

Group develops method of killing cancer cells with antibodies and light

November 7 2011, by Bob Yirka

(Medical Xpress) -- Traditionally, there are three major ways to combat cancer in people: surgical removal, radiation therapy and chemotherapy. And while all three have been proven to be effective in treating some types of cancer, all three also have unpleasant side effects. It's for this reason that researchers continue to try to find other ways to kill cancer cells. Now, in a paper published in *Nature Medicine*, a team from the National Cancer Institute in the United States, says that it has developed a type of photoimmunotherapy that combines a light-sensitive dye that has a special chemical in it and antibodies to target and kill cancer cells when light is shined on them.

Photoimmunotherapy has been tried before, but not in this way, in previous research such antibodies were not nearly so target specific, meaning they tended to kill other cells as well. In this latest research, the team was able to use tumor specific antibodies that would attach themselves to the [cancer cells](#), but would remain dormant. It was only when the same cancer cells were also exposed to a chemical called IR700 and then exposed to light that the antibodies went to work killing the cancer cells.

In their lab studies, the team inserted a type of skin cancer into the skin on the back of a mouse; when given the drug and then exposed to light, the research team found that the size of the tumor in the mouse was significantly reduced compared to control mice. They also found that other cells around the tumor were unaffected and that there didn't appear to be any toxic reactions to the treatment.

It's not yet known if the procedure would work in humans, but further research is likely to be done in a lot of areas, likely including other types of animals before tests can be conducted with human volunteers. Also, research is continuing to see if it might be possible to use [antibodies](#) to deliver other sorts of cancer killing agents, such as radiation.

If such types of photoimmunotherapy prove workable, millions of people the world over might be spared the pain of surgery and/or the harmful side effects of radiation and [chemotherapy](#).

More information: Cancer cell–selective in vivo near infrared photoimmunotherapy targeting specific membrane molecules, *Nature Medicine* (2011) [doi:10.1038/nm.2554](https://doi.org/10.1038/nm.2554)

Abstract

Three major modes of cancer therapy (surgery, radiation and chemotherapy) are the mainstay of modern oncologic therapy. To minimize the side effects of these therapies, molecular-targeted cancer therapies, including armed antibody therapy, have been developed with limited success. In this study, we have developed a new type of molecular-targeted cancer therapy, photoimmunotherapy (PIT), that uses a target-specific photosensitizer based on a near-infrared (NIR) phthalocyanine dye, IR700, conjugated to monoclonal antibodies (mAbs) targeting epidermal growth factor receptors. Cell death was induced immediately after irradiating mAb-IR700–bound target cells with NIR light. We observed in vivo tumor shrinkage after irradiation with NIR light in target cells expressing the epidermal growth factor receptor. The mAb-IR700 conjugates were most effective when bound to the cell membrane and produced no phototoxicity when not bound, suggesting a different mechanism for PIT as compared to conventional photodynamic therapies. Target-selective PIT enables treatment of cancer based on mAb binding to the cell membrane.

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