

Professor strives for new breast cancer treatment

Cadie Thompson/The Daily Friday, May 8, 2009



Roger Harrison, sits in the lab inside of Sarkey's Energy Center Thursday
Amy Frost/ The Daily

An OU professor is building biochemical treatments for breast cancer that would speed up the process of targeting only cancerous cells and increase the efficiency of treatment.

Roger Harrison, chemical engineering professor, has studied for more than 10 years how to use proteins to treat cancer, and has recently developed two different forms of therapy that find and target only cancerous cells throughout the body.

His treatments are designed to not only find and kill tumor cells, but also to prevent the cancer from spreading.

“With current treatments, you have a cancer drug and that cancer drug goes all throughout your whole body, so it has toxic effects on normal cells,” Harrison said. “But this therapy won’t go in the normal part of your body; it will just bind to the tumor. The idea is to have it be locally where it’s needed in the tumor.”

Harrison’s research still is in the preclinical stage, though.

Dr. Shubham Pant, a hematology-oncology specialist with OU Physicians, also is involved in targeted cancer treatment and said he has seen a positive response from patients who have used targeted therapy for breast cancer.

He said in trials, women who received targeted treatment with chemotherapy lived longer than women who did not.

Targeted cancer therapy research currently is more focused on treating breast cancer patients because of the cancer’s prevalence, Pant said.

According to the American Cancer Society in 2009, an estimated 27 percent of the 713,220 cancer cases in women are cases of breast cancer. That is over 192,500 cases of breast cancer in the United States.

“Women have been the driving force behind breast cancer research,” said Pant. “They have a great voice in the community. It’s the women who take control of their disease and it really helps us out in a big way.”

Although Harrison specifically is focused on using his research to treat breast cancer, he said in the future his research could be used to treat other cancers.

Both of Harrison’s treatments involve using targeted enzymes, but one treatment requires pro-drug therapy and the other involves nanotubes and photodynamic therapy.

The targeted enzyme in both treatments is Annexin, which only attaches to cancer cells.

In the treatment that involves pro-drug therapy, where a drug is put into the body but remains ineffective until it is triggered by an enzyme, Annexin is fused with another enzyme called Methioninase to form one protein. Methioninase is the enzyme that triggers the pro-drug and converts it to a toxic cancer treating agent. Methioninase also works to kill the tumor by cutting off its access to essential amino acids.

The other treatment requires the targeted enzyme Annexin as well, but in this treatment the enzyme is attached to nanotubes. Nanotubes are simple rod-like structures made up of carbon molecules and bonds, and are used to transmit heat from infrared light to the cancer cells. The heat kills the cancer cells, and causes blood to clot, which cuts off the tumors' blood supply, killing the tumors.

Although targeted cancer treatment is a growing medical trend, the enzyme and pro-drug therapy Harrison is working on could offer a more efficient, speedier treatment of cancer cells.

One of the problems with using pro-drug therapy to treat cancer is how the drugs are delivered.

In pro-drug therapy, cancer fighting agents usually are directly applied to the tumor, but because tumor cells are hard to reach, it can take a while for the drugs to treat the cancer, Harrison said.

But the pro-drug therapy Harrison is working on would start treating the tumor cells immediately because the protein that triggers the pro-drug attaches directly to the cancer cells and also begins to break down the barriers surrounding the tumor cells.

"The pro-drug has got to go across multiple barriers, but ours circumvent all that," Harrison said. "All it's got to do is just bind to the protein that is attached to the cancer cell and it starts to work. It's a new way of delivery is what it is. A more rapid way of delivery for cancer treatment."

But even with advancements like Harrison's, it's unlikely chemotherapy completely will be out of the picture in the future, Pant said.

He said chemotherapy combined with the progress of targeted therapy will help treat the individual needs of breast cancer patients.

"Chemotherapy plays a very good role, not all chemotherapy is toxic," Pant said. "Maybe it can't completely replace chemotherapy, but what I think will happen is we will find subgroups of women who do not benefit from chemotherapy, but only targeted treatment and some that won't benefit from targeted treatment but only chemotherapy."

Pant said he praises the work of researchers like Harrison who use basic science knowledge to engineer therapies that can be brought to the clinic to treat patients.

But even then, a researcher's job isn't finished because cancer reacts differently in everyone, so data goes back to the researcher and they work to figure out new solutions, he said.

"The cancer cell is a very smart person; it's like a moving target," Pant said. "You have to constantly keep learning, it's hard to kill one type of cancer and then it comes back a completely different kind of cancer. But it's an exciting time; it's a time when people are pulling up their sleeves and fighting this, but there is still so much to do."