

ENGL 121: Styles of Academic and Professional Prose
Professor Randi Epstein

By submitting this essay, I attest that it is my own work, completed in accordance with University regulations. —Karen Tian

Unthinkable

by Karen Tian

One hundred years ago, a 10-year-old girl was diagnosed with glioblastoma multiforme, a deadly brain tumor¹. Wearing neither masks nor rubber gloves, Dr. Harvey Cushing—the nation’s first neurosurgeon—hazarded the tumor’s location, drilled into the skull, missed, then plucked out bits of rotted brain with bare fingers.

Three years ago, 52-year old Rick Schneider was diagnosed with glioblastoma multiforme. Using state of the art imaging technology, Dr. Lisa DeAngelis—chair of Neurology at Sloan-Kettering Memorial Hospital—pinpointed the tumor and treated with rounds of chemotherapy and radiation².

Both patients died. Despite improvements in sanitation and medical technology, one thing hasn’t changed: glioblastoma multiforme kills.

Unlike tumors of the body, glioblastoma multiforme are stubborn (they regrow after surgical removal) and aggressive (they inflame the body’s control center), which means that even benign growths can pose serious health problems. Of the different breeds of brain tumors, glioblastoma is the deadliest, with only 3% of patients surviving more than three years³. What makes these tumors so tricky to treat is described in the name—multiforme—coined by Cushing

¹ C. Pendleton et al. "Harvey Cushing's surgical treatment of a pediatric patient with an intraventricular glioma." *Pediatric Neurosurgery* 46.6 (2010): 475-9.

² Rick’s Place – What’s New with Him. Blogspot, 2008. Web. 27 April 2008.

³ Dietmar Krex et al. “Long-term survival with glioblastoma multiforme.” *Brain* 130.10. (2007): 2596-2606.

in 1926⁴. “It’s pronounced multi-*form-e*. It’s got that little *e* at the end,” enunciates Dr. Gary Correnti, a University of Pennsylvania-trained neurosurgeon at the Sybert Institute in Fort Myers, FL. Multi-*form-e* means multiple forms. Metastases, tumors of the body that spread to the brain, ripen like peaches, with a contained pit of cancerous cells encased by fleshy rings. Unlike metastases, glioblastomas grow in multiple locations. On an MRI or CAT scan, the tumor may look like one big clump, but microscopically, the cells of malignancy fan out several inches beyond the central pit. Neither surgery nor radiation nor chemotherapy can remove all the tiny projections without also hurting the brain, which makes glioblastoma multiforme essentially incurable⁵.

Although they can grow anywhere in the brain, glioblastoma multiforme typically sprout in one of the two hemispheres, and not the brainstem—the trunk to tree-like brain—or cerebellum—the “little brain” managing motor control⁶. Called brain tumors because they tenant in the brain, glioblastoma are not technically tumors of nerve cells, but cells that give the brain its supportive structure, called glia⁷. Glioblastoma eat away at glia, crumbling the brain’s architecture until all that’s left is termite debris. Without its framework, the brain becomes spongy and porous. The tumored tissue curdles and chars, white and black like grizzled fat on a half-eaten steak.

Snaking between folds of brain, glioblastoma multiforme grows inconspicuously. “By the time it’s diagnosed, it’s been cooking for a while,” Art Belanger, autopsy technician at the Yale

⁴ Kimberley Mak, “Imaging in Glioblastoma Multiforme: Diagnosis, Treatment, and Follow-Up.” (presentation, Harvard University Lieberman’s Learning Lab, May 19, 2009).

⁵ Gary Correnti. Personal Interview. 7 April 2014.

⁶ James Knierim, *Neuroscience Online* (Houston: UTHealth, 1997), <http://neuroscience.uth.tmc.edu/s3/chapter05.html>. Web.

⁷ “Glioma,” UCLA Neurosurgery, accessed April 27, 2014, <http://neurosurgery.ucla.edu/body.cfm?id=159>.

