# Light-activated anti-cancer drugs on target – 29/11/2007

Combining light-activated cancer drugs with tumour-targeting proteins could provide a more effective way of treating many cancers, according to new research published on-line at the end of October in the ***International Journal of Cancer***.

The study describes how **Imperial College London** scientists successfully attached over 10 light-activated drug molecules to an antibody fragment which recognises and homes in on cancerous cells. This delivers these highly potent drug molecules precisely to cancer targets much more effectively than if they are not attached to the antibody.

The techniques of using light-activated drugs to treat cancer, is known as photodynamic therapy (PDT). This treatment involves ensuring the drugs are located in diseased tissues, and then illuminating them with cold laser light. A chain reaction is set off which converts oxygen into a highly toxic bleach-like form that destroys any cells in its close proximity. PDT has been successfully used to treat head and neck, prostate and skin cancers.

However, current PDT is limited by the inefficiency with which the light-activated drugs specifically target tumours. This means they circulate in the body for some time after PDT treatment, leaving patients prone to acute light-sensitised skin damage. The study's Imperial research team think their results show how to solve this problem, by ensuring the drugs go specifically to cancerous cells, and then leave the body long before they can damage the skin.

Dr Mahendra Deonarain, from Imperial College London's Department of Life Sciences and lead author on the paper, explains: "PDT is a very promising way to treat cancer because compared to current surgical techniques, it leaves patients with very little cosmetic scarring and the chances of drug resistance are minimal. We have shown that it's possible to use tumour-seeking antibodies, like the ones used in the drugs Herceptin and Rituxan, to deliver these highly potent drugs safely and 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: "Quite counter-intuitively, we've managed to show that it's possible to attach more of these drug molecules to antibody fragments than it is to whole antibodies, and without destroying the useful targeting properties of the fragment 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 filed four 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.

For more information please contact: Dr Lionel R Milgrom, PhotoBiotics Ltd Press Office,
Tel: +44 (0)208 450 8760
Mob: +44 (0)7970 852156

Email: lionel.milgrom@hotmail.com

Notes to Editors:

1. The research paper is available here: http://www3.interscience.wiley.com/cgi-bin/fulltext/116837461/HTMLSTART

2. 'Targeted photodynamic therapy with multiply-loaded recombinant antibody fragments', The International Journal of Cancer, published online 31 October 2007.

**About PhotoBiotics** (see www.photobiotics.com)

Photobiotics is a spin-out company from Imperial College London set up in 2001 to develop novel biologically- targeted photodynamic therapeutic (PDT) agents. Created out of a unique, in-house and world-class expertise in chemistry, physics, and biotechnology, these new PDT agents will be able to specifically target and destroy tumours, a range of other proliferating tissues, and pathogenic organisms. Potential applications of this new technology include cancer, age-related macular degeneration (AMD), 'irresistible antibiotics' and many more.

PhotoBiotics' uniquely targeted approach to PDT will ensure the photosensitising agent specifically localises only in pathological tissues. This will greatly improve PDT's therapeutic margin, drastically reducing photosensitivity and therefore allow for its more effective use in a wide range of cancers and AMD. It will also enable PDT's wider application in indications such as microbial infections, restenosis following angioplasty, and various proliferative skin conditions.

PhotoBiotics believes its unusually distinctive and multidisciplinary approach to PDT has the potential to offer strikingly improved treatment regimes that could replace conventional PDT and significantly extend its market penetration. Relatively few organisations worldwide have the skills to develop PDT technology, and PhotoBiotics is highly distinctive in possessing an integrated capability involving chemistry, laser physics and biology. The science is challenging and is delivering on its promise in a series of successful in vitro and in vivo trials. The founders have already established successful research collaborations. Accordingly PhotoBiotics will seek to align itself with other PDT and market focussed companies in cancer, ophthalmics and other markets researching, discovering and developing improved therapeutic modalities.

For more information, go to PhotoBiotics website; www.photobiotics.com

**About PDT**

PDT has an established niche in the treatment of certain cancers and in age related macular degeneration (AMD), which is a common cause of visual impairment in the over-50's. However, PDT's clinical development and use have been slow to evolve owing mainly to the novelty of the treatment regimen. Its growth has been further restricted by the technical limitations of existing approaches; specifically the therapeutic margin, which is the ratio of effective dose to toxic dose.

The main toxicity arising from current PDT is post-treatment systemic photosensitivity. The photosensitising agent remains in the system for up to six weeks post treatment in some cases, and when it reaches the skin, patients can become exquisitely photosensitive sensitive to ambient light even on cloudy days, leading to symptoms akin to acute sunburn in uncovered parts of the body.