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Chemist refines treatment of prostate cancer with light

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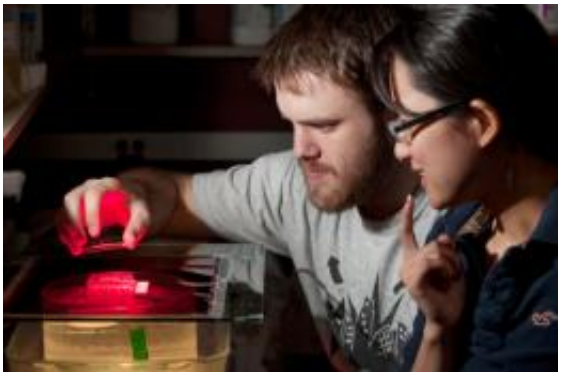

There's more than one way to kill a cancer cell. Cliff Berkman is working on a better way -- one that specifically targets prostate cancer cells and causes a type of natural death that spares surrounding tissues from damage. In a recent paper in the journal *Cancer Letters*, he describes a method that delivers to the cells a chemical that, when exposed to a certain type of light, prompts the cells to die and disappear with minimal side effects.

“Ultimately, what we’re trying to do is cure cancer with light,” said Berkman, a Washington State University chemistry professor.

Berkman and his coauthors are studying photodynamic therapy, which has grown in popularity in recent decades after being used with limited

success for more than 100 years. As with radiation and chemotherapy, photodynamic therapy researchers have struggled to target tumors without causing side effects or damage to other parts of the body.

“Therapy that is not specifically targeted to cancer cells results in collateral damage,” said Berkman. In prostate cancer, that can involve hitting sensitive tissue nearby, resulting in impotence and incontinence.

Berkman’s lab set out to specifically target prostate cancer cells by developing a chemical that will bind to prostate-specific membrane antigen, a protein unique to the cells and referred to as PSMA. The lab at first called the chemical LW54—LW for doctoral graduate student and co-author Lisa Wu, and 54 for the laboratory notebook page on which she documented the first time the chemical was made.

The chemical effectively mimics two amino acids recognized by PSMA and is brought into the cell. It is in effect a Trojan horse, carrying a chemical that, when exposed to the right type of light, releases destructive free-radical oxygen molecules.

In general, physical and chemical cell damage often leads to a process in which the cell’s contents simply get dumped into the body, creating an inflammatory response that can cause pain and damage to surrounding tissue. But Berkman’s method targets a specific part of the cell that triggers a programmed cell death in which the components of a dead cell are reabsorbed without causing inflammation.

Berkman says the recent research, done in laboratory cell cultures, serves as a proof of concept for future work. Moving one step further in a related study, he has already seen that the LW54 chemical outfitted with a radioactive payload can home in on prostate tumors in mice. The next step is to see how prostate tumors in mice react when the LW54 chemical carries a photosensitizer.

“After two hours, we’ll shine light on the tumors and that should cause those cells to self-destruct and the tumors should be eradicated,” Berkman said.

“Once we prove that, then we may have an alternative therapeutic photodrug for the treatment of prostate cancer.”

Provided by Washington State University