School of Medicine, explains⁸. Hidden by scalp and skull, brain tumors aren't the reason patients seek medical care. Instead, something else is askew. Patients present with headaches, seizures, or symptoms traceable to the damaged brain region: motor center tumors mean motor problems; speech center, speech problems; visual center, blindness.

For Rick Schneider, it was none of the above. His wife, Tami, suspected problems when Rick “started becoming extremely strange. Just bizarre.” He was falling asleep at odd hours. “He was changing his passwords on every device because he couldn't get in. He couldn't remember and then he'd change his password and then he couldn't remember what he changed it to.” One morning, Tami awoke to find a bath mat, sopping wet, draped over the kitchen sink. “What's going on?” she asked Rick. He couldn't remember.

Tami dragged her husband to the emergency room. An ET, MRI, and 24 hours later, they were presented with terrible news. Tami had joked about Rick having a brain tumor, but never expected it to be the truth⁹.

Even after the presence of tumor is confirmed by imaging and physical exam, it is not until surgeons crack open the skull to peer into brain that the type of tumor—benign, metastatic, or glioblastoma—can be confirmed. When Dr. Correnti detects a tumor, he is candid and frank. “Listen,” he tells patients. “You have a tumor. We don't know what it is.” He presents the statistics of brain tumor types, from slow growing grade I to lethal stage IV glioblastoma¹⁰. “The learning curve...the lingo...the words,” Tami recalls. “It's a crash course in one of the most complicated things you'll ever have to have a crash course in.” The doctor checks for growths in

⁸ Arthur Belanger (autopsy technician) in discussion with the author, April 10, 2014.

⁹ Tami Schneider. Personal interview. April 10, 2014.

¹⁰ “Tumor Grades and Types,” *National Cancer Institute*, accessed April 27, 2014, <http://www.cancer.gov/cancertopics/wyntk/brain/page3>.

other parts of the body (which would indicate metastases), and makes a decision on whether or not to perform surgery.

The majority of the time, that decision is operate. Images of the patient's brain are fed to a computer, which splits the brain into a grid and spits out coordinates of tumor. This cutting edge technology, called brainless stereotaxy, draws a roadmap for surgeons, who no longer have to fumble and find like Cushing with his bare fingers. Roadmap in hand, surgeons begin craniotomy—the chipping away of skull to peep into squishy brain beneath. The patient's hair is shaved and head seat-belted into place. The skin and muscle are cut to reveal skull, on which tiny burr holes are drilled based on the stereotactic data. Then it's a game of connect the dots. Tracing the burr holes, surgeons jigsaw the skull with a high-speed drill until they hit dura – the thick white covering of the brain¹¹.

Sometimes, the tumor comes right to the surface. Splashed against the uniform pinkish-yellow of healthy brain are spots of discoloration. The spots may be gray, purplish if there is blood, or pale if the vessels are dry. These are the tumors. Other times, the tumor is wedged deep into the brain, so looking alone does not do the trick. Doctors must feel their way through, sifting rubbery, firm tumor from soft, gelatinous brain. “So we make little cuts in the blood vessels and then we use suction,” describes Dr. Correnti. “And then we'll suck out some soft, suckable brain. If we get to something and it doesn't go up the sucker, that's when you know it's tumor.”

Harvey Cushing operated without gloves, stereotactic computers, or suckers. Still, one hundred years have passed and the life expectancy of a patient with glioblastoma multiforme

¹¹ Correnti.

hasn't budged. This statistic Dr. Correnti never offers unless asked. On average, patients with treated glioblastomas live nine to fourteen months. Untreated, about three¹².

The treatment of glioblastomas began in the 1920s with Harvey Cushing at Yale. Beneath Yale's ivory towers lies an unexpected scene from a horror movie, a Hannibal Lecter feast of jars upon jars of brains dipped in formaldehyde. Past the tangle of industrial pipes and forgotten furniture, venturesome medical students would congregate not for *Skull and Bones*, but another cranially named society – the Brain Society. The Brain Society was Cushing's playground. A Yale graduate and the father of modern neurosurgery, Cushing documented his patients with obsessive frenzy, stuffing over 500 diseased and tumor (mostly glioblastoma) pocked brains into the medical school's abandoned dormitory basement¹³.

