NTU develops miniature kidneys

Grown from cells extracted from each patient's skin cells, the miniature kidneys can be used for drug screening to determine the best course of treatment for patients individually.

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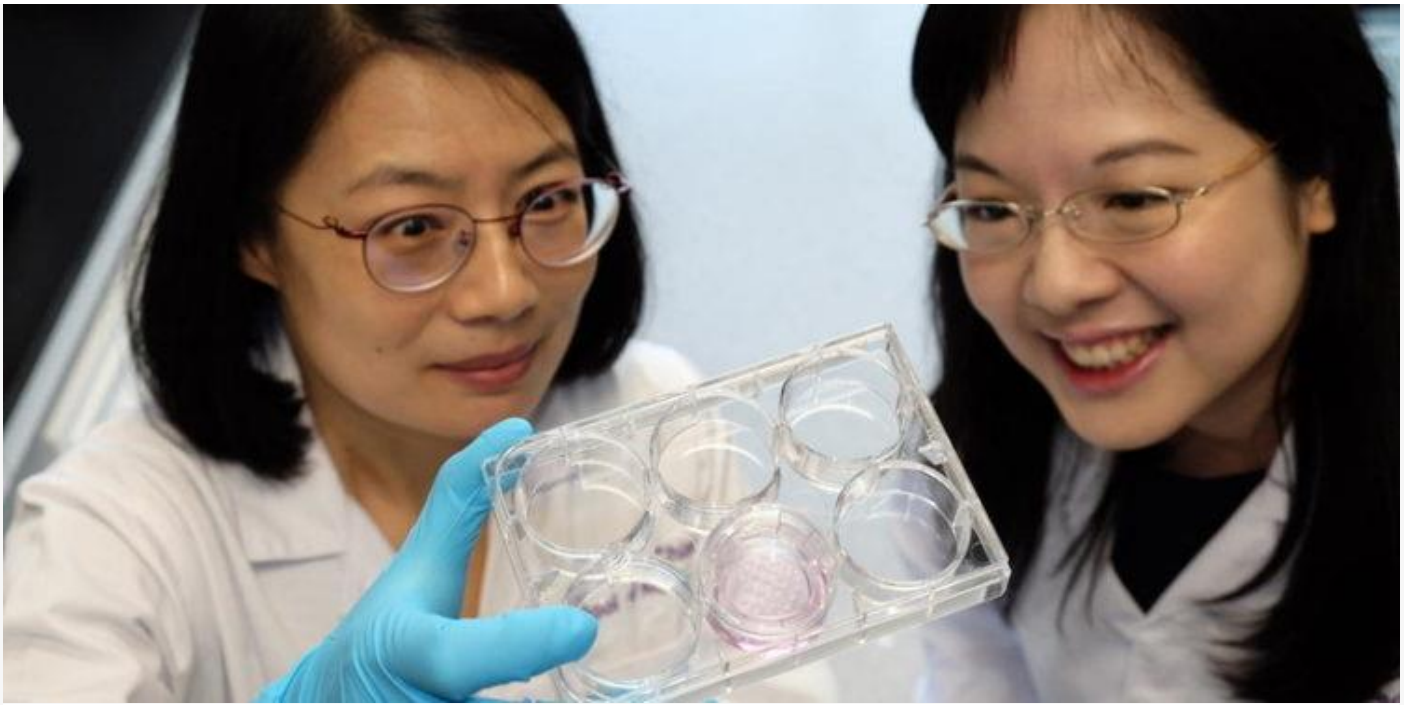

A research team from the Nanyang Technological University (NTU) has developed miniature versions of kidneys for conducting drug tests.

Measuring between 1mm to 2mm in diameter, these small-sized kidneys have been extracted from the patient's skin cells.

Tests conducted on them will aid researches in determining which drugs and treatments are best suited for the kidney disease-stricken patient.

NTU said that administering a drug or treatment, according to the patient's condition is crucial as genetic errors causing kidney failure can differ amongst patients.

Conducting drug screening on patients will no longer be necessary as tests can be conducted on the miniature kidneys instead.

The patients from which the skin cells were extracted from had kidney failure as a result of a commonly inherited genetic disorder known as polycystic kidney disease. This disorder causes the formation of multiple cysts within the kidney.

The skin cells were grown in a laboratory and were modified to become self-replicating stem cells, which when placed under the right conditions could develop into miniature kidneys, like foetal kidneys.

NTU Singapore Assistant Professor Xia Yun led the research team. He said that the creation of miniature kidneys has allowed them to cater to each patient's specific requirements by administering drugs that best suits them.

Dr Xia from the NTU Lee Kong Chian School of Medicine (LKC Medicine) said that this research work can be applied to the study of other forms of kidney disease, such as diabetic nephropathy which is kidney damage resulting from diabetes.

There currently is not a comprehensive understanding of the origination of kidney blood vessel networks. However, the study of cells within the miniature kidneys has led researchers to uncover a new source of stem cells known as nephrons.

These cells play a part in the formation of these blood vessel networks.

NTU LKC Medicine Assistant Professor Foo Jia Nee said that nephrons can be studied to identify if there is a correlation or causation between being born with higher nephrons and receiving a higher level of protection.

Dr Xia added that the deep understanding of human embryonic kidney development will help researchers to create ways for generating a high birth nephron number for foetuses.

Scientists from NTU had previously developed luminescent imaging probes that allowed for the early detection of acute kidney failure.
The sensitivity of the probe allows for the faster tracking of changes in the biological process which are triggered by the onset of the condition.

The tracking is done through the injection of the renal probes into the bloodstream, which 'light up' after a period when they detect molecular changes which are caused by the onset of acute kidney failure.

This discovery paves the way for a new and non-intrusive method of detecting kidney failure.