

'Smart' nanoparticle called PEARLs a promising gem to target, treat tumours

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Dr. Gang Zheng and a team of biomedical researchers have discovered a "smart" organic, biodegradable nanoparticle that uses heat and light in a controlled manner to potentially target and ablate tumours with greater precision.

The proof-of-concept findings, published online today and designated a "very important paper" in the leading chemistry journal *Angewandte Chemie*, provide a viable approach to boosting the clinical utility of photo-thermal therapy in treating cancer, says Dr. Zheng, Senior Scientist at the Princess Margaret and Professor of Medical Biophysics at the University of Toronto. Dr. Zheng also holds the Joey and Toby Tanenbaum/Brazilian Ball Chair in Prostate Cancer Research.

In the lab, using phantom models, the "smart" nanoparticle the team has dubbed PEARLs - photo-thermal enhancing auto-regulating liposomes - showed how it can solve the two bottlenecks currently preventing more effective use of photo-thermal therapy with patients. These are overheating of tissue that can cause collateral damage during treatment, and the inability to ablate larger tumour volumes because the light stops travelling when it is absorbed.

Dr. Zheng, a chemist, explains: "Our smart nanoparticle is super cool. It can absorb light, generate [heat](#) and ablate the tumour. It's a thermal sensor and once it reaches the desired ablation temperature of 55C, it becomes invisible allowing the light to move deeper into more areas of tumour and repeat the treatment process.

"The result is a promising new way to heat and ablate larger volumes of tumour with minimal damage to surrounding tissues in a controlled and precise way. The next step is to conduct pre-clinical studies to test the concept further."

For the past 10 years at the Princess Margaret, Dr. Zheng's research has focused on advancing nanoparticle technology by harnessing [light](#), heat and sound to advance tumour imaging and targeted treatment.

More information: Kenneth K. Ng et al, Controlling Spatial Heat and Light Distribution by Using Photothermal Enhancing Auto-Regulated Liposomes (PEARLS), *Angewandte Chemie International Edition* (2016). DOI: [10.1002/anie.201605241](https://doi.org/10.1002/anie.201605241)

Provided by University Health Network

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