Deceptively named, The Brain Society was not so much a society as a badge of audacity worn by medical students gutsy enough to crawl into a basement brimming with brains. Admittance to the society was straightforward: simply sign your name on a poster board¹⁴. The society did not do much else, so maintaining membership was even easier. Finding the tumor room was the challenge.

Today, finding a glioblastoma is easy. Removing one is the challenge. After shaving the scalp, chipping the skull, peeling the dura, and sucking the brain, surgeons nudge the brain with retractors, on the lookout for more diseased tissue. But unlike the clustered peach pit growth of metastases, glioblastoma multiforme expands in microscopic tendrils. Clearing the tendrils is like

¹² Ibid.

¹³ Zara Kessler, Visiting Yale's Brain Collection, *Yale Daily News*, March 23, 2012, <http://yaledailynews.com/blog/2012/03/23/kessler-visiting-yales-brain-collection/>.

¹⁴ Members were not only brave, but "brainy," signing in with names like Mike "Hippocampus" Schlosser, Prem "Queen Amygdala" Bhat, and José "Hole in the Head" Prince.

picking up confetti after a NYC parade—impossible to fully remove. One piece overlooked can paint Manhattan in tumors, which multiply and infiltrate nearby cells.

“You can’t get all these little spots,” Dr. Correnti laments. “So you don’t want to be overly aggressive taking tumor out that’s not going to make a difference because you’re not going to end up curing somebody. You may leave a little behind, so you don’t remove an important part of the brain.” Brain tumors can’t be resected as unabashedly as tumors of the skin or colon, where the consequences of excising a little extra are not life threatening. “For me, every brain cell is important,” Art Belanger points to his balding head. “I killed off too many [of my own] in the 70s.” The doctor must make a judgment call for when to stop, which in brain surgery typically errs on earlier rather than later. When the surgeon signals stop, the dura is re-stitched, the skull screwed in, scalp flap closed, and hair regrown.

The statistic states that after two months of recovery, patients have about a year, symptom free, to check items off bucket lists before glioblastoma multiforme wins. The problem with statistics, Dr. Correnti explains, is that they describe the group, not the individual. A patient can live far longer or shorter. Rick, for instance, experienced a “big bounce” after surgery. “We didn’t expect him to be as good as he was post-op,” Tami said. The spring following diagnosis, a series of clean scans and a get-well letter from President Bush boosted the Schneiders with “cautious optimism¹⁵.” Between Temador¹⁶ (chemo in pill form) and Avastin¹⁷ (a drug stunting blood vessels in hopes of starving tumor), the Schneiders remained upbeat and festive. For Halloween, the kids—Casey and Brady—dressed up as Thing 1 and Thing 2, with the family

¹⁵ Tami Schneider, *Rick’s Place – What’s New with Him* (blog), February 8, 2008 to April 5, 2010, <http://rhs51.blogspot.com/>.

¹⁶ “Temador Temozolomide,” *Merck Connect*, accessed April 27, 2014, <https://www.merckconnect.com/temodar/overview.html?hcpUser=yes>.

¹⁷ “How Avastin is Designed to Work,” *Avastin Bevacizumab*, accessed April 27, 2014, <http://www.avastin.com/patient/gbm/about>.

dog—Bumpy—as the Cat in the Hat. For Valentine’s, Rick sported hot pink socks in the hospital. When chemo coaxed Rick and Tami from Valentine’s dinner at PerSe, PerSe came to them, delivering chicken soup to the clinic. Rick was part of the 30%—surviving two years following diagnosis¹⁸.

For other glioblastoma patients, like Abbie and BethAnn, the bleak numbers are incredible motivators. Abbie¹⁹ considers herself one of the “lucky ones.” She was diagnosed with glioblastoma multiforme, which typically hits those in the 60s or 70s, when she was 21. A dancer, Abbie trained harder than ever after receiving her diagnosis—attending the American Dance Festival summer intensive at Duke University and teaching girls at the Alta Vista School how to spin and shimmy. “The diagnosis of a brain tumor does not mean the end of being able to do the things you wish to do,” says BethAnn²⁰, who fulfilled her life-long dreams of running in the Boston Marathon and Ford Lake Placid Ironman Triathlon, twice, after diagnosis.

