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NTU professors develop new way of detecting and treating tumours

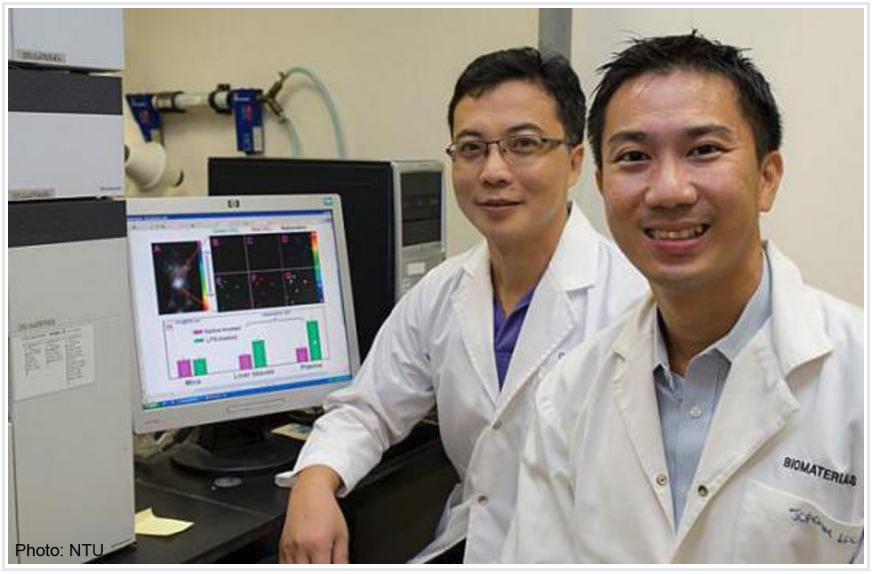

Photo: NTU

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SINGAPORE - Researchers at Nanyang Technological University (NTU) have invented a unique way of detecting and treating tumour cells.

The method, which was developed by associate professors Zhang Qichun and Joachim Loo, involves the use of a biomarker, which is made from a particle ten thousand times smaller than a grain of sand.

The biomarker will light up when it detects tumour cells to allow scientists to take a better look. This happens when it is activated by near-infrared light emitted by an imaging device, and only if tumour cells release small signalling molecules.

In a statement released today, Prof Zhang said that the use of near-infrared light, which is invisible to the human eye, is unique as most imaging techniques use ultraviolet light or visible light.

"Near-infrared light can penetrate 3cm to 4cm beyond the skin to deep tissue, much deeper than visible light. It also does not cause any damage to healthy cells, unlike ultraviolet or visible light," added Prof Zhang, a materials expert.

The biomarker is also able to release anti-cancer drugs at the same time to the specific cells.

According to Prof Loo, the new biomarker releases the anti-cancer drugs by creating a layer of coating loaded with drugs on the outside of the nanoparticle. The drugs are released when the biomarker lights up in response to the near-infrared light.

"This is the first time we are able to do bio-imaging, and potentially target the delivery of drugs at the same time, as proven in small animal tests," said Prof Loo, a nanotechnology and bioimaging expert, adding that the breakthrough will open new doors in nanomedicine, bioimaging and cancer therapeutics.

The breakthrough has resulted in two papers published in Small, one of the world's top scientific journals for material science and nanotechnology.

The new biomarker also has twice the contrast of conventional dyes and is able to emit up to three different colours of light, which allows for better differentiation between healthy and tumour cells. It is also non-toxic and can stay in the body for up to two days before it is passed out harmlessly.

The project, which took three years, is jointly funded by NTU, the Ministry of Education and the National Research Foundation, Singapore.

Moving forward, the team from NTU's School of Materials Science and Engineering will be looking to load multiple layers of drugs into their biomarker.

This will benefit cancer patients as there will be fewer side effects due to the small doses administered and also higher efficacy as the biomarker has the ability to accurately target tumour cells.

seanyap@sph.com.sg