

# International Conference on Significant Advances in Biomedical Engineering

April 27-29, 2015 Philadelphia, USA

## Use of Natural Toxins combining with Nanotechnology to treat cancer in experimental models

**P Gopalakrishnakone**

National University of Singapore, Singapore

Gastric cancer is the 4th common cancer worldwide and a leading cause of cancer mortality. The majority of patients usually present with locally advanced or metastatic tumours at the time of diagnosis, which greatly reduces treatment efficacy. In this study, we explore the anti-tumor activity of bee venom component, melittin in gastric cancer for therapeutic application.

The hypothesis in this study is that melittin, a bee venom component, could have anti-tumor activity in gastric cancer and is a potential agent for gastric cancer therapy. Our preliminary studies to screen the potential cytotoxicity and anti-cancer effects of bee venom and melittin in various gastric cancer cell lines have yielded positive results. Our collaborator Zhang Yong has shown the efficacy of photosensitizer-loaded up-conversion nanoparticles as an in vivo-targeted PDT agent (reported in Nature Medicine 2012).

For the in vitro study, nanocapsules will be synthesized using azobenzene derivative and encapsulated with near-infrared (NIR) light-to-UV/visible light (Vis) core-shell upconversion fluorescent nanoparticles (UCNs) along with melittin, from a commercial source, and the photosensitizer zinc (II) phthalocyanine.

For the in vivo study, we will use a subcutaneous gastric cancer mouse model to verify the effect of melittin and its synergistic effect between melittin delivery and PDT on tumor growth. For this study, nanoparticulated melittin will be injected and released through photodynamic therapy (PDT) to determine the efficacy of melittin and PDT as combined anti-cancer modality.

### Biography

P. Gopalakrishnakone is Professor in the Anatomy Department and Chairman of the Venom and Toxin Research Programme at the National University of Singapore. He is also a consultant to the Defence Science Organization in Singapore and Adjunct Senior Research Scientist at the Defence Medical Research Institute. He is an Honorary Principal Fellow at the Australian Venom Research Unit. His research awards include the Outstanding University Researcher Award from the National University of Singapore (1998); Ministerial Citation, NSTB (National Science and Technology Board, present A\* STAR) Year 2000 Award in Singapore; and the Research Excellence Award from the Faculty of Medicine, National University of Singapore (2003). His awards in teaching include, Faculty Teaching Excellence Award 2003/4 & NUS Annual Teaching Excellence Award 2003/4. He also received the Faculty Teaching Excellence Award in 2009/10 and the Annual Teaching Excellence Award at University level, NUS for 2009/10.

[gopalakrishnakone\\_pon@nuhs.edu.sg](mailto:gopalakrishnakone_pon@nuhs.edu.sg)

### Notes: