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Source : www.thehindu.com Date : 2023-09-03

EARLY PREDICTION OF PREECLAMPSIA USING A BLOOD-DERIVED BIOMARKER

Relevant for: Science & Technology | Topic: Biotechnology, Genetics & Health related developments

September 02, 2023 09:15 pm | Updated 09:15 pm IST

A liquid-biopsy approach that measures DNA-methylation levels in the blood may improve the detection of pregnancies at risk of developing preeclampsia at early stages, a study published in *Nature Medicine* shows.

Preeclampsia is a major cause of morbidities during gestation. Early-onset preeclampsia — occurring before 34 weeks of gestation — is associated with a higher risk of severe disease and foetal mortality.

Among the few interventions available, low-dose aspirin at early stages of the disease (before 16 weeks of gestation) can reduce the risk of developing preeclampsia, but early identification of the disease is needed to initiate this intervention. Previous studies have shown that widespread methylation changes in the placenta occur at delivery. Liquid biopsy is a promising emerging tool for non-invasive diagnostics, and it is increasingly being used to detect disease and monitor progression and treatment response.

Bernard Thienpont from the Department of Human Genetics, KU Leuven, Leuven, Belgium and colleagues profiled blood DNA-methylation data from 498 pregnant women, about one third of whom developed preeclampsia. The authors detected differences in DNA methylation in the control pregnancies versus the pregnancies that developed preeclampsia. Using these data, they developed a model that enabled risk stratification not only when preeclampsia was diagnosed but also presymptomatically, at around 12 weeks of gestation. In a further analysis involving 197 of these women, they showed that this model, in combination with clinical and demographic risk factors, generated a risk score that correctly predicted 72% of patients with early-onset preeclampsia.

An accompanying News & Views piece cautions on overestimating the pre-eclampsia cases in the general population. It says that though the authors validated the screening tool in populations beyond the discovery cohort, they had used a case-control design in all populations. This would “inflate the relative proportions of pre-eclampsia cases far above what is seen in the general population (preterm pre-eclampsia has only a 1% population incidence).”

“The preliminary results suggest that cell-free DNA methylation profiling is a promising tool for presymptomatic PE risk assessment, and has the potential to improve treatment and follow-up in the obstetric clinic,” the authors.

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Source : www.thehindu.com Date : 2023-09-10

SCIENTISTS GROW A MODEL OF HUMAN EMBRYO IN THE LAB

Relevant for: Others | Topic: Body Parts And Their Processes

September 09, 2023 09:15 pm | Updated 09:15 pm IST

Due to ethical reasons and technical challenges, studying human post-implantation development has been limited. The closest that scientists have come to understand intrauterine development after implantation is by using mouse naïve embryonic stem cells (ESCs) that gave rise to embryonic and extra-embryonic stem cells capable of self-assembling into mouse structured stem cell-based embryo models at the post-gastrulation stage. It is at this stage that the embryo differentiates into the three primary founding tissue types of the body. But for the first time, researchers were able to extend the findings from mouse to humans by using genetically unmodified human naïve embryonic stem cells. The results were published recently in *Nature*.

The researchers were able to develop a “complete” model of the human embryo in the lab from implantation into the uterus to 14 days after fertilization. The model mimics the 3D structure and key hallmarks of post-implantation human embryos up with all the known features found in normal embryos around two weeks old.

Known as stem cell-based embryo-like structures, or SEMs, they were developed without using sperm, eggs or a womb. According to the researchers at the Weizmann Institute of Science in Israel, the models secreted a hormone that turned a commercial pregnancy test to positive.

The authors note that their model recreates the organization of all known lineages and compartments of early post-implantation human embryos, including the epiblast, hypoblast, extraembryonic mesoderm and trophoblast. Unlike previous models, this model shows defining hallmarks of integrated embryo models, including all lineages of the post-implantation embryo and structural organisation.

“We observed proper spatial allocation of cell lineages into defined embryonic and extra-embryonic compartments in the complete absence of fertilisation or interaction with maternal tissues and without the need of providing external targeted signalling pathway induction during the self-organisation of the aggregated cells,” they write.

“This SEM platform may enable the experimental interrogation of previously inaccessible windows of human early post-implantation up to peri-gastrulation development,” they add.

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