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Device tested to treat aggressive brain tumors

March 26, 2013 by DELTHIA RICKS / delthia.ricks@newsday.com

Separate clinical trials under way on Long Island and in the city are attempting to prove that electrical-field therapy can effectively treat the worst form of brain cancer, which has been on the rise in recent years.

Glioblastoma is the most aggressive form of brain cancer and carries a dismal prognosis. Only 26 percent of patients are alive two years after diagnosis, doctors say.

Medical investigators at the Long Island Brain Tumor Center in Rockville Centre and at the Mount Sinai Hospital in Manhattan have embarked upon trials that, while similar, are fundamentally different in scope.

Both are testing a skullcaplike device that contains embedded electrodes, so-called transducer arrays. Nine of them alternate round-the-clock permeating each patient's brain with electrical field energy.

At the brain tumor center, an arm of Neurological Surgery Pc, a practice in Nassau and Suffolk counties, doctors are treating a half dozen patients whose brain tumors have recurred.

The study is designed to prevent further tumor growth with the energy.

"It's low-intensity, about 200 kilohertz, and generates an electrical field in two perpendicular directions," said Dr. Paul Duic, a neuro-oncologist and the center's co-director.

He added that some patients have not joined the trial because it requires them to shave their heads.

Patients must remain bald, Duic said, to allow the electrical energy unfettered access to the brain.

Patients must wear the cap 18 hours a day for an indefinite amount of time, or until the tumor is no longer held in check by the fields.

At Mount Sinai, the same device is being tested in a clinical study of brain cancer patients following surgery.

That investigation is designed to prevent recurrence altogether. This is a new use of the device, which was approved by the Food and Drug Administration in 2011 in a trial similar to Duic's.

"Glioblastoma is very difficult to fight because it has a recurrence rate that is 98 percent," said Dr. Isabelle Germano, lead investigator at Mount Sinai.

Germano noted that standard therapy for glioblastomas consists of chemotherapy and radiation.

"Even with aggressive treatment the tumor comes back and life expectancy is very limited," Germano said. "We recommend 20 hours a day, taking it off to shower, to be free of it for a little while.

"But we know that 98 percent of patients recur within a year, so we encourage them to keep it on for 12 months."

Made by Novocure, a medical device company with U.S. operations in New Hampshire, the treatment system is called the NovoTTF. TTF stands for tumor-treating fields. The system requires a portable power pack into which the cap is wired.

The new clinical trials come as the incidence of glioblastoma and other forms of brain cancer continue to escalate, according to the National brain Tumor Society in Boston. No one can explain why.

Clinical trial data presented to the FDA for approval two years ago showed the device worked as well as chemotherapy in preventing recurrences. The longest surviving patient has been using the system six years, Duic said.

Both doctors say the fields interrupt mitosis, the process by which a cell divides, creating two new identical ones.

Neurons, key brain cells underlying all higher human functions, are non-dividing and remain unscathed by the energy bombardment. Only rapidly dividing tumor cells are disassembled by the fields, Germano said.With inconclusive studies driving a fear of cell phones and power lines, the choice of round-the-clock electrical field exposure may seem an unlikely choice for brain cancer therapy.

"The jury is still out as to whether cell phones cause brain tumors," Duic said. There is a lot of [discussion] about it but it has not been conclusively proven and I am not convinced that it's true."

Killing cancer with electrical fields

System is portable and delivers energy called "TTFields" or tumor-treating fields to the brain

Small electrode-like pads -- transducer arrays -- embedded in a cap connect to a battery-driven power pack. The cap connects to the power supply through wiring.

When the transducers are placed on patients' shaved heads, contact with the skin allows a low-intensity, alternating electric field to permeate

the skull.

The fields inhibit the replication of rapidly dividing cancer cells, leaving healthy brain cells unscathed.

Patients are freed from additional rounds of chemotherapy, which carry side effects and reduce immunity

Device maker, Novocure in New Hampshire, tested the system in more than 200 people to determine whether it could kill cancer cells -- and it did.

Sources: Novocure; Dr. Paul Duic

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