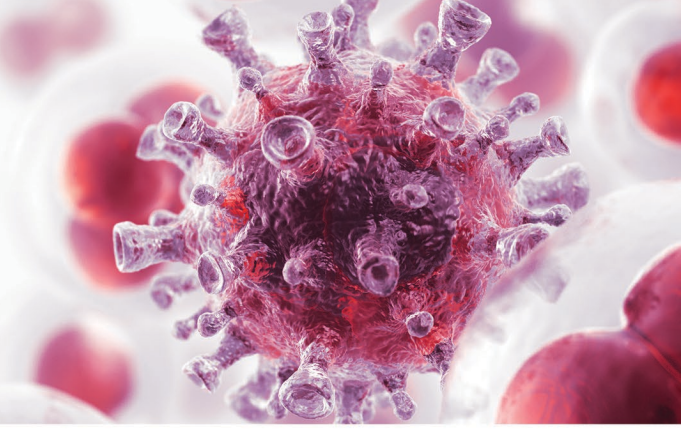
Griffith UNIVERSITY
Institute for Glycomics
Queensland, Australia



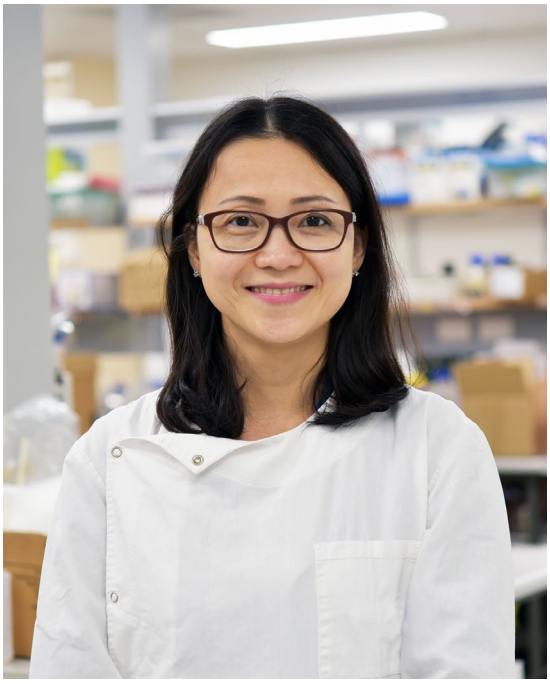
2021 Lecture Series

Assoc Prof Hang T. Ta

School of Environment and Science, Griffith University
Queensland Micro- and Nanotechnology Centre, Griffith University

will present a seminar entitled

Developing nano- and micro-technology solutions to advance the diagnosis and treatment of cardiovascular and inflammatory diseases



Friday 20 August 2021, 11am

Institute for Glycomics
Lecture Theatre (G26 4.09)

(No food or drink allowed in the lecture theatre)

Abstract

The most common form of cardiovascular disease (CVD) and also the leading cause of sudden death is atherosclerosis, a chronic progressive inflammatory disease of the arterial vessels. Unstable, vulnerable atherosclerotic plaques can rupture and cause thrombosis, resulting in myocardial infarction (MI) and stroke. Magnetic resonance imaging (MRI) has been used as a powerful and indispensable tool in medical research and clinical diagnosis due to its high spatial resolution and non-limited penetration depth. We have developed both targeted negative contrast agents and targeted dual positive/negative contrast agents for molecular imaging of atherothrombosis[1,2,3]. The simultaneous use of positive and negative MRI imaging that employs the same contrast agents will significantly improve the detection accuracy. Using these dual contrast agents, both T_1- and T_2-weighted MRI of thrombosis can be recorded simultaneously which enables self-confirmation of images and leads to a greater diagnostic accuracy. We have also designed and developed smart MRI nano-sensors that can not only detect, but also sense and report the stage or progression of CVD such as thrombosis[4]. The early detection and accurate characterization of life-threatening diseases such as CVD and cancer are critical to the design of treatment. Knowing whether a thrombus in a blood vessel is new/fresh or old/constituted is very important for physicians to decide a treatment protocol. Theranostic nanoparticles based on iron oxide and cerium oxide have also been developed in our group as potential materials for diagnosis and treatment of reactive oxygen species related inflammatory diseases such as CVD[5,6]. Another class of theranostic nanoparticles based on iron oxide and silver/gold with NIR absorption has also been synthesised as a potential material for the simultaneous detection and treatment of thrombosis. In our group, attempts have also been made to develop diseases on microfluidic devices to enable fundamental investigation of the disease, and also allows testing therapies freely on “subjects” without harming any living creatures and lessen the need for animal testing.

1. Hang T. Ta et al. 2011. Enzymatic Single-chain Antibody Tagging: A Universal Approach to Targeted Molecular Imaging and Cell Homing in Cardiovascular Disease. Circulation Research, 109, 365-373.
2. Hang T. Ta* et al. 2017. Molecular Imaging of Activated Platelets via Antibody-Targeted Ultra-small Iron Oxide Nanoparticles Displaying Unique Dual MRI Contrast. Biomaterials, 134, 31-42.
3. Hang T. Ta* et al. 2017. Effects of magnetic field strength and particle aggregation on relaxivity of ultra-small dual contrast iron oxide nanoparticles. Materials Research Express, 4, 116105.
4. Hang T. Ta* et al. Nanoscale, 10, 15103-15115, Jif = 7.4.
5. Yuao Wu, …, Hang T. Ta*. 2018. Novel iron oxide-cerium oxide core-shell nanoparticle as a potential theranostic material for inflammatory diseases. Journal of Materials Chemistry B, 6, 4937-4951
6. Yuao Wu, …, Hang T. Ta*. 2021. Chitosan Nano-cocktails Containing Both Ceria and Superparamagnetic Iron Oxide Nanoparticles for ROS-Related Theranostics, ACS Applied Nano Materials, accepted on 17 March 2021.

For further information, contact

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