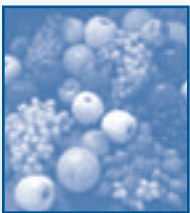


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Brain Tumors Defined

Brain tumors are typically categorized as primary or secondary. Primary brain tumors start in the brain and can be cancerous or non-cancerous. Secondary brain tumors (metastatic, cancerous brain tumors) are more common. These tumors result from cancer that started elsewhere in the body and spread (metastasized) to the brain.

Primary brain tumors may be classified in two categories:

- **Gliomas:** astrocytomas, oligodendrogliomas (mixtures of oligodendroglioma and astrocytoma elements), and ependymomas. Most gliomas involve critical brain tissue in such a way that surgical removal is not possible.
- **Non-gliomas:** non-cancerous tumors, like meningiomas and pituitary adenomas; or cancerous tumors like primitive neuroectodermal tumors (medulloblastomas), primary central nervous system (CNS) lymphomas, and CNS germ cell tumors.

Diagnosis and Diagnostic Testing

Brain tumor diagnosis usually begins with a physical exam by a *neurologist*, which includes checking vision, hearing, balance, coordination and reflexes. A biopsy is usually required to diagnose a brain tumor and confirm its type.

There are different kinds of tests a doctor may order to help in diagnosing a brain tumor.

- **Magnetic Resonance Imaging (MRI)** uses magnetic fields to create images of the brain. MRI scans outline the normal brain structures in great detail. Sometimes a special dye is injected into the bloodstream to make tumors more distinguishable from healthy tissue (MR angiography). MRI is more sensitive than CT scanning for confirming the presence of a brain tumor.
- **Other brain scans** such as magnetic resonance spectroscopy (MRS), single-photon emission computed tomography (SPECT) or positron emission tomography (PET) scanning, help physicians gauge brain tumor activity and blood flow. These scans can be combined with MRIs to help physicians understand the effects of a tumor on brain activity and function.
- **Computerized Tomography (CT)** uses a sophisticated X-ray machine linked to a computer to produce detailed, two-dimensional images of the brain, which can be helpful in certain types of tumors, especially ones close to or involving bone.
- **Angiogram** involves a special dye that is injected into the arteries to locate blood vessels in and around a brain tumor.
- **X-rays** of the head and skull may show changes in the skull bones that could indicate a tumor. However, an X-ray is far less sensitive than brain scans and is not used often.



Treatment Options

Brain tumor treatment at Mayo Clinic is a team process. A patient may see several Mayo Clinic specialists from the brain tumor treatment team. Generally, a neurologist who has expertise and additional training in neuro-oncology will coordinate the care team. Because new treatments continually develop, several options may be available for patients at different points in their treatment.

- **Surgery**

Surgery is the initial therapy for nearly all patients with brain tumors. The goal of surgery is to remove as much of the tumor as possible while minimizing damage to healthy tissue. Some tumors can be removed completely; others can be removed only partially or not at all. Partial removal helps relieve symptoms by reducing pressure on the brain and reducing the size of the tumor to be treated by radiation or chemotherapy.

 - **Computer-assisted neurosurgery** allows surgeons to precisely map the brain and more accurately and aggressively treat brain tumors.
 - **Intraoperative MRI** provides the neurosurgeon with real-time data on tumor size and location.
 - **Awake brain surgery** is used for tumors that involve brain regions that control functions like speech and movement. The surgery is performed with the patient awake during segments of the operation. The patient's responses to questions allow the medical team to more precisely identify critical brain regions and minimize injury during tumor removal.
 - **Lasers** are sometimes used to remove tumors.
- **Radiation Therapy**

Radiation therapy is an essential component of treatment for many patients with brain tumors. Radiation is often the primary treatment for patients with metastatic brain tumors.

 - **External-beam radiation** is a traditional form of radiation therapy that delivers radiation from outside the body. The treatment schedule depends on the tumor type.
 - **Fractionated stereotactic radiotherapy (FSR)** is a technique that minimizes damage to normal tissue by carefully targeting radiation. The treatment involves many smaller treatments rather than one big dose of radiation.

