More Effective Drug Delivery to Brain Tumors Expected for the Future

Mark Saltzman, PhD, the Goizueta Foundation Professor of Chemical and Biomedical Engineering at Yale University, has devoted his career to researching methods to more effectively deliver chemotherapy to the most aggressive forms of brain tumors. Saltzman worked with an interdisciplinary team for over a decade to develop what is now the standard of care for treating brain tumors. Referred to as Gliadel® wafers, they are degradable implant polymers that contain chemotherapy and are implanted at the tumor site in the brain during surgery. “We are using the drugs in a different way, we are putting them in the hands of the surgeons,” said Saltzman. “It is used on the most aggressive forms of primary brain cancer where the survival rate isn’t that great.” Glioblastoma multiforme is the most common and aggressive type of primary brain tumor, accounting for 52% of all primary brain tumor cases and 20% of all intracranial tumors. The median survival rate is less than a year.

Gliadel® wafers were approved by the FDA for the treatment of brain tumors in 1996. Previous to this, a new treatment for brain tumors had not been approved in 25 years. According to Dr. Saltzman, this approval marked great promise and hope. Gliadel® wafers work by slowly releasing chemotherapy. 90% is released in the first couple days, and the remaining 10%, over the next couple of months.

Although there are many patients currently benefiting...
David Shoehalter knew cancer affected his family because before he was even born his dad’s sister died of breast cancer at the age of 52. He knew that cancer existed, but it did not really affect him personally until his father was diagnosed in 2003 with early-stage prostate cancer at age 79. He was treated successfully with radiation therapy. It never occurred to David that these two cancers might be linked.

Then, a year ago David’s father was diagnosed with breast cancer. It came as a surprise because David never realized that men could develop breast cancer. Shockingly, within the same week that his father was diagnosed, his 47-year-old sister was also diagnosed with breast cancer. When cancer hit his immediate family in this way, it was an awakening. Since male breast cancer is so uncommon, David’s father had genetic testing and learned that he carries a mutation in the BRCA2 gene. It was suggested that all of his children be tested for the mutation.

A month later during his annual physical David asked his family physician about measures that should be taken in regards to his risk of getting breast cancer. His doctor had never dealt with male breast cancer and was not sure what steps should be taken to monitor David. After being told to do self breast exams and have yearly mammograms, he was referred to the Yale Cancer Center Genetic Counseling Program where he decided to have genetic testing done to see if he carried the BRCA2 mutation found in his family. It was suggested that all of his children be tested for the mutation.

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“Genetic testing helped alleviate some of his fears and concerns for the future. ’It was not a difficult decision for me, deciding whether or not to have the testing done. It was a no–brainier, I needed to know. For me there was never a question.’”

David met with Ellen and received the genetic counseling that is provided before the test is ordered to ensure that the test was ordered and interpreted correctly. Ellen prepared him for what lay ahead. “She explained everything to me and we discussed what a positive and negative result would mean. She drew out a family tree and it was very helpful to see the pattern that had evolved in my family.” It was a very easy and positive experience for David that wasn’t painful or invasive, but more like giving blood.

In David’s view it was better to know, but he understands why people would be afraid to have the test done. Either way, according to David, you have to deal with life as it comes. He is happy with his decision to have the genetic testing and recommends it to people who are at a greater risk for cancer and want to be prepared. “Genetic testing is such an important part of the future of cancer. In my mind it’s better to know so you can take any steps necessary to keep yourself healthy, which is the most important thing you can do.”
2006. He credits his successful treatment and care to members of the Yale Cancer Center Thoracic Oncology Program, who guided him through his treatment. “Let’s celebrate a moment as great as today in the fight against cancer. When all of the dedicated people of Yale Cancer Center are in the same building, it will be amazing. Other patients will become a thriving survivor like me,” Sclafani said.

“‘We can only dream about the day when the building isn’t needed because we’ve found a cure for cancer.’

Joel Smilow

Yale University President Richard C. Levin also expressed gratitude for the Smilows’ donation. “This generous gift will have a lasting impact on the lives of countless patients who will benefit from the state-of-the-art clinical care,” he said. “We are deeply thankful for Joel and Joan’s dedicated support.”

An active philanthropist and long supporter of Yale University, Smilow was the presiding officer, from 1999 to 2004, of his Yale College Class of 1954, which in the early 1970s started a fund that grew to $60 million and ultimately totaled $120 million. In addition, Mr. and Mrs. Smilow have provided generous funding to five other medical institutions, including New York University Medical Center and Johns Hopkins University. He is also an active supporter of the Boys & Girls Club of America and the New York Philharmonic.

“This opportunity responded to my interests both in medical care and, because of the close involvement of the hospital with Yale School of Medicine, medical research. The third factor was supporting Yale. This confluence of positive things made it something I was delighted to be able to do,” Mr. Smilow explained.

