

NTU scientists develop luminescent probe to detect acute kidney failure early



The probes, when added to a urine sample with biomarkers that indicate the onset of acute kidney failure, light up when exposed to UV light. They do so 36 hours faster than other real-time molecular imaging methods. (Photo: Nanyang Technological University, Singapore)

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SINGAPORE: Scientists from Nanyang Technological University (NTU) have developed a type of luminescent imaging probes that could allow for acute kidney failure to be detected early, NTU said in a press release on Thursday (Jul 11).

The new probes, which have been tested on mice, could potentially be used in test strips for urine samples, allowing for a non-invasive method of detecting kidney failure, NTU said.

A Singapore patent has been filed for the technology, which the scientists hope to test on critically ill patients next.

TRACKING CHANGES AT THE MOLECULAR LEVEL

Acute kidney failure - a condition when the kidneys stop working suddenly - usually occurs in a few hours or a few days and can be fatal.

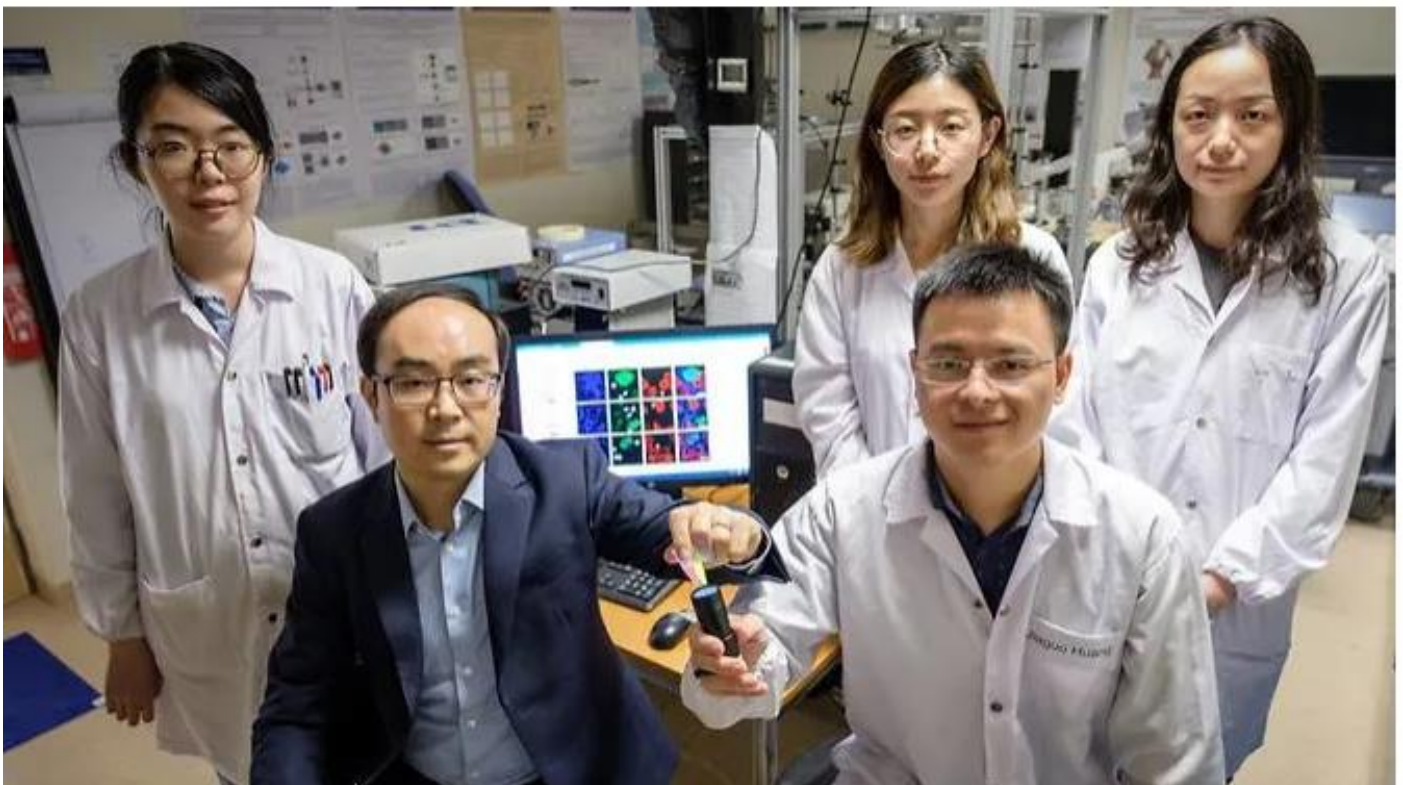
Currently, there are no diagnostic platforms that are able to detect early stage, pre-morbid changes that underlie acute renal failure.

“For patients who are critically ill, like those in the intensive care unit, every minute is precious in reversing a condition like acute kidney failure, which can cause a patient’s health to deteriorate rapidly,” said NTU Associate Professor Pu Kanyi.

The new probe is sensitive enough to track changes in the biological process triggered by the onset of the condition, said NTU.

When tested on mice with drug-induced acute kidney failure, the probes detected the onset of the condition 1.5 days earlier than current molecular imaging procedures.

“Our molecular renal probes are useful because they follow the body’s subtle changes at the molecular level and could help to arrest the development of the disease before it is too late – something current diagnostic methods are unable to do,” said Assoc Prof Pu.



Assoc Prof Pu Kanyi and his team from the NTU School of Chemical and Biomedical Engineering.
(Photo: Nanyang Technological University, Singapore)

HOW IT WORKS

During their research, the NTU team injected the probes into mice who had been given cisplatin, a cancer drug, at a level destructive to the kidneys.

Twelve hours after cisplatin was injected, the probe lit up, signalling the detection of a change in the biomarkers linked to acute kidney injury.

Aside from the probe's ability to detect signs of acute kidney failure, the scientists also found that the probes have a high renal clearance - more than 97 per cent of the probes injected into the mice flowed through the kidneys and were excreted as part of urine.

The probe's high renal clearance efficiency means they could be used directly on urine samples, said Assoc Prof Pu.

"This opens up possibilities of developing these probes as test strips for urine samples, making it a potential non-invasive way of checking for acute kidney failure in the future", said Assoc Prof Pu.

[READ: Flu season may play a role in kidney failure deaths](#)

In the next phase of research, the scientists plan to focus on further refining the probes with urine samples from critically ill patients. They plan to do this by collaborating with medical institutions both in Singapore and overseas.

Source: CNA/nr(aj)

Read more at <https://www.channelnewsasia.com/news/singapore/ntu-develop-probe-detect-acute-kidney-failure-early-science-11710806>