Microfilter allows non-invasive diagnosis of fetal abnormalities

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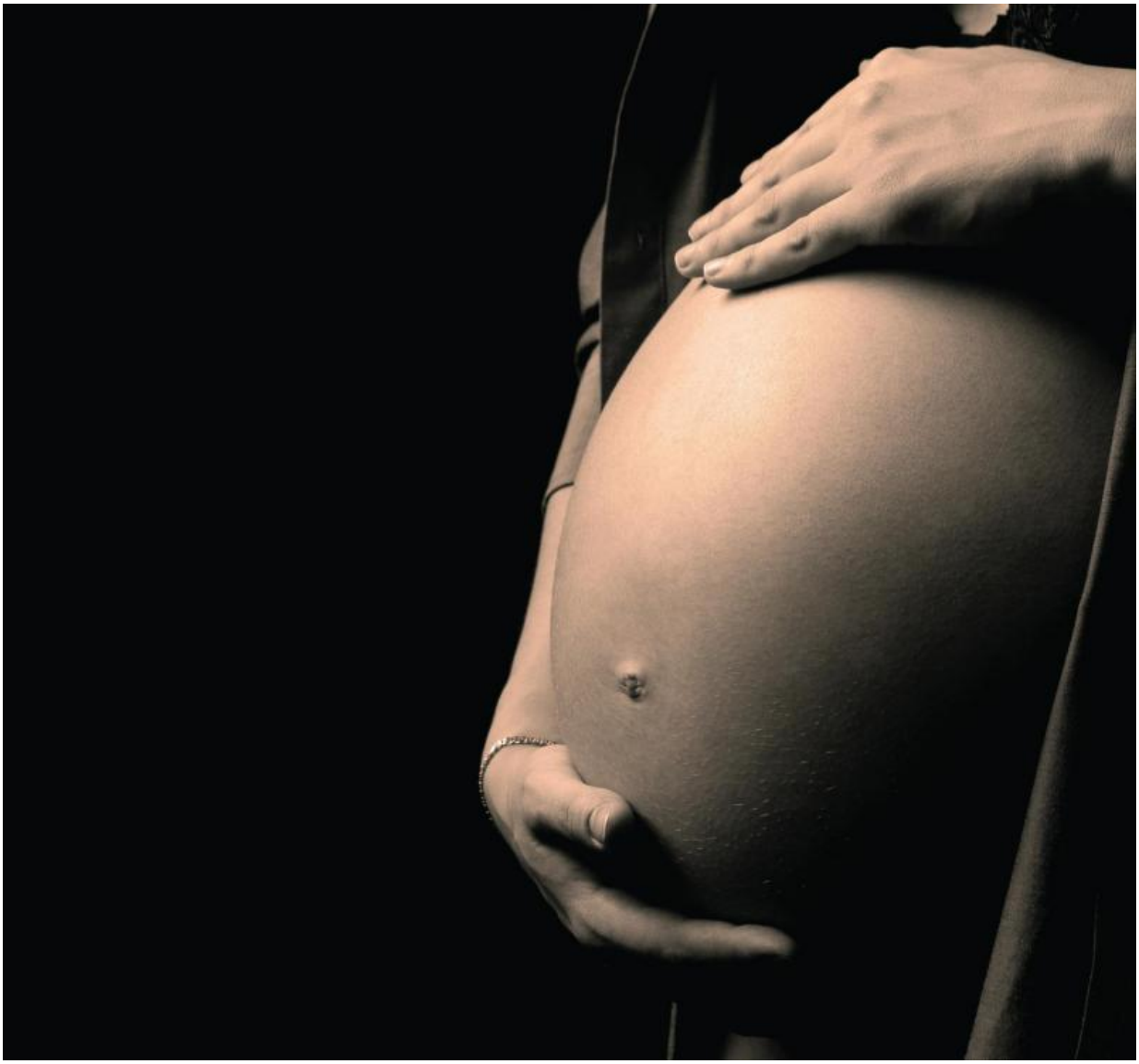

The technique, which would require drawing only a few millilitres of blood from

an expecting mother, could be used from the eighth week of pregnancy; earlier than current prenatal diagnostic procedures. Credit: anak

A team of scientists at the Agency for Science, Technology and Research (A*STAR) Institute of Microelectronics (IME) has fabricated a microchip that can filter fetal red blood cells from the mother's circulation. Retrieving these isolated fetal cells could allow the early diagnosis of fetal genetic abnormalities.

The technique, which would require drawing only a few millilitres of blood from an expecting mother, could be used from the eighth week of pregnancy; earlier than current prenatal diagnostic procedures.

Current procedures used to diagnose fetal abnormalities include amniocentesis and chorionic villus sampling (samples are taken from the fluid surrounding the baby or from the fetal side of the placenta respectively). These techniques are invasive and hold small but real risks including miscarriages, injury to the mother or fetus, infection, or induction of preterm labour.

Fetal red blood cells contain a nucleus, making them relatively larger than adult red blood cells. IME's microchip consists of a circular microfilter membrane that contains thousands of microslits. It allows the mother's smaller red blood cells and platelets to pass through while trapping the fetal red blood cells.

Fetal red blood cells normally circulate through the mother's bloodstream but in extremely small numbers – in the range of one cell per millilitre of maternal blood – making them very difficult to isolate. Cells captured in the IME microfilter are treated with dyes that differentiate them, allowing researchers to retrieve and then analyse the

fetal red blood cells for genetic defects.

This technique could also be applied to monitor the numbers of circulating tumour cells in cancer patients. If treatments are working, there will be less circulating tumour cells within patients' blood.

The team aims to conduct experiments for preclinical validation of its method until June 2016. After preclinical validations, the researchers hope to determine the number of genetic disorders that can be detected through this technology. So far, two patents have been filed from the project and the IME has been given funding to accelerate the process of bringing the technology to market.

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