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Monday, August 05, 2002

Sound treatment

By GEOFFREY LIP

Using ultrasound as a “knife” to destroy cancerous cells is the latest cancer treatment method available in Malaysia.

This method using High Intensity Focused Ultrasound (Hifu) technology to destroy tumour cells was introduced in early May to Malaysian doctors by the developers of the method, Professors Wang Zhi Biao and Wu Feng from Chongqing Medical Sciences University in China.

The two professors are the foremost experts of this technology in the world and have worked on it for the past 14 years.

“We use ultrasound images for detection and examination of patients very often with no damage to our bodies unlike regular X-rays or other methods that use radiation. It is mechanical energy that poses no problems,” explained Prof Wu.

“However, if the ultrasound beam is focused, it is like a magnifying glass focusing the heat of the sun. By doing this, we can destroy tumours by burning them off, but if the beam is out of focus, it is safe.”

Prof Wu continued: “Hifu is a non-invasive procedure,

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No. A strong deterrent.

Yes. It does not prevent further crime.

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which means there is no surgery or inserting of tubes or instruments into our body. It is also bloodless and only requires a short hospital stay, sometimes for just one day.”

Another advantage is that unlike other treatments, this method actually helps increase the cancer immunity of the patient.

“This is because the tumour is ‘cooked’ and is destroyed by heat. Tumour cells have special antigens, so if you destroy these tumour cells, these antigens will still remain in our body. This helps increase our immunity because these special antigens will stimulate antibodies to negate the cancer,” said Prof Wu.

However, there are, as with all methods, disadvantages.

“It is a very complicated method, and further complications can arise with the differing shapes and sizes of tumours,” he said.

Another disadvantage is the possibility of the operator of the machine failing to calculate the exact location of the tumour, missing it, and destroying normal tissue.

“This limitation is a technical one that depends on the abilities of the operator. The worst-case scenario here is that the patient would have to return for retargeting of the cancerous cells,” he explained.

As it is a relatively new method, it requires long-term clinical follow-ups, often taking years for comparative studies to prove its effectiveness.

Another drawback with this method is that it cannot be used on organs that have air in them like the stomach, intestines and the insides of the lung. Any tumours in these organs would not be treatable because the air in these organs would distort the ultrasound waves, rendering them unsafe and inaccurate.

Any bone structure that is shaped differently, like the spinal column, would also be difficult to treat because

it would cause difficulty in controlling the ultrasound frequency.

“Whatever the ultrasound cannot detect, it cannot destroy,” said Prof Wu.

The history of Hifu technology can be traced to the first report made on tissue destruction by Hifu published in 1942 by Drs Bill and Frank Fry from the University of Illinois, United States.

In the 1950s, Dr Fry used the technology during a brain operation, where it was used to remove a tumour in open surgery.

Since then, this technology has been used extensively to fight cancer, especially in the last decade. In 1993, Associate Professor Dr Narendra Sanghvi, from Indiana University, performed transrectal Hifu treatments on 158 patients with benign prostate hyperplasia.

In 1995, Dr Fry used the method to treat 35 patients with brain tumours, and in Britain, Dr Gail Ter Haar from Royal Marsden Cancer Hospital, London, used the treatment to help 58 patients with metastatic liver cancer.

On Dec 10, 1997, the first patient with osteosarcoma, a particularly aggressive form of cancer that spreads very quickly, was treated with extra corporeal Hifu in China, and since then China has the largest population of Hifu patients in the world.

At the forefront of this development are Profs Wang and Wu, who were the first in the region to use this technique. Prof Wang was the first to develop what is called the Biological Focus Field (BFF) of Hifu technology, whilst Prof Wu developed the world’s first high intensity focused ultrasound knife.

In a paper presented to the first international workshop on the application of Hifu in medicine last year in Chongqing, China, Prof Wu said: “If the Hifu therapeutic system is compared to a knife, the BFF

shall be the sharp tip of the knife.”

Up till last October, the two doctors said they had treated over 1,000 patients.

In a test group of 123 liver cancer patients, their method showed a 68% survival rate, and 23% of local recurrences, they said. Thirty-six of the 123 patients died, but they were in the later stages of the disease.

More impressive was their test group on breast cancer, where out of a group of 46 patients, there was a 100% survival rate and one local recurrence, they said.

Osteosarcoma was also one of the cancers tested, and a majority of patients subjected to this treatment produced positive results. Out of 47 cases, there was an 85% survival rate, with a recurrence rate of 11%. There were seven deaths, they said.

The Chinese have many years of experience developing their method of using Hifu technology and they also receive heavy financial support from their government.

“While the approach in the West is more on dynamic studies to materialise their academic theories, we prefer to integrate our mechanical expertise with medical concepts,” said Prof Wu.

“Our research has shown that we have found a better method of treatment, and after treating over 1,000 people, and using fifth generation mechanics, we have been able to find ways of decreasing complications.

“Hifu really complements the work against cancer. We always tend to use Western technologies, but this is ours. This technology is not only for China, but for Asia, and we would prefer to start distributing it to the East.

“We feel this technology should be a source of pride for Asians, especially as we have managed to break through the technology barrier, and develop something that is not readily available in the West.

“Although we have so many methods of treating patients with cancer, like surgery, radiotherapy and chemotherapy, the result is still not satisfactory because of the high death rate.

“The reason that we have so many methods is to treat local recurrences and metastases. However, we found that with long distance metastases, for example liver cancer, it was difficult to control the tumour. Metastases in the liver, bone and brain are big problems for our doctors. We can treat one but there will ultimately be extensive metastases, and that is our main problem,” he added.

The conventional methods for cancer treatments today include surgery, chemotherapy and radiotherapy.

Surgery has many advantages. It is a possible cure for patients in the early stages of cancer, and if the patient has a single tumour in a place that can be reached, an operation can be conducted to have it removed.

However, it has several disadvantages like severe trauma from the operation and maybe the amputation of a body part.

“In the case of liver cancer, we may have to remove a large portion of the liver, or in cases of kidney cancer, we may have to remove the whole kidney. With leg and breast cancer, this is also often done with very obvious effects, and causes a lot of trauma to the patient,” said Prof Wu.

Chemotherapy is another method that is often used, and can possibly kill tumour cells in the whole body. Its disadvantages though are in its numerous and well-known side effects like hair loss and nausea which sometimes discourage patients from opting for this method. It also destroys the patient’s healthy cells.

Another problem with chemotherapy is multiple drug resistance. In general, anti-cancer drugs can kill cancer cells and tumour cells are sensitive to these drugs. However, if these drugs are used often, the tumour cells lose this sensitivity and may build multiple drug

resistance.

Radiotherapy is often used as a possible way for killing localised tumours. The disadvantages of this method is that there could be resulting radiation damage and the destruction of the person's anti-cancer immunity systems would also be a possibility.

Every year, there are more than 10 million cases of cancer globally and around six million of these patients die.

According to World Health Organisation's (WHO) statistics, 12,822 Malaysian cancer cases, excluding those with skin cancer, were reported in 2000. Out of this number, 9,845 died.

A recent report by WHO called the *National cancer control programmes: policies and managerial guidelines* stated that cancer is the second most common cause of death in industrialised countries, taking up 12% of deaths in the world.

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