## Title and Author

Include Title of your submission and any collaborator as co-authors Title: Anaplastic Astrocytoma

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### **Introduction or Patient History**

The patient was a 71-year-old female who completed radiation therapy and chemotherapy following gross total resection of her anaplastic astrocytoma. The patient has been having trouble with reading, speech, and memory. She also has trouble naming objects and word finding, and she is unsteady on her feet. Previous imaging studies at this institution include Brain MRI's.

#### Patient Preparation and Scan Set up

A GE Signa HDx 3.0 Tesla MR scanner was used for this study. The subject was screened prior to the MRI exam according to MRI safety guidelines and changed into a hospital gown, removing any ferrous material from her body. The patient was positioned supine and head first in the GE 8-Channel High Resolution Brain Array coil. Earplugs were used for noise reduction and patient comfort. The patient was immobilized with a strap across her forehead and sponges on both sides of her head. A cushion was placed under the patient's knees and the patient was covered with a blanket for comfort. The patient was also given an emergency squeeze ball to use if necessary.

### MR Imaging Parameters

Eleven sequences were performed on this patient's brain to evaluate tumor resection.

3 Plane Localizer:

Pulse sequence type: FIESTA TR: 3.2 TE: .9 Slice thickness: 10cm thick/ skip 5cm FOV: 24 Bandwidth: 125 kHz Number of signal averages: 1 Matrix: 256x128 Sagittal T1 FLAIR: Pulse sequence type: Inversion Recovery Manufacturer's identification and parameters: Flow Compensation, Sequential, Tailored RF TR: 2178 TE: 10.4 Echo Train: 7 TI: 883 Slice thickness: 5cm thick/ skip 2.5cm FOV: 22 Bandwidth: 41.7 kHz Number of signal averages: 1 Matrix: 448x224 Axial T1: Pulse sequence type: Fast Spin Echo Manufacturer's identification and parameters: Flow Compensation, Sequential, Tailored RF TR: 2335 TE: 10.2 Echo Train: 7 Slice thickness: 5cm thick/ skip 1cm FOV: 22 Bandwidth: 41.7 kHz Number of signal averages: 2 Matrix: 512x224 Axial T2 FLAIR: Pulse sequence type: Inversion Recovery Manufacturer's identification and parameters: Tailored RF TR: 9502 TE: 128.1 TI: 892 Slice thickness: 5cm thick/ skip 1cm FOV: 22 Bandwidth: 31.2 kHz Number of signal averages: 1 Matrix: 352x224 Axial T2: Pulse sequence type: Fast Spin Echo, Propeller Manufacturer's identification and parameters: Tailored RF

TR: 6500 TE: 84.6 Echo Train: 32 Slice thickness: 5cm thick/ skip 1cm FOV: 22 Bandwidth: 62.5 kHz Number of signal averages: 1.5 Matrix: 512x512 Axial Gradient: Pulse sequence type: Gradient Echo Manufacturer's identification and parameters: Flow Compensation, ZIP512, Extended Dynamic Range TR: 600 TE: 9.4 Slice thickness: 5cm thick/ skip 1cm FOV: 22 Bandwidth: 31.2 kHz Number of signal averages: 1 Matrix: 448x224 Axial Diffusion weighted images: Pulse sequence type: Spin Echo, Echo Planar Imaging Manufacturer's identification and parameters: Asset TR: 7000 TE: 84.6 Slice thickness: 5cm thick/ skip 1cm FOV: 22 Bandwidth: 250 kHz Number of signal averages: 2 Matrix: 128x128 Tensor Asset: Pulse sequence type: Spin Echo, Echo Planar Imaging Manufacturer's identification and parameters: Asset TR: 9000 TE: 83.4 Slice thickness: 3cm thick/ skip 0 FOV: 22 Bandwidth: 250 kHz Number of signal averages: 1 Matrix: 128x128 15mL Multihance (gadolinium-based contrast material) is injected intravenously Post Gadolinium Axial T1 FLAIR: Pulse sequence type: Inversion Recovery Manufacturer's identification and parameters: Flow Compensation, Sequential, Tailored RF TR: 2389

TE: 9.3 TI: 892 Echo Train: 7 Slice thickness: 5cm thick/ skip 1cm FOV: 22 Bandwidth: 41.7 kHz Number of signal averages: 2 Matrix: 448x224 Post Gadolinium Coronal T1 FLAIR: Pulse sequence type: Inversion Recovery Manufacturer's identification and parameters: Flow Compensation, Sequential, Tailored RF TR: 2800 TE: 9.4 TI: 892 Echo Train: 7 Slice thickness: 5cm thick/ skip 1cm FOV: 22 Bandwidth: 41.7 kHz Number of signal averages: 2 Matrix: 448x224 Post Gadolinium Sagittal T1 FLAIR: Pulse sequence type: Inversion Recovery Manufacturer's identification and parameters: Flow Compensation, Sequential, Tailored RF TR: 2178 TE: 10.43 TI: 883 Echo Train: 7 Slice Thickness: 5cm thick/ skip 1cm FOV: 22 Bandwidth: 41.7 kHz Number of signal averages: 1 Matrix: 448x224

#### **Findings and Discussions**

There is a cystic mass in the left parieto-occipital region, which has increased in size from the previous study. The mass measures 4.1cm anterior to posterior x 3.3cm right to left x 2.8cm superior to inferior. There is increased contrast enhancement along the outer border of the mass, likely indicative of tumor recurrence. There is also a lesion in the area of the left cerebropontine angle, which appears isointense on T1 and T2 weighted images and which enhances post contrast administration. This likely represents a stable meningioma.

The MRI exam was done to follow up on the patient postcraniotomy and tumor resection. There is a cystic mass in the patient's left parieto-occipital region. The fact that the tumor has increased in size since her previous brain MRI and shows increasing peripheral enhancement means that it most likely represents a reoccurrence of her anaplastic astrocytoma.

An astrocytoma is a type of tumor that arises from brain cells called astrocytes. Astrocytes are relatively large, star-shaped cells that make up the supportive tissue of the brain. They have tentacle-like projections that join with nerves and blood vessels. Anaplastic astrocytomas are also called Grade III astrocytomas or malignant astrocytomas. (The word "anaplastic" means malignant.) They are most common in adults ages 30-50, and they are more common in men than in women. Anaplastic astrocytomas account for about four percent of all brain tumors. These are aggressive and rapidly growing tumors. They often have tentacle-like projections that invade neighboring tissue, making them difficult to fully remove in surgery. Treatment usually consists of surgical resection, followed by radiation therapy and/or chemotherapy.

# References

American Brain Tumor Association. (2004) <u>A Primer of Brain</u> <u>Tumors: A Patient's Reference Manual, 8<sup>th</sup> Edition</u>. Retrieved April 10, 2007 from: <u>http://www.abta.org/pdf/ABTA%20Primer-</u> <u>Chapter%206.pdf</u>

Damjanov, Ivan. (2006) <u>Pathology for the Health Professions</u>, 3<sup>rd</sup> <u>Edition</u>. St. Louis: Elsevier Inc.

National Brain Tumor Foundation. <u>Tumor Types: Glial Tumors</u> (<u>Gliomas</u>). Retrieved April 10, 2007 from: <u>http://www.braintumor.org/patient\_info/surviving/tumor\_types/gliom</u> <u>as.html#aa</u>

Poage, David. MRI examination dictation, staff radiologist. Nebraska Medical Center. March 23, 2007.

# Images

Axial T2



Axial T2 FLAIR



Sagittal T1 FLAIR



Sagittal T1 FLAIR Post Contrast



Axial T1 FLAIR Post Contrast



