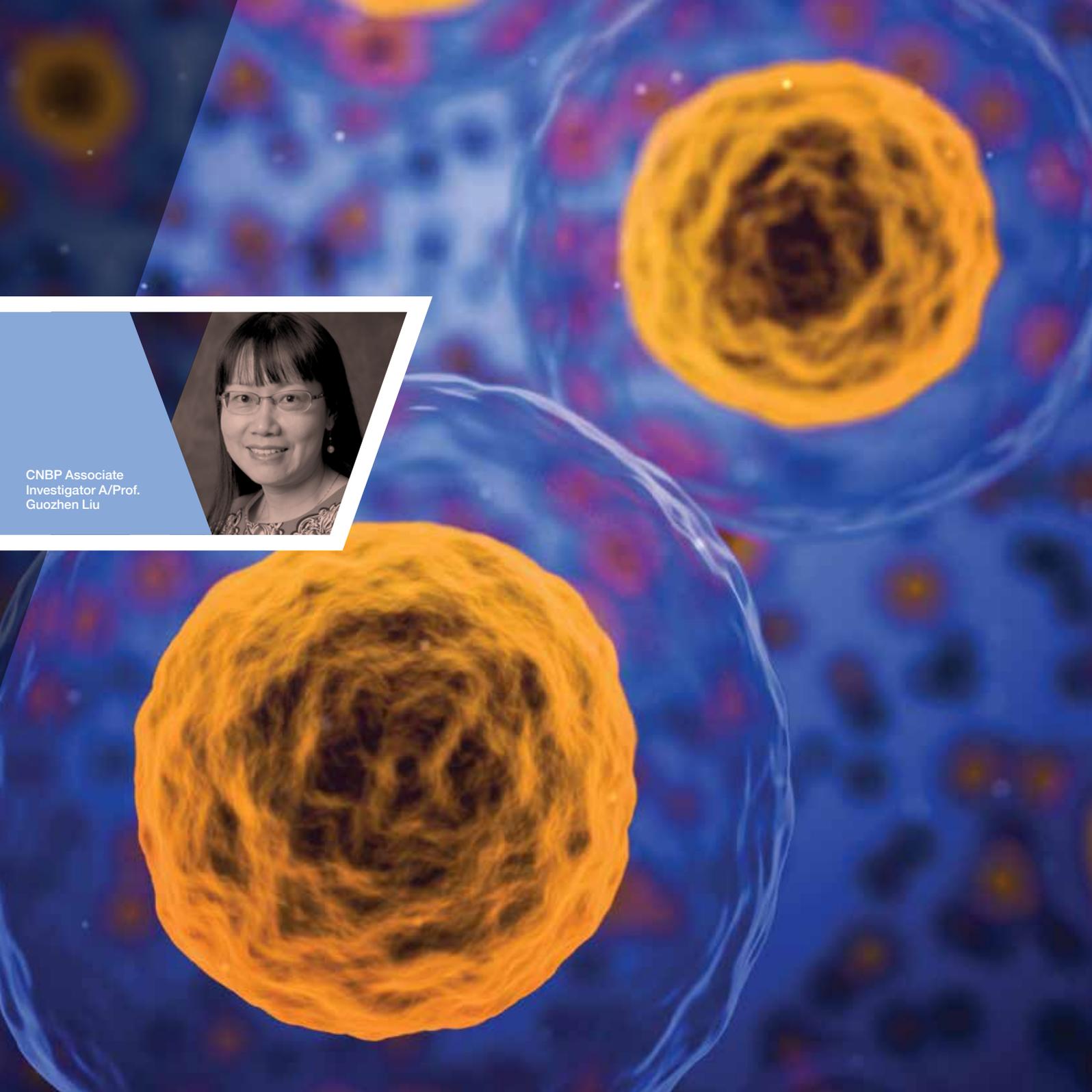




CNBP Associate
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Case Study

Next Generation Cell Therapies

UNDERSTANDING CYTOKINE SECRETIONS

A/Prof. Guozhen Liu

At the CNBP, we have developed advanced nanoscale sensing technologies that identify and select cells based on the secretion of cytokine molecules.

Utilising cutting-edge nanotechnology and bio-imaging research, our work is expected to have significant impact in areas including nanomedicine, drug discovery, immunology, oncology, regenerative medicine and vaccine related investigation.

Cytokines are proteins which are secreted by cells in the immune system. They are important in cell signalling and their release is frequently symptomatic of disease or health-related issues, such as arthritis, tissue trauma, inflammation, depression or even cancer. Consequently, monitoring cytokine secretions has enormous value in the understanding of basic physiology and how the body is actually working.

Until now, cytokines have been extremely hard to measure and quantify, due to low concentration, their small size, a complicated cytokine network, their dynamic and transient nature, and the fact that they exist in an environment of background 'noise' and interference.

We took an innovative approach, developing nanotools for monitoring cytokines *in vivo*. Surfaces of nanomaterials such as gold nanoparticles, graphene oxides and magnetic nanoparticles were engineered, 'tuned' to cytokine sensing and detection.

Our technique offers benefits of superior performance, simplicity, stability, sensitivity and the capacity to sense in real-time.

This led to a major breakthrough in assay sensitivity (0.1 pg/mL), sufficient to probe cytokine secretion from a single live cell by altering an existing cell surface affinity assay.

Compared to traditional enzyme-linked immunoassay methods, our technique offers benefits of superior performance, simplicity, stability, sensitivity and the capacity to sense in real-time.

This success saw the technology licensed to Regeneus, an Australian clinical-stage regenerative medicine company.

They aim to manufacture next generation cell therapies based on the identification and selection of high potency secreting stem cells.

More recently, our activity has seen the development of an optical fibre based cytokine test-strip to spatially monitor localized cytokine secretion *in vivo*.

This technology has initiated collaboration with the private sector and will impact current research on spinal cord injury diagnosis and monitoring.