- **Stereotactic radiosurgery** is effective for well-defined *lesions* such as meningioma or limited brain metastases. Radiosurgery precisely targets the tumor with high doses of radiation, while sparing nearby normal tissue.

- **Chemotherapy**

Although chemotherapy provides only modest benefit for many patients with brain tumors, it plays an increasingly important role in pain relief.
- **Other Drugs**

Corticosteroids are very important for controlling increased pressure in the brain and reducing tumor size. Other drugs are sometimes given after surgery to prevent or control seizures.
- **Innovative Techniques**

Innovative techniques such as gene therapy also are available under research protocols.

Research

Mayo Clinic Cancer Center is one of only four cancer centers to receive a National Cancer Institute sponsored Specialized Program of Research Excellence (SPORE) grant for brain cancer research. In December 2004, this \$10.8 million grant offered over five years was awarded to assist principle investigators Brian Patrick O'Neill, M.D., Mayo Clinic Rochester neurologist; and Robert Jenkins, M.D., Ph.D., Mayo Clinic Rochester molecular geneticist, and their research team across all three Mayo sites to focus research on adult gliomas, the most common form of tumors that originate in the brain or spinal cord tissue.

Many individuals receiving treatment also participate in clinical trials and associated research at Mayo Clinic Cancer Center. This large patient base forms the foundation of the neuro-oncology research program. The program's goal is to identify brain tumor biology and to develop treatments that result in improved outcomes and quality of life for patients with primary brain tumors.

Mayo Clinic participates in numerous clinical trials for brain and nervous system tumors, including trials sponsored by Mayo Clinic and the National Cancer Institute (NCI) through the North Central Cancer Treatment Group (NCCTG).

For more information on brain tumors or available clinical trials, visit www.mayoclinic.org or www.clinicaltrials.gov.

Nutrition Q and A

By Jacalyn See, Registered Dietitian

Q Should cancer survivors follow a low-fat diet?

A. Contrary to widespread belief, there is limited evidence suggesting that dietary fat is a cause of cancer. However, fat is very high in calories and can easily contribute to being overweight or obese, and excess body fat is linked to at least six types of cancer. Eating a low-fat diet to help maintain a healthy weight may reduce your chance of developing recurrent or new cancers, heart disease or diabetes. If you are underweight, fat is actually good for you. Because fat is a very concentrated source of calories, it can help you increase your caloric intake without eating large portions.

Q Which supplements should cancer survivors take?

A. *The Expert Report – Food, Nutrition, Physical Activity, and the Prevention of Cancer*, released in November 2007 by the American Institute for Cancer Research (AICR), recommends that individuals not rely on supplements for cancer protection, but to meet their nutritional needs through diet alone. There will be exceptions to this rule for people who are identified to have deficiencies of certain nutrients. Whole foods offer many nutrients necessary for cancer protection, including fiber, vitamins, minerals and phytochemicals (plant chemicals). But experts still do not know if taking these substances alone will provide the same benefits, and taking them in high doses can be dangerous.

Another review of research published this year in the *Journal of the National Cancer Institute* (Vol. 100, n. 11), suggests that cancer patients undergoing treatment avoid *antioxidants* and other high dose supplements. High dose supplements may decrease the effectiveness of radiation or chemotherapy, or even make the *toxicities* of these treatments worse. The antioxidants may protect the cancer cells from harm just like they protect normal cells. Most doctors would agree that a multivitamin mineral supplement with no more than 100 percent of the daily recommended value is OK, and likely a good idea for patients who have difficulty eating.

Q I'd like to start eating more fruits and vegetables but worry about the pesticides. How can I protect myself from pesticide toxicity?

A. Eating fruits and vegetables has many benefits and no convincing evidence indicates that pesticides and additives increase cancer risk. The American food supply is the safest in the world due to government regulations of both the food supply and pesticide levels. Government agencies including the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), and the U.S. Department of Agriculture (USDA) set safety limits based on the maximum amount of pesticides someone could consume in a 70-year life span, and inspect both domestic and imported foods for illegal amounts of pesticides.

