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Singapore invents coin-sized device to rapidly isolate blood plasma for diagnostics

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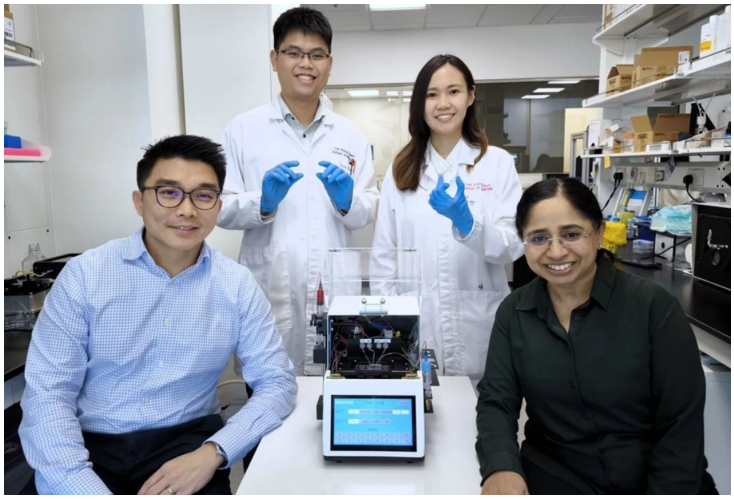
ExoArc can achieve high blood plasma purity by removing more than 99.9 per cent of blood cells and platelets



Scientists at Nanyang Technological University, Singapore (NTU Singapore), have developed a coin-sized chip that can directly isolate blood plasma from a tube of blood in just 30 minutes, which is more convenient and user-friendly as compared to the current gold standard, multi-step centrifugation process.

Named ExoArc, in just one step, it can achieve high blood plasma purity by removing more than 99.9 per cent of blood cells and platelets precisely and gently. This will greatly speed up clinical analysis of the cell-free DNA and RNA molecules, as well as nanoparticles commonly known as extracellular vesicles. These particles are often used to screen for biomarkers that are tell-tale signs specific to certain cancers and diseases.

Together with clinician-scientists from National Cancer Centre Singapore (NCCS), Tan Tock Seng Hospital (TTSH), and the Agency for Science, Technology and Research (A*STAR), the team clinically validated ExoArc by analysing the microRNA profile of blood plasma in healthy people and cancer patients using a biomarker panel 2 and found it was able to diagnose non-small cell lung cancer with a sensitivity of 90 per cent.

As a proof-of-concept, the team built a portable prototype device (measuring 30cm x 20cm x 30cm) to house the ExoArc chip (3.5cm x 2.5cm x 0.3cm), which has a large touch-screen interface to adjust settings, as well as internal pumps and pipings for the processing of blood samples and collection of the isolated blood plasma.