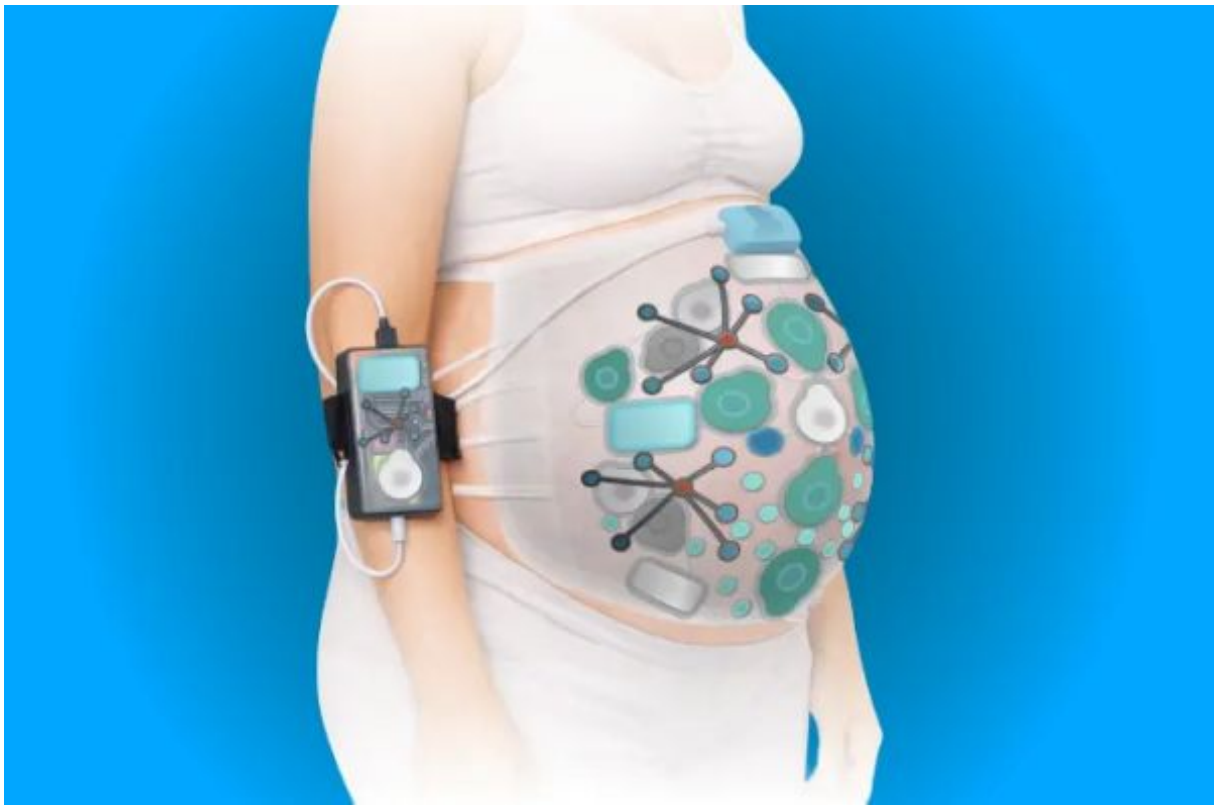
ICFO



OMEGA: A new project to transform care during labor and childbirth

OMEGA is funded by the Advanced Research Projects Agency for Health (ARPA-H) in the USA, and coordinated by Carnegie Mellon University in Pittsburgh.

ICFO's Medical Optics research group is one of OMEGA's partners the international, multi-centre project will develop a new wearabl monitoring system that will improve clinical assessment of feta health.

July 06, 2026

An international consortium, led by Carnegie Mellon University, has secured funding up to $39.3 million from the Advanced Research Projects Agency for Health (ARPA-H) to develop a wearable monitoring system to better identify fetal distress and its cause, enabling a safer labour and delivery experience for mothers and babies. The system, called **OMEGA**, or Optical, Mechanical, and Electrical Global Assessment of fetal hypoxia, aims to replace

50-year-old, indirect, unreliable fetal heart rate monitoring technology with a unified, real-time assessment of fetal oxygen delivery and adaptive capacity. The project is under ARPA-H's Making Obstetric Care Smart program, led by ARPA-H **Program Manager Kate Arnold, M.D., MBA.**

The standard of care for determining whether a baby is in distress during labor and delivery, including contractions and fetal heart rate monitoring, remains largely unchanged from the 1970s. While changes in heart rate can indicate potential problems, they fail to provide critical information such as whether a fetus is receiving enough oxygen. Without direct information about oxygen levels, clinical decisions made during labor often rely on incomplete data.

i¿½When a fetus is suspected to be hypoxic, care teams may have to act quickly without knowing the underlying cause,i¿½ said **Jana Kainerstorfer**, Professor of Biomedical Engineering at Carnegie Mellon and Principal Investigator of OMEGA. i¿½The ability to directly measure a lack of oxygen to the fetus, and identify the cause, will have significant implications for obstetric care by enabling safer deliveries for all.i¿

? To pinpoint why fetal hypoxia occurs during labor, OMEGA is looking at the whole syste , not just the fetus in isolation. OMEGA will integrate several noninvasive sensors to measu e contributing factors not only from the mother, but also from the placenta and uterus, as we l as the fetus. This systems-level, mechanism-based solution aligns with the complexity f maternal-fetal physiology, enabling clinicians to understand not only whether a fetus s distressed but wh

. The OMEGA project team is co-led by **Tiffany Ko**, PhD, a research scientist with Children's Hospital of Philadelphia (CHOP)'s Resuscitation Science Center. i¿½This project is a chance to close the gap between what clinicians need - reliable, real-time clarity - and what current monitoring can provide,i¿½ says Ko. i¿½Our team is focused on methods that are rigorous, interpretable, and built for the realities of the delivery room. We believe this work can directly improve outcomes for mothers and babies, and CHOP's commitment to children and families makes that mission deeply meaningful to us.i¿

? Turgut Durduran, **ICREA Prof. at ICFO** and leader of the Medical Optics team, has been working on fetal brain oximetry for two decades. His team will contribute to developing a wearable OEM module to be integrated in the optical system. i¿½It is exciting to look back at where we were in the early 2000s and compare that to where our technologies are nowi¿½, he says. i¿½We can now propose scalable, wearable technologies while the accepted clinic l tools have essentially remained the same. OMEGA project will allow us to work with t e frontier researchers in Europe and in the USA, developing different modalities a d incorporating them in a unique system. The possibilities for clinical impact with su h developments are very broad, and we are still discovering them.i¿½

The team of nine partner institutions also includes UPMC Magee Women's Hospital (USA), University of Pittsburgh (USA), University of Notre Dame (USA), Washington University, St.

Louis (USA), University of Pennsylvania (USA), and Tyndall National Institute (Ireland).