

Scientists uncover signal for when a pregnant woman is about to go into labor

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During the last few weeks of a woman's pregnancy, many keep an overnight bag ready to go at a moment's notice in case they begin to go into labor. They do this because there is no clear signal that labor is about to begin - before the body makes it abundantly clear that this process has started. Understanding the mechanisms that initiate this process is especially important when treating women at risk of going into labor early.

Researchers from The University of Texas Medical Branch at Galveston have uncovered a cellular signal in the [amniotic fluid](#) around the fetus that builds up when a pregnant woman is about to go into labor. The findings were recently published in *PLOS ONE*.

"The initiation of the birthing process is complex. Several body systems maintain pregnancy through a delicate balance - altering this balance tends to promote labor," said lead author Ramkumar Menon, assistant professor in the UTMB department of obstetrics and gynecology.

The UTMB team focused their investigation on telomeres, which are the parts of the DNA that

protect our genetic data while cells are dividing. These telomeres become shorter every time a cell divides, which hinders their ability to ensure that the new cells are identical to the parent cells. This shortening process is linked with the changes that take place in our bodies as we age. Over time, the telomeres become too short for the cell to divide and they become "senescent."

"We investigated whether the presence of senescent telomere fragments in the amniotic fluid around the fetus is linked with labor status, as we know that the telomeres continue to get shorter as the pregnancy progresses," Menon said.

The researchers used amniotic fluid samples from the Nashville Birth Cohort Biobank of 50 women in labor and 51 women at the end of their pregnancy but not in yet in labor. They also acquired demographic information from patient interviews and medical information from their medical records. In addition, the team dissected fetal membranes from the placenta after babies were delivered at term.

Menon said his team wanted to know what triggered a change in the delicate balance that had maintained a pregnancy. "We began this study suspecting that that the senescent cells cause oxidative stress-associated damages to the amniotic sac that create inflammation in the placenta," said Menon. "We know from previous studies that inflammation can alter the balance of the mother's hormones in the uterus, triggering the labor process."

The researchers used telomere mimics, resembling those found in amniotic fluid, and conducted cellular analyses, finding more telomere fragments when a woman who was in labor compared to women who were at the end of their pregnancy but not yet in labor. They report that as the fetus mature in the womb and nears term, placenta and other related tissues also age correspondingly due

to telomere fragmentation and eventual loss. These telomere fragments can increase sterile inflammation, as Menon termed, potentially signaling fetal maturity to trigger the process of labor and eventual delivery.

"A better understanding of the pathways activated by telomere fragments and their contribution to fetal membrane senescence may contribute to the design of more effective labor assessment, perhaps including preterm birth risk and direct medical interventions for [labor](#) induction or prevention."

More information: Jossimara Poletini et al. Telomere Fragment Induced Amnion Cell Senescence: A Contributor to Parturition?, *PLOS ONE* (2015). [DOI: 10.1371/journal.pone.0137188](https://doi.org/10.1371/journal.pone.0137188)

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