For Dr. Correnti, these cases are the most challenging, emotionally, because he can relate. Statistically, glioblastoma strike the elderly, but occasionally, the tumors afflict someone like Rick, Abbie, or BethAnn: young, still a kid, or with kids not much older than his two own. Tami couldn’t hide anything from Casey and Brady (middle schoolers when their dad was diagnosed) because Rick’s “behavior was very peculiar.” That was the most frustrating part, Tami reveals. “When you’re dealing with someone with brain cancer, unlike cancer of pretty much any other

¹⁸ “Glioblastoma,” *American Brain Tumor Association*, accessed April 27, 2014, <http://www.abta.org/brain-tumor-information/types-of-tumors/glioblastoma.html>.

¹⁹ Abbie, “Silver Lining,” *National Brain Tumor Society*, accessed April 27, 2014, <http://www.braintumor.org/join-the-fight/share-your-story/stories/silver-lining.html>.

²⁰ BethAnn, “BethAnn’s Story,” *National Brain Tumor Society*, accessed April 27, 2014, <http://www.braintumor.org/join-the-fight/share-your-story/stories/bethanns-story.html>.

part of your body, it affects your ability to think.” With glioblastoma, Rick “wasn’t the guy that he was.”²¹

Although the outcomes of glioblastoma multiforme have not changed, surgery has. From the raw sawing of limbs—amputations—in the 17th century to Cushing’s surgeries to the stereotactic techniques today, doctors are delving deeper into once “sacred” and untouchable cavities of the brain²². For Dr. Correnti, who was driven to neurosurgery by influences both external (his father joked that he could be anything he wanted, after becoming doctor) and personal (his younger brother died of a brain tumor at age 8), neurosurgery is as an unexpectedly beautiful practice. “The first time you do it, you know, there’s no feeling like it,” he reminisces. “It’s the ultimate thing because that’s what you’ve trained for that’s what you’ve wanted to do and it’s really kind of an amazing thing... which is weird because you know the person on the other side has this death sentence.”

Scientists are trying to sever the synonymy between glioblastoma multiforme and death sentence. At Duke University, the nation’s hub of neuroscience research, scientists are testing novel therapies: leukapheresis (separating blood cells to improve blood flow to the brain), dendritic cell vaccines (injecting immune system cells to fight brain tumors), and different chemical cocktails for chemotherapy²³. At the Cancer Genome Atlas, researchers have identified four molecular subtypes of glioblastomas, with patients of one subtype surviving more than 50% longer than the others²⁴. Scientists hope that better understanding these subtypes will tailor

²¹ Tami Schneider.

²² Michael Bliss, *Harvey Cushing: A Life in the Surgery* (New York: Oxford University Press, 2007), 85.

²³ “Clinical Trials/Studies,” *The Preston Robert Tisch Brain Tumor Center*, accessed April 27, 2014, <http://www.cancer.duke.edu/btc/modules/ClinicalTrials4/index.php?id=2>.

²⁴ “Glioblastoma Multiforme,” *The Cancer Genome Atlas*, last modified January 3, 2014, <http://cancergenome.nih.gov/cancersselected/glioblastomamultiforme>.

treatment and perk prognoses. Will these treatments work? “We don’t know,” Dr. Correnti admits. “We don’t know.” Despite the uncertainty, scientists are hard at work concocting ways to clear malignant confetti, so that for the Rick, Abbie, BethAnn, and the 9,000 Americans diagnosed with glioblastoma multiforme each year,²⁵ diagnosis will not mean death.

²⁵ Stuart Grossman and Juliette Batara, “Current management of glioblastoma multiforme,” *Seminars in Oncology*, 31.5 (2004): 635-644.

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