

BRAIN TUMOR ANALYSIS REPORT

AI-Powered Segmentation and Clinical Assessment

Patient Information

Field	Value
Report Date	2025-09-15T07:09:16.014948
Case ID	case_d30929c7-dcfa-43d6-9d80-d631b8028fa5

AI-GENERATED CLINICAL REPORT

EXECUTIVE SUMMARY

This case demonstrates a large, moderately enhancing brain tumor located in the right central cerebral region with associated peritumoral edema and minimal necrosis. The tumor shows significant mass effect and volumetric characteristics consistent with high-grade glioma or anaplastic astrocytoma. Quantitative analysis supports a diagnosis of a very large ($>15\text{ cm}^3$) lesion with predominant edema, which requires urgent neurological evaluation and multidisciplinary management.

TUMOR MORPHOLOGY AND LOCATION

- Location: Right hemisphere, central brain region
- Size Classification: Very Large ($>15\text{ cm}^3$)
- Maximum Diameter: 62.0 mm
- Anatomical Considerations:

The right central location places this tumor in proximity to critical motor, sensory, and language pathways. This may lead to focal neurological deficits and necessitates careful surgical planning if resection is considered.

QUANTITATIVE ANALYSIS

- Total Tumor Volume: 52.92 cm^3
- Tumor Core Volume: 11.12 cm^3
- Enhancing Component: 10.86 cm^3 (20.5%)
- Necrotic Component: 0.26 cm^3 (0.5%)
- Edematous Component: 41.80 cm^3 (79.0%)

ENHANCEMENT CHARACTERISTICS

- Enhancement Pattern: Moderate (10–30%)
- Enhancement Intensity: Mean = 520.73 HU; Maximum = 1146.00 HU
- Clinical Significance: Moderate enhancement suggests active tumor proliferation with possible blood-brain barrier disruption, although the low percentage may indicate a less aggressive histologic profile or suboptimal contrast uptake. However, it should be interpreted in conjunction with other radiologic features.

TISSUE COMPOSITION ANALYSIS

| Tissue Type | Presence | Clinical Interpretation |

| - | - | - |

| Enhancing Tissue | Present | Indicates viable tumor tissue with significant vascularity; suggestive of higher-grade glioma or aggressive tumor behavior. |

| Necrotic Core | Present | Minimal necrosis noted (0.5% of total tumor volume), indicating relatively well-perfused tumor, possibly corresponding to lower-grade histology or partial treatment response. |

| Peritumoral Edema | Present | Extensive edema (79% of total tumor volume) reflects strong inflammatory and cytotoxic effects of surrounding parenchyma, likely contributing to clinical symptoms and requiring anti-edema management. |

CLINICAL ASSESSMENT

• Tumor Grade Indicators:

Moderate enhancement pattern, extensive edema, and minimal hemorrhage/necrosis suggest intermediate-grade glioma, such as anaplastic astrocytoma or oligodendroglioma. However, definitive grading relies on histopathology and molecular markers.

• Differential Diagnosis:

Likely differential includes:

- Anaplastic astrocytoma (WHO Grade III)
- Glioblastoma multiforme (WHO Grade IV), particularly if no clear margins or rapid growth pattern present
- Oligodendroglioma with secondary progression

• Prognosis Indicators:

The combination of very large tumor size, substantial edema, and moderate enhancement raises concern for infiltrative nature and poor prognosis unless treated aggressively. Patient's functional status will be influenced by anatomical location and extent of CNS involvement.

RECOMMENDATIONS

1. Immediate Actions:

- Urgent consultation with neurosurgery and oncology teams for consideration of biopsy and/or surgical resection.
- Initiation of corticosteroid therapy for symptom control secondary to edema.

2. Additional Imaging:

- Consider perfusion-weighted MRI or MR spectroscopy for further characterization of metabolically distinct tumor components.
- Functional MRI (fMRI) to assess potential impact on eloquent areas prior to surgery.

