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Predicting Gestational Age and Time to Delivery in Pregnant Women

Researchers at Stanford have developed computational modeling methods for improved prediction of gestational age and time to delivery. This work is based on the identification of blood metabolites in pregnant women that can accurately predict gestational age and provide insights into pregnancy variations undetected by ultrasound (currently the most accurate timing method for pregnancy). In the new method, a computational model, trained using temporally aligned analyte measurements derived from a cohort of pregnant individuals, is used to assess metabolite data sampled from a pregnant subject over one or more time points. This approach aligns temporal data to evaluate gestational age, time to labor, preterm birth, and preterm abortion including diagnostics to be utilized for clinical interventions. Accurate estimation of the timing of pregnancy and birth is important for many clinical decisions in obstetrics, including determination of preterm birth and related treatment regimens. However, current clinical methods are based on information about the last menstruation date, which can be imprecise, or ultrasound imaging, which depends on accessibility at early pregnancy. Moreover, the accuracy of ultrasound for estimating gestational age is suboptimal, with only 40% of the newborns delivered within 7 days of the predicted due dates.

Stage of Development
A recent study by the researchers demonstrated that the development of clinical tools with a few metabolites in maternal blood to time pregnancy is promising. Testing of blood drawn from the pregnant woman would likely be limited to once or a few times to be informative and have the potential to benefit pregnant women in both the developed and developing worlds.

Applications

- Predicting gestational age and delivery

Advantages

- Accuracy is significantly improved compared to prior technology using blood metabolites
- There is a great need for accurate timing of pregnancy: in the U.S. alone, 900,000 women annually missed their first-trimester ultrasound

Publications

- Liang, Liang, et al. "Metabolic dynamics and prediction of gestational age and time to delivery in pregnant women." *Cell* 181.7 (2020): 1680-1692.

Patents

- Published Application: 20220142477
- Issued: 12,426,782 (USA)

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