Cancer: India's New Treatments

A new device offers patients hope.

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Parthasarthy Rengarajan, an ear, nose, and throat surgeon in Bangalore, walks out of his clinic after seeing over 30 patients, flashes a smile, and gets ready to drive back home. No one would guess that the 57-year-old doctor was diagnosed 18 months ago with a deadly form of cancer—an aggressive brain tumor called glioblastoma multiforme.

Having lost all hope with standard treatment, he decided to try a new, experimental treatment being tested locally—and it worked so well that Dr. Rengarajan was back to operating on others in no time.

"I am over 80 percent fit with no trace of any recurrence yet," he says. Dr. Rengarajan and scores of others with terminal cancer have survived far beyond the time physicians gave them, thanks to a new technology called Rotational Field Quantum Magnetic Resonance.

RFQMR is similar to conventional MRI (magnetic resonance imaging) but functions very differently in the way it attacks tumors. Since there was no control group in its Phase I trial, and therefore no measure of how RFQMR results compare to conventional therapy, hard comparative data won't emerge until the Phase II trial. However, the new therapy surpasses what chemotherapy and radiation can do in curing sufferers, a proponent contends. What's more, it costs only a quarter of what chemo costs, says Rajah Vijay Kumar, the chief scientific officer at Scalene Cybernetics' Center for Advanced Research and Development.

Advances in RFQMR and better, cheaper ways to diagnose cancer early are welcome advances in India, where 700,000 new cases of cancer are detected every year. About 50 percent of patients die now, half the survival rate of cancer patients in developed countries.

More than 75 percent of cancer cases in India are detected too late. Lack of awareness, poverty, and a dearth of inexpensive diagnostics all contribute to this deadly spiral.

Despite its fast-growing biotech sector, which is projected to top $9 billion by 2008, India still has no company with a cancer diagnostic product in the pipeline. Most work done in the country is contract research for larger firms in other countries. "The high-end science required for molecular diagnostics has only recently begun to be undertaken," says B.V. Ravi Kumar, managing director of XCyton, a diagnostic firm in Bangalore.

In a country where paying for cancer treatment often requires selling house and home, relatively inexpensive RFQMR and new diagnostic tests, even if they are in their developmental infancy, offer tremendous hope.

Zapping Cancerous Tumors

Mr. Kumar has worked with RFQMR for over a decade but only started trying it on cancer cells after he and V.G. Vasishta of the Institute of Aerospace Medicine (IAM) in Bangalore saw positive results working

with acute osteo-arthritis patients. "We realized that we were able to re-grow the cartilage, proving the textbooks wrong," says Mr. Kumar.

So, Mr. Kumar built a device called a Cytotron, which targets tumors with electromagnetic beams. The beams increase the cell membrane electric voltage, which falls in cancer cells after they become malignant. As the voltage rises to its normal level, the natural cellular cycle of cell death is resumed and the tumor stops growing.

The Cytotron's intellectual property is protected under a Patent Cooperation Treaty application and remains the only device in existence, according to Mr. Kumar, to use nuclear resonance for in-vivo tissue engineering. The multi-frequency beams that emanate from the device range from 400 hertz to 100 kilohertz. It works on the principle that each living and non-living structure has a certain natural frequency and when two objects with similar frequencies come near each other they can communicate without physical touch. Thus, the tumor cells can be given instructions to activate their normal cell cycle of apoptosis, or programmed cell death.

So far, 106 terminally ill cancer patients have been treated: 60 percent are still alive and 30 percent of them have gone back to work and normal lives. "Patients who died had severe complications from chemotherapy and radiation and did not have time to respond to our treatment," says Dr. Vasishta, the principal investigator in the study.

Using conventional MRI, the natural frequency (or electromagnetic signature) of the cancerous region is calculated. A magnetic field, corresponding to the signature, is then applied to the region using the Cytotron. This results in enhanced resonance of the cancerous cells with the applied magnetic field. As a result, researchers believe, a tumor suppressor protein, p53, gets activated, which initiates the programmed cell death and the stops the tumor's growth.

Normally, 28 one-hour sessions in as many days are given, although some patients require less aggressive treatments. "Most patients, even those on morphine, stopped use of painkillers by the fourth exposure," says Dr. Vasishta. "What is surprising is that the tumor stops growing and spreading even after eight months, where the tumor doubling period was about one month."

Dramatic tumor shrinkage is a hallmark of the therapy. "One of my liver cancer patients, who was given a few weeks to live, is living a healthy life well over one year [later]," says Vishwanath Hiremath, an oncology surgeon with Mallya Hospital in Bangalore. "What is most astonishing is that the massive tumor from one side of her liver has disappeared and she is absolutely pain free," he says.

Cyclotron has completed its Phase I trial with 40 patients. Mr. Kumar and Dr. Vasishta have since recruited 100 patients for Phase II trials set to begin shortly. "Since Cytotron is a device [and not a drug requiring Phase III trials], we will be able to commercialize the technology within three years," says Mr. Kumar. Indeed, he has initiated moves to get the device certified in the European Union. At $250,000 a machine, Scalene Cybernetics has so far built five, all of which are now in use.

The duo say they are swamped with requests from patients as well as funding offers. The hurdle ahead of scaling up the project is getting the paperwork through the bureaucracy, IAM being a unit of the Indian Air Force.

Researchers say they have treated a host of different cancers beyond the bone, blood, and breast variety with the Cytotron. "But the best results have been from brain tumors and lung," says Mr. Kumar.

As the Cytotron enters into Phase II trial, Mallya Hospital's Dr. Hiremath says researchers will need to analyze the data and classify which types of cancer respond best to the treatment to get a better fix on RFQMR's success rates.

Late Detection, Expensive Treatment

On the detection side, a new optical diagnostics kit was tested in January in the southern state of Tamil Nadu. The kit was developed by Vadivel Masilamani, a laser physicist from the Indian Institute of Technology, Madras, who is currently at Saudi Arabia's King Saud University in Riyadh.

Using a laser on body fluids like blood and urine from 274 people, the equipment was able to screen out cancer patients from non-cancer patients, and monitor disease progression and regression with over 90 percent efficacy, according to Mr. Masilamani. Laser diagnosis was also able to identify 28 new persons without lumps or masses, but with other signs of possible cancer meriting further investigation.

Mr. Masilamani says his next step is to demonstrate the technology for the Indian Council of Medical Research in Delhi to get approval for a bigger clinical trial. Masila's Diagnostics, as the kit is called, adds

up to a non-invasive, easy-to-administer diagnostic tool costing less than five dollars.

It also adds up to a lot of hope to primary healthcare centers in developing countries. Mr. Masilamani says he intends to start a diagnostic center in India, and while he's not tending to that, look for entrepreneurs to commercialize the technology worldwide.

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