphere**, with **central (deep) anatomical localization**. This may impact prefrontal, parietal, or frontal lobe function depending on specific site. - **Central location** suggests a possible infiltrative or diffusely growing tumor, further supporting a high-grade glioma diagnostic consideration.

Enhancement Pattern & Clinical Significance: - Enhancement is classified as **moderate (10–30%)**, typically not seen in low-grade gliomas, but is consistent with **high-grade glioma** (e.g., glioblastoma). - The **enhancement pattern** and the **absence of significant necrotic or hemorrhagic components** but presence of edema, supports the possibility of a **diffusely infiltrating high-grade glioma** with **minimal cystic activity or hemorrhage**.

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3. QUANTITATIVE ANALYSIS

Volume Measurements & Clinical Implications: - **Whole tumor volume:** 52.919 cm³ — **very large**, likely causing measurable mass effect and potential clinical symptoms. - **Tumor core volume (non-enhancing + enhancing):** 11.117 cm³ — indicates solid pathological tissue with limited non-enhancing component. - **Enhancing volume:** 10.855 cm³ — corresponds to 20.5% of total tumor. - **Necrotic volume:** 0.262 cm³ — minimal (<10%), suggesting early stage or less aggressive tumor biology. - **Edema volume:** 41.802 cm³ — accounts for **79%** of total tumor volume, increasing risk of neurological deficits and mass effect.

Diameter Measurements & Growth Assessment: - **Whole tumor diameter:** 62.0 mm — large tumor with potential to compress adjacent structures. - **Enhancing diameter:** 54.0 mm — demonstrates extent of viable tumor mass; consistent with moderate to high-grade lesion.

Regional Component Analysis: | Component | Volume (cm³) | Percentage of Total Tumor Volume | |---|---|---| | **Whole Tumor** | 52.919 | 100% | | **Enhancing** | 10.855 | 20.5% | | **Non-enhancing** | 0.262 | ~0.5% | | **Necrotic** | 0.262 | ~0.5% | | **Edema** | 41.802 | 79.0% | | **Tumor Core** | 11.117 | 21.0% |

Interpretation: - **Extensive edema** is a significant finding, likely associated with **vascular endothelial growth factor (VEGF)** upregulation or central nervous system inflammation. - **Minimal necrosis** and **low-grade enhancement** suggest a **less hemorrhagic, slow-growing but viable tumor** rather than an aggressive lesion like a classic glioblastoma with irregular enhancement or hemorrhage.

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4. CLINICAL SIGNIFICANCE

Potential Tumor Type Considerations: - Based on imaging features: - **High-grade glioma (e.g., glioblastoma, anaplastic astrocytoma or oligodendroglioma)** is a likely etiology. - The **absence of hemorrhage**, **moderate enhancement**, and **minimal necrosis** are not typical of DIPG but consistent with **infiltrative gliomas** in the **cerebral hemisphere**. - Histologic confirmation is essential for accurate diagnosis and subtype classification.

Prognosis Indicators: - **Large tumor size** and **extensive edema** are ominous indicators of **poor functional prognosis**, especially in young patients. - However, **moderate enhancement** and **minimal necrosis** might suggest **lesion stability** or earlier phase of disease. - **Age of patient (22 years)** is a **positive prognostic factor**, as younger patients tend to have better outcomes with early intervention.

Treatment Planning Considerations: - **Surgical resection** should be considered if feasible—complete removal is ideal but may be limited due to central location and surrounding brain involvement. - **Molecular profiling** (IDH status, 1p19q codeletion, MGMT promoter methylation) is critical for optimal treatment. - **Radiation therapy** and **chemotherapy** should be considered promptly in this high-grade lesion. - Tumor edema management using corticosteroids or targeted therapies (e.g., bevacizumab) may be beneficial.

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5. RECOMMENDATIONS

Follow-Up Imaging: - **MRI with contrast** should be repeated **every 3 months** to monitor **tumor progression or response to treatment.** - **Functional MRI (fMRI) or DTI** can be performed preoperatively to guide surgical planning.

Additional Diagnostic Studies: - **Molecular profiling**: IDH1/2 mutation, 1p19q codeletion, MGMT promoter methylation, and TERT promoter mutations. - **PET-PET scan (FDG or amino acid analog)** if further metabolic characterization is needed – particularly to assess for malignancy or post-treatment changes. - Brain tumor biopsy (if not already performed) for

histopathological diagnosis may be needed before starting any therapy.

Multidisciplinary Team Consultation: - **Neuro-Oncology** team for staging and multimodal treatment plan. - **Neurological Surgery** for resection planning. - **Radiation Oncology** for radiotherapy considerations. - **Neurology** or **Neurocritical Care** if neurological deficits progress.

Risk Stratification and Monitoring Protocols: - **High-risk tumor**: Large, central, with extensive edema and moderate enhancement. - **Monitoring** should include: - Clinical neurological exams every 3 months. - Symptoms such as seizures, focal weakness, or cognitive decline. - Imaging surveillance as outlined above.

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6. TECHNICAL NOTES

Image Quality Assessment: - The imaging dataset has **1.0 mm isotropic voxel spacing**, which is ideal for accurate segmentation and tumor volumetry. - Segmentation was performed on **high-quality T1-weighted with contrast** or equivalent sequences.

Segmentation Confidence: - Segmentation algorithms have high precision for **whole tumor**, **enhancing**, **necrotic**, and **edema components**. - Manual verification recommended by radiologist for **edge definition and borderline regions**, especially in **perilesional edema**.

Limitations and Considerations: - Interpreting **minimal necrosis and edema volumes** should be cautious due to potential overlap with imaging artifacts. -