It is still a good idea, however, to consider:

- Selecting produce without mold, cuts or decay
- Scrubbing under running water
- Discarding outer leaves
- Eating a variety of foods



Uncovering Miracles

‘Targeted treatment’ uses individualized medicine model to give new hope to patients with recurrent brain tumors

By Nicole Brekke Sisk



David Rose, glioblastoma brain tumor patient and five-year survivor.

Spend any time talking to David Rose and you'll likely hear about his wife, Natalie, or his son, Owen. He may tell you about his job delivering movies to theaters, or about his latest bowling game. And if you ask about his ever-present baseball cap, you'll surely discover that the Boston native is a devoted fan of the New England Patriots.

What you're less likely to discover is that the baseball cap does more than represent Rose's allegiance to his favorite team; it also hides scars from two surgeries Rose underwent for treatment of *glioblastoma*, an aggressive brain tumor.

"It's still hard to talk about," says Rose, age 36.

But it's getting easier. That's because his story, once a nightmare, is starting to look like it may have a happy ending thanks to a unique treatment Rose is receiving at Mayo Clinic. A combination of drugs tailored specifically for glioblastoma has given Rose and a handful of patients like him hope for the future.

Looking for answers

Rose's medical odyssey began five years ago, when an ordinary night suddenly turned terrifying.

"My wife and I were watching TV, and I had a *grand mal seizure*," says Rose. "My wife freaked out and called an ambulance. I was taken to Baptist Medical Center South in Jacksonville and had a CT scan. They referred me to Mayo Clinic."

At Mayo Clinic Florida, Rose had an MRI and met with Kurt Jaeckle, M.D., neurologist, and Robert Wharen, M.D., neurosurgeon. Rose was told he had a brain tumor, and was scheduled for surgery to remove the tumor two days later.

"I was a little scared because they said they had to go in right away, but for the most part I wasn't worried," says Rose. "I was 31 and felt invincible. I thought Dr. Wharen would go in, take out the tumor and I'd be fine. It just didn't sink in how serious this was."

Rose had surgery, followed by radiation and chemotherapy treatments. Every six months, he had an MRI to check for tumor *recurrence*. For a while, it looked like he was cured.

But in September 2006, an MRI showed the tumor was back. Since the standard treatment course had failed to cure Rose's cancer, Dr. Jaeckle suggested Rose enroll in a clinical trial studying the effectiveness of a cancer drug.

When the medication — which made Rose quite ill — failed to shrink his tumor, Rose had a second surgery. Just a few months later, an MRI showed the tumor was growing again. It looked like Rose was running out of options.

"Dr. Wharen felt it was impossible to operate a third time without a serious risk of impairing David's function," says Dr. Jaeckle. "In addition, because he'd had more than one recurrence, David was no longer eligible for any of our clinical trials. Eligibility criteria are created to protect patients from the risk of toxicity from

multiple exposures to the drugs, but they also put people like David in a catch-22: they need to be involved in a trial to get treatment, but they aren't eligible for most trials."

At 34, with a young son, Rose no longer felt invincible. His own mortality was suddenly very real.

"At that point, it really sunk in that I might die," says Rose. "I started planning goodbye video messages. I was going to leave a long videotape for my son."

Finding new hope

Rose became depressed. He immersed himself in work, and avoided talking about his condition. For a while, he even kept the difficult news from his wife.

But then Dr. Jaeckle offered Rose a new possibility: he could try a new treatment regimen Dr. Jaeckle had heard about that was still being tested and was showing promise. The treatment combines two drugs — Avastin and CPT-11 — commonly used to treat other types of cancer.

The doctors thought that, used together, the two drugs might have an effect on Rose's tumor that other drugs had not been able to produce up to that point.

"Avastin is FDA-approved for treating colon and lung cancer, and CPT-11 is FDA-approved for treating colon cancer, and both have recently been found to show promise for treating recurrent glioblastoma," says Dr. Jaeckle. He refers to this as "targeted therapy" and says it's a step toward realizing the potential of individualized medicine.

Dr. Jaeckle says he's more excited about treatment options today than he's been in his entire 25-year career.

