New targeted approach to light-activated cancer drugs

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Combining light-activated cancer drugs with tumour-seeking antibodies could provide a more effective way of treating many cancers, according to new research published in advance online in the *International Journal of Cancer*.

The study, which is due to appear in the December issue of the journal, describes how scientists have successfully attached 10 light-activated drug molecules to an antibody which recognises and homes in on the cancerous cells. The researchers have shown that using this method means highly potent drug molecules are delivered to precise cancer targets much more effectively than if they are not attached to the antibody.

Using light-activated drugs to treat cancer is known as photodynamic therapy (PDT). This treatment involves focusing drugs on diseased tissues, and then illuminating the area with a cold laser which sets off a chain reaction in the cancerous tissue, converting oxygen to a highly toxic type of oxygen-like bleach, which destroys cells in the vicinity. PDT has been shown to be successful in treating head and neck, prostate and skin cancers.

However, current PDT is limited by the inefficiency with which the light-activated drugs are able to specifically target tumours. This can mean that the light-activated drugs can circulate in the patient's body for some time after the treatment, leaving patients light-sensitive and prone to skin damage. The research team behind the new study think their results show

they can solve this problem by ensuring the drugs get straight to the cancerous cells, and do not affect the rest of the body.

Dr Mahendra Deonarain from Imperial College London's Department of Life Sciences, lead author on the paper, explains: "PDT is a very promising way to treat cancer because it leaves patients with very little cosmetic scarring and there are low chances of drug resistance. We have shown that it’s possible to use tumour-seeking antibodies, like the ones used in drugs like Herceptin and Rituxan, to deliver these potent drugs accurately to the site of the cancer, minimising the risk of healthy tissue getting accidentally damaged in the treatment process, and maximising the number of cancer cells that are destroyed."

The research team, led by scientists from Imperial and the Imperial spin-out company PhotoBiotics, has shown that their antibody-carrying light-sensitive drugs have effected complete tumour regression in an animal model. Dr Deonarain explains that the next step is to take the study forward into clinical trials:

"We have shown that it’s possible to attach these drug molecules to these targeting antibodies without destroying the useful properties of the antibody itself. Our initial results are extremely promising and we're hoping to take this forward into clinical trials in the near future. Our work is expanding the applications of PDT for many cancers and we're excited about moving towards making targeted PDT a clinical reality."

PhotoBiotics has 4 filed patents protecting this new technology and is currently completing further pre- clinical studies with a view to moving into clinical trials within the next three years.

Source: ICL