Mr. Smilow said that he also hopes the gift will free up other funds “that can be used for the medical school, to enable Dean Alpern to aggressively recruit more of the world-class scientists that are needed to move research ahead.”

“Great facilities,” he said, “help you attract and motivate outstanding people and make it easier for them to interrelate with one another. That’s where the longer-term payoff comes. The immediate benefits - providing a better place for healing and helping tens of thousands of victims of cancer - are obvious. We can only dream about the day when the building isn’t needed because we’ve found a cure for cancer.”

The Smilow Cancer Hospital will be a 14-story, nearly 500,000 square-foot building with advanced diagnostic and treatment facilities. The largest healthcare project in Connecticut’s history, it will integrate all of Yale’s cancer services, including inpatient and outpatient facilities for adults and children.

“I look forward to the end of 2009 when we have another celebration and we will see patients coming to take advantage of all the tremendous resources at this institution to begin their healing and find hope,” Smilow said. ✦
Yale Cancer Center, Yale-New Haven Hospital, and non-profit Friends of Cancer Research recently co-sponsored a town hall entitled, “Discovery to Delivery: A Public Forum about the Future of Cancer Research.” This informative event, which was open to the public, helped open the eyes of many to the concerns confronting the future of cancer research. Various issues were discussed, including new research focused on cancer prevention and early detection, the need for increased federal funding, and the collaboration required to achieve these goals.

Hosted by Susan Dentzer, Health Correspondent for the News Hour with Jim Lehrer,  

Yale Cancer Center has numerous support groups available for our patients and their families. For more information, please go to yalecancercenter.org/patient/support or call 1-866-YALECANCER.
Contribute to Yale Cancer Center and Make an Impact on Cancer

Dedicated to bringing tomorrow’s best cancer treatments and cures to patients today, Yale Cancer Center is a leader in cancer research and patient care. Its excellence has long been supported by the generosity of individuals, businesses, corporations, and foundations. Private philanthropy has made a significant impact on Yale Cancer Center’s efforts to understand, prevent, and detect cancer and treat patients who need care. The case for continued financial support has never been stronger so please consider a contribution today.

There are many reasons to make a gift to Yale Cancer Center

* To help complete the Smilow Cancer Hospital capital campaign.
* In memory or honor of a loved one or friend.
* To celebrate a special occasion.
* To recognize a physician, nurse, or caregiver.
* In lieu of holiday gifts or wedding favors.
* For your own personal intentions.

Every gift makes a difference

The cumulative effect of many gifts can be very significant. The power of your gift is increased many times over when it joins others in the fight against cancer. Your contribution will support frontline efforts to combat the disease.

The impact of your gift is direct and significant

We invite you to join us in our fight against cancer by becoming a donor to Yale Cancer Center. Charitable contributions come in many shapes and sizes – through outright cash gifts, a pledge payable over a period of 3 – 5 years, planned gifts, special events, and other creative philanthropic projects. If you have questions when considering your next gift to Yale Cancer Center, please contact us at (203) 436-8526. Our Development staff is here to help you with your philanthropic plans and decisions.

For online information please go to yalecancercenter.org/involved
from this treatment, it is not perfect. Therefore, Dr. Saltzman and his team continue to develop new ideas and methods. “This treatment is not a cure so we must continue to work on new generations of systems,” explained Dr. Saltzman. “The wafers are able to deliver high doses of chemotherapy, but are limited to a relatively small area. We’re looking now at using particles instead of implants so that we can increase the area that the drug reaches.” These particles measure 100 nanometers, as opposed to the dime sized wafers, and will be able to release chemotherapy to other parts of the brain as well. They will be infused through a needle or catheter rather than implanted, so they will be able to reach areas of the brain that surgical devices cannot. High doses of chemotherapy will still be released slowly into the brain, but in a much more controlled and effective way. Animal studies have already shown that these particles, when injected, have stopped the growth of aggressive tumors. According to Dr. Saltzman, “There is enhanced uptake of the drug, longer circulation, and better targeting of the cancerous cells. Most importantly, there are fewer side effects. Polymeric drug delivery systems are new tools for cancer therapy.”

Nanoparticles have only been studied for the last decade and are still considered new technology. Dr. Saltzman and his team at Yale are doing exciting research looking at ways to engineer these nanoparticles, or designer particles. “Our hope is to be able to take synthetic polymers, put antibodies on their surface, and have the antibodies direct the degradable synthetic polymer to the location of the tumor,” he explained. Theoretically, this will enable the drug to be packaged with many individual molecules that can be individually designed to match the tumor present in a particular patient. This will allow doctors to control

“It is exciting because it opens up a new way of thinking about how chemotherapy drugs are delivered to patients. We know that some drugs work well, but what we need are new ways of thinking to deliver high doses of potent drugs to patients.”

Mark Saltzman, PhD