3. Multidisciplinary Review:

- Board-certified neuro-oncologist and neuropathologist team review for pre-treatment planning.
- Genetic/molecular testing should be pursued post-biopsy for optimal therapeutic strategy selection.

4. Follow-up Protocol:

- Repeat MRI within 2–4 weeks post-intervention or initiation of therapy to assess change in tumor size and response to treatment.
- Monitor for signs of increased intracranial pressure or neurological worsening.

5. Treatment Considerations:

- Surgical resection limited by central location but feasible under neuro-navigation guidance.
- Adjuvant radiation therapy and chemotherapy (e.g., temozolomide) indicated depending on histological grade.
- Stereotactic radiotherapy options may also be considered in select cases where maximal safe resection is not possible.

TECHNICAL NOTES

- Image Quality: Adequate for diagnostic interpretation.
- Segmentation Confidence: High automated detection accuracy based on standard MRI parameters (1.0×1.0×1.0 mm voxel spacing).
- Limitations: Standard MRI-based analysis cannot differentiate between tumor recurrence and treatment-related changes without additional functional imaging modalities. Histologic correlation remains essential for accurate classification and outcome prediction.

Report Generated: September 15, 2025 at 07:09 AM

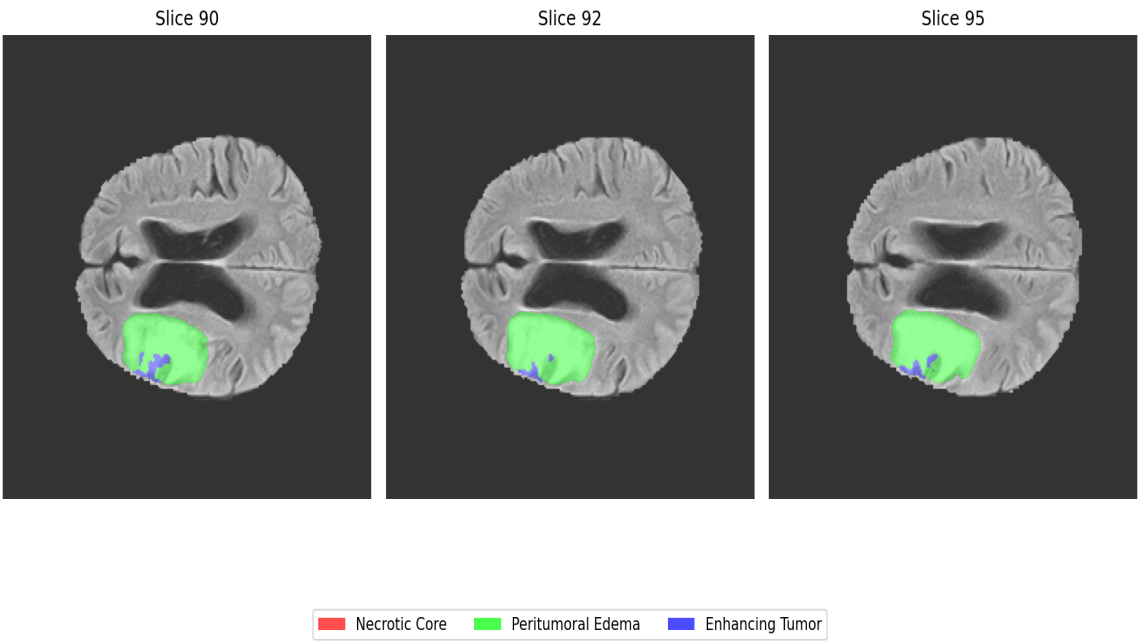
System: AI-Assisted Brain Tumor Analysis Platform