"For a long time now, our options were limited to surgery, radiation and chemotherapy; it's very exciting to have so many new treatment agents being developed," he says. "There's enormous potential on the horizon. In 20 years, cancer treatment will look very different than it does today."

Into the future

Targeted therapies are already making a real difference in the lives of patients like David Rose. Since he began the Avastin/CPT-11 regimen in May 2007, Rose's tumor has virtually disappeared.

"My MRIs went from showing a tumor the size of an orange to nothing," says Rose. "I don't know how to explain it. I went from bad, to worse, to being 100 percent again."

Dr. Jaeckle says it's personally gratifying to see Rose's response to treatment.

"To see someone like David walk the gauntlet and not fall off helps keep us going," says Dr. Jaeckle. "It helps to see a response like this because so many of our patients don't make it."

Rose will continue the Avastin/CPT-11 regimen as long as it keeps his tumor at bay with manageable side effects.

He has treatment every other Friday, and usually feels a little nauseous afterward.

"I'm pretty achy on Saturday and usually spend the day in bed, but by Sunday I feel a lot better," he says.

Rose, whose goals for the future include watching Owen graduate from high school and college, says a Saturday in bed is well worth the return.

"It's all worth it when I see my wife smile or see my little one running around," he says. "When I feel the worst, just looking at my wife and child help me hang on and keep going. I feel blessed. I feel like it's a miracle that I'm here."

Dr. Jaeckle says Rose, himself, is part of that miracle.

"David's attitude has much to do with his survival," says Dr. Jaeckle. "He wants to be here. He wants to see his child grow up. I'll take my doctor hat off for a minute and say that I truly believe that there's more to tumor control than just medicine."



Anna Willson and Kurt Jaeckle, M.D., Neurology, Jacksonville, help patients find treatment options for difficult cancers. They also work with patients and insurance companies to obtain coverage for the novel treatments that may meet resistance because they are not yet proven.

(Photo by Daniel Hubert)



Cancer Terms

Antioxidant

A substance that protects cells from the damage caused by unstable molecules during normal cell metabolism. Antioxidants include beta-carotene, lycopene, vitamins A, C, and E, and other natural manufactured substances.

Corticosteroid

Any steroid hormone made in the adrenal gland. They are also made in the laboratory. Corticosteroids have many different affects in the body, and are used to treat many different conditions.

Glioblastoma

A fast-growing type of tumor that forms from glial (supportive) tissue of the brain and spinal cord that has cells that looks very different from normal cells. Glioblastoma usually occurs in adults and affects the brain more often than the spinal cord. Also called grade IV astrocytoma, glioblastoma multiforme, and GBM.

Grand mal seizure

Convulsion; a sudden, involuntary movement of the muscles.

Lesion

An area of abnormal tissue; which may be benign (noncancerous) or malignant (cancerous).

Neurologist

A doctor who specializes in the diagnosis and treatment of nervous system disorders.

Recurrence

Cancer that has come back, usually after a period of time during which the cancer could not be detected.

Targeted therapy

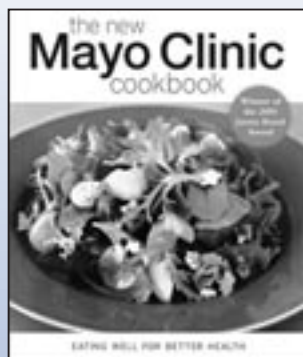
A type of treatment that uses drugs or other substances, such as monoclonal antibodies, to identify and attack specific cancer cells without harming normal cells.

Toxicity

The extent to which something is harmful.

Definitions obtained from www.cancer.gov. Defined terms are italicized in the newsletter.

Book Review



The New Mayo Clinic Cookbook: Eating Well for Better Health

Oxmoor House International, 2006, ISBN 9780848728120, \$24.95

Based on recommendations from Mayo Clinic's healthy weight pyramid, this visually appealing cookbook includes simple recipes using fresh ingredients to provide lower calorie and lower fat options for a healthy diet. Of the over 150 recipes, each is accompanied by a full page photo and a nutritional analysis listing. Recipes focus on few ingredients but a natural blend of herbs and spices to enhance flavor.

