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PREDICTION OF PREECLAMPSIA RISK USING CIRCULATING CELL-FREE RNA

Researchers at Stanford and the Chan Zuckerberg Biohub have developed methods for predicting the risk or existence of preeclampsia.

Preeclampsia, a multi-organ syndrome diagnosed after 20 weeks of gestation, is associated with an increase in adverse maternal and perinatal outcomes. Detection and diagnosis can prove challenging, as early signs of preeclampsia (PE) can be easily confused with general pregnancy discomfort or other gestational complications. There is an unmet clinical need for high-quality predictive tests for PE early in gestation (16 weeks) to guide prophylactic use of potential therapeutics and improve obstetric care. Liquid biopsies that measure circulating, cell-free RNA (cfRNA) offer the ability to noninvasively study the development of pregnancy-related complications, like preeclampsia.

Stage of Research
The inventors have developed a method of diagnosing or evaluating risk of preeclampsia by quantifying levels of cfRNA from a biological sample in a pregnant subject. To develop this method, the inventors conducted a prospective clinical study to identify a predictive signature of transcriptomic changes across gestation. Specifically, the inventors isolated and analyzed cfRNA to identify a panel of differentially expressed genes that segregate PE and control samples across gestation, agree with known PE biology, and together provide a risk score for PE.

Applications

- High-quality predictive tests for PE early in gestation (16 weeks), applicable as early as 5 weeks
- Risk score can provide diagnostic and prognostic insight into risk of developing disease, or to assist in the selection of therapeutic intervention or disease

management approaches

Advantages

- Small subset of differentially expressed genes can predict PE risk before 16 weeks of gestation with high specificity and sensitivity, and can differentiate PE from other pregnancy-related complications
- Method separated PE and normal samples across gestation with good specificity, despite differences in symptom severity, PE onset subtype and gestational age at delivery
- Gene expression can be easily measured using RT-PCR (or other common methods of gene expression detection), which is a clinically relevant and inexpensive alternative to RNAseq
- cfRNA can be isolated from the non-cellular fraction of a bodily fluid (e.g., blood serum or plasma)

Patents

- Published Application: WO2022192467
- Published Application: 20250388967

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