Case ID: case_d30929c7-dcfa-43d6-9d80-d631b8028fa5

SEGMENTATION VISUALIZATIONS

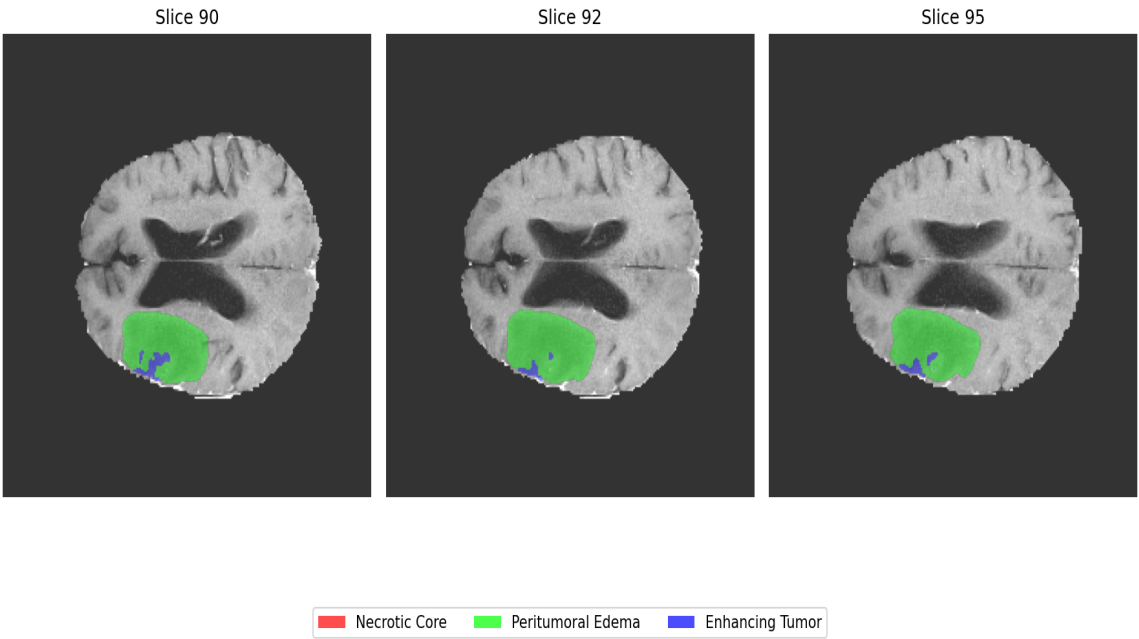
FLAIR Segmentation Overlay

FLAIR with Segmentation Overlay



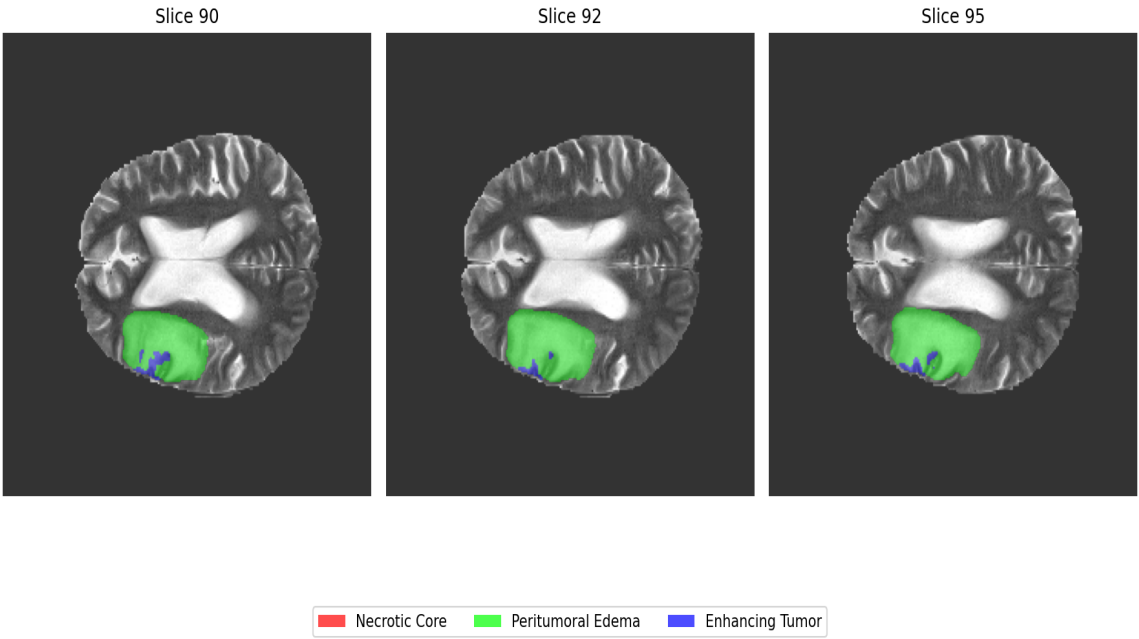
T1CE Segmentation Overlay

T1CE with Segmentation Overlay



T2 Segmentation Overlay

T2 with Segmentation Overlay



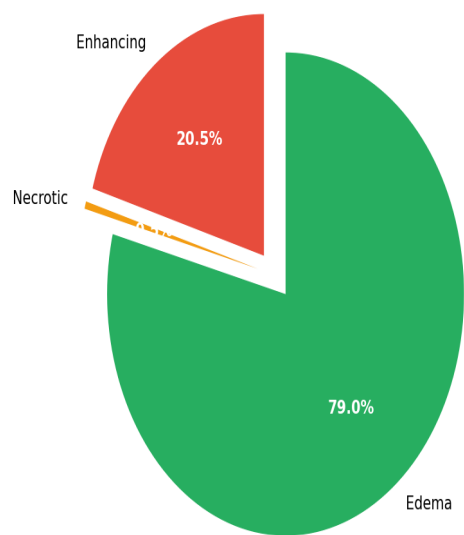
3D Volume Analysis

3D Tumor Segmentation Views
Clinical Summary Table