Offering a wide range of comfort foods as well as regional fare, this cookbook offers recipes prepared in a way to enhance the appetite of any consumer. A glossary includes information on recipe ingredients as well as information on how to cook them to achieve the freshest taste possible. This book is written in an easy-to-read format that focuses on personal choice in meal preparation and would serve well as a compass to healthy eating during one's cancer journey.

Young Adults and Cancer

By Jeri Lensing, American Cancer Society Navigator



Nearly 70,000 young adults in their late teens to early thirties are diagnosed with cancer each year. The news unfortunately often comes at a point in their lives when they are sorting through their educational opportunities, work experiences and lifestyle options. Suddenly their focus is redirected to learning more about their cancer, exploring treatment options and managing the challenges that accompany a cancer diagnosis.

Many young adults face an additional challenge if they don't have health insurance. They may no longer be covered under their parents' insurance policy, may not have been working long enough to qualify for insurance, or work for an employer that does not offer insurance.

Other challenges that young adults with cancer may encounter include:

- Maintaining their independent living situation
- Living far from their family
- Peer support system
- Privacy
- Dating, intimacy, relationships, or fertility
- Maintaining a sense of "normal"
- Inexperience with medical systems and medical professionals
- Managing their medical treatment

The following resources are available to assist in managing these challenges:

- American Cancer Society
www.cancer.org
- Cancer Care, Inc.
www.cancercare.org
- Cancer Hope Network
www.cancerhopenetwork.org
- Fertile Hope
www.fertilehope.org
- Lance Armstrong Foundation
www.livestrong.org
- Mayo Clinic
www.mayoclinic.org
- National Cancer Institute
www.cancer.gov
- National Coalition for Cancer Survivorship
www.canceradvocacy.org
- OncoLink
www.oncolink.com
- Patient Advocate Foundation
www.patientadvocate.org
- Planet Cancer
www.planetcancer.org
- Young Cancer Spouses
www.youngcancerspouses.org

For more information or assistance, contact a local American Cancer Society Navigator at 800-227-2345 or visit www.cancer.org.



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*Angela Young
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Calendar of Events

September 2008

13 Multiple Myeloma Charitable Foundation 5K Walk/Run

7:00 a.m. registration
Essex Park
Rochester, Minn.
<http://mmcf.wordpress.com/events-5k-walkrun/>

21 Join the Journey Ten Mile Breast Cancer Awareness Walk

7:30 a.m. registration
Mayo High School
Rochester, Minn.
<http://www.jointhejourney.us/index.cfm>

25 Light the Night Walk
The Leukemia & Lymphoma Society
Jacksonville, Fla.
800-868-0072
<http://www.lightthenight.org>

27 Women's Cancers 2008: Merging Science and Care
8 a.m. – 3:15 p.m.
Phillips Hall, Siebens Building
Mayo Clinic
Rochester, Minn.
507-266-4886

For information and a listing of annual health observances, visit <http://www.healthfinder.gov>.

Event Spotlight

Sept. 25, 2008

Light the Night Walk

The Leukemia & Lymphoma Society
Jacksonville, Fla

The Light the Night Walk is the Leukemia & Lymphoma Society's nationwide evening walk. Walkers carry illuminated balloons to celebrate and commemorate the lives touched by cancer. Funds raised will support efforts to cure leukemia, lymphoma, Hodgkin's disease and myeloma, and to improve the quality of life of patients and their families.

Anyone can participate; children, adults, and seniors are all welcome. This is a casual walk with no fitness requirements.

For more information, call 800-868-0072 or visit <http://www.lightthenight.org>.

together

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The mission of Mayo Clinic Cancer Center is to provide compassionate, state-of-the-art care for the patient with cancer today and continued advancements in the prevention, diagnosis, treatment and cure of cancer in the future. The programs and services of the Cancer Center span the three Mayo Clinic campuses in Arizona, Florida and Minnesota.

together newsletter provides educational information for cancer patients, their family, caregivers and friends. Physicians, staff and cancer patients write the articles. To view the **together** newsletter online, visit www.mayoclinic.org/cancer-education-rst.

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