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Stem cells from a drop of blood!!

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Singapore: Dr Loh Yuin Han Jonathan, Principal Investigator at A*STAR's Institute of Molecular and Cell Biology (IMCB) has been extensively working on understanding the molecular mechanisms that grounds the processes of pluripotency and cell fate decision. His research efforts are to access these molecular switches to derive high-quality stem cells and differentiated cell types that can potentially be used for modelling human disease and future clinical therapy.

Dr Jonathan analyzed that by genetic reprogramming, matured human cells, usually blood cells, can be transformed into human induced pluripotent stem cells (hiPSCs) that have similar properties to human embryonic stem cells and hence, could be huge resources for basic research, drug discovery and cell therapy. However, he faced the challenge of the methods of sampling collection, as the available method for reprogramming blood cells into hiPSCs includes invasive methods such as

collecting cells from the bone marrow or skin or large quantity of blood sample in case of blood cells that might discourage prospective donors.

Brains at IMCB started to look for ways that could reduce the volume of blood used for reprogramming the blood cells and eventually demonstrated that a single-drop volume of blood are sufficient for reprogramming into hiPSCs.

Overcoming the challenge of sampling collection Dr Jonathan along with his team of scientists have successfully developed a method, which he terms as finger-prick reprogramming technique, to generate hiPSCs from a single drop of finger-pricked blood.

Finger-prick reprogramming technique enables donors to collect their own blood samples, which they can then send to a laboratory for further processing. The easy access to blood samples using the new technique is likely to boost the recruitment of greater numbers and diversities of donors.

"The finger-prick technique paves the way for establishing hiPSC banking for stem cell research. The potential access to a wide range of hiPSCs could also replace the use of embryonic stem cells, which are less accessible. It could also facilitate the set-up of a small hiPSC bank in Singapore to study targeted local diseases," says Dr Jonathan.

For his innovation in research, Dr Jonathan was the winner of the Singapore Young Scientist award in 2009, the MIT TR35 regional award for Asia Pacific and was a top 8 finalist for the World Technology award in Biotechnology in 2012.