

New sensors could lead to earlier lymphoma diagnosis

20 September 2019, by Lianmei Jiang



Lianmei in the lab. Credit: CNBP

CNBP researchers have developed a new method of detecting multiple cytokines—the body's messenger proteins—in very small volume samples, which could lead to earlier diagnosis of diseases such as lymphoma.

The work was published in a paper in the journal *ACS Sensors*.

"It could open the door to non-invasive diagnosis at early stage, as well as clinical applications such as monitoring treatments," says Dr. Lianmei Jiang, one of the authors of the study and a biomedical engineer based at Macquarie University in Sydney.

Cytokines are a key part of the immune system which swing into action in the event of disease or

injury.

That has made them a longstanding target by researchers keen to get a better understanding of how the body responds to infection.

It has always been a challenge, however, to simultaneously detect multiple cytokines in a single sample and this imposes significant limits on research.

Various cytokines perform different functions and can trigger other cytokines to react in a complex network speaking a complex "language."

"When you look at just one type of [cytokine](#) it is very difficult to tell what is going on between the cells," Lianmei says. "If we can get to look at multiple cytokines we can understand better what is happening in the complex networks."

And being able to detect the cytokines in such low concentration—as low as 5 picograms per milliliter—allows for diagnosis at a very early stage, she says.

Lianmei, working with Dr. Yuling Wang's team (AI of CNBP) developed the alternative detection approach using [gold nanoparticles](#) with surface-enhanced Raman spectroscopy (SERS) nanotags to target the cytokines used as biomarkers for lymphoma.

Raman spectroscopy is widely used in chemistry to identify certain molecules. In this case the Raman readers on the nanoparticles picked up the signals from the cytokines.

"The sensitivity of this technique that allows it to work in such low concentrations is down to the SERS nanoparticles," says Lianmei.

More information: Dan Li et al. Sensitive and Multiplexed SERS Nanotags for the Detection of

Cytokines Secreted by Lymphoma, ACS Sensors
(2019). DOI: [10.1021/acssensors.9b01211](https://doi.org/10.1021/acssensors.9b01211)

Provided by CNBP

APA citation: New sensors could lead to earlier lymphoma diagnosis (2019, September 20) retrieved 29 November 2021 from <https://medicalxpress.com/news/2019-09-sensors-earlier-lymphoma-diagnosis.html>

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