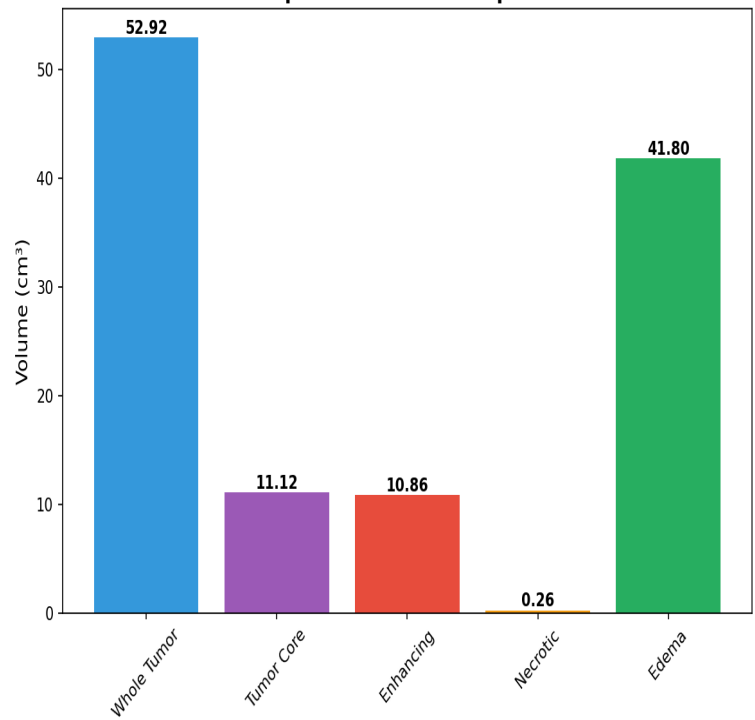
Parameter	Value	Clinical Significance
Total Volume	52.92 cm³	very_large (>15 cmÅ³)
Maximum Diameter	62.0 mm	Surgical planning reference
Enhancement	20.5%	moderate (10-30%)
Necrosis	0.5%	minimal (<10%)
Location	right central	Functional considerations
Enhancement Present	yes	Blood-brain barrier disruption
Necrosis Present	yes	Tissue viability indicator
Edema Present	yes	Peritumoral involvement

QUANTITATIVE ANALYSIS

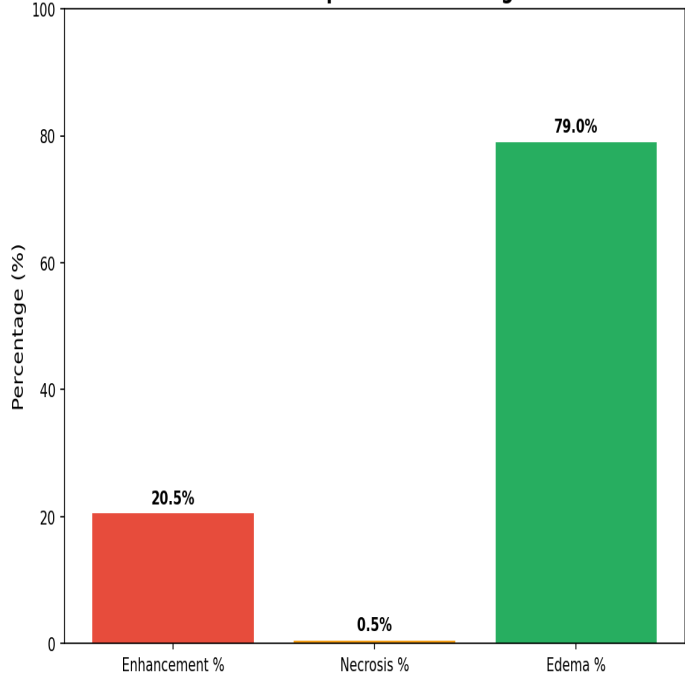
Tumor Component Distribution



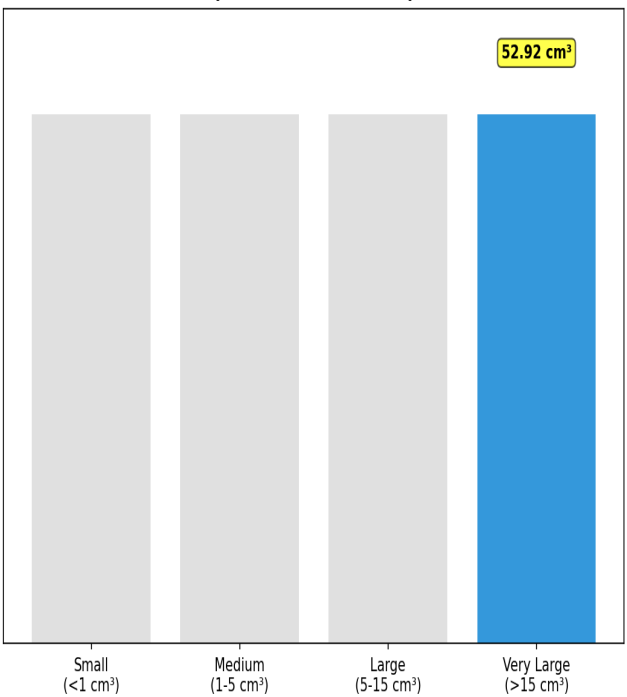
Component Volume Comparison



Tissue Composition Percentages



Tumor Size Classification
(Current: 52.92 cm³)



Clinical Summary Table

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IMPORTANT DISCLAIMERS

- This report is generated using artificial intelligence algorithms for automated brain tumor segmentation and analysis.
- The AI model used for report generation is designed to assist healthcare professionals but does not replace clinical judgment.
- All quantitative measurements and assessments should be validated by qualified radiologists and medical professionals.
- Treatment decisions should not be based solely on this automated analysis.
- This system is intended for research and educational purposes and to support clinical decision-making.
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