Diagnostic for Detecting Preconception Stress from Oocytes and Cumulus

Tech ID: 34712 / UC Case 2026-426-0

ABSTRACT

Researchers at the University of California, Davis have developed advanced epigenetic methods and systems that detect and assess developmental risks in embryos caused by maternal stress prior to conception.

FULL DESCRIPTION

This technology encompasses novel methods, systems, assays, and kits designed to identify DNA methylation biomarkers in oocytes and associated cells that reflect maternal preconception stress, which can influence developmental outcomes in embryos. By analyzing genome-wide methylation patterns at specific genes linked to early development, immune function, and neuronal pathways, these techniques provide insight into the risk of neurodevelopmental and metabolic disorders. Additionally, the technology enables enhanced embryo selection for assisted reproductive technologies by detecting stress-related epigenetic signatures noninvasively. Supplementation with specialized peptides in culture media further improves embryonic development and IVF success.

APPLICATIONS

- Clinical diagnostics for assessing maternal preconception stress and embryo developmental risk.
- Enhanced embryo screening and selection tools to improve IVF success rates.
- Kits and reagents for genome-wide DNA methylation analysis in reproductive health labs.
- Supplementary culture media products incorporating specialized peptides for IVF clinics to enhance embryo viability.
- Research platforms studying epigenetic impacts of environmental and endocrine stressors on reproduction.
- Personalized reproductive planning and intervention strategies based on maternal stress biomarkers.
- Pharmaceutical compositions aimed at reversing oxidative stress effects during assisted reproduction.

FEATURES/BENEFITS

- Detects stress-associated, locus-specific DNA methylation changes at high resolution in individual oocytes and cumulus cells.
- Enables noninvasive estimation of oocyte stress exposure by profiling DNA methylation in cumulus cells.

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OTHER INFORMATION

KEYWORDS

assisted reproductive technology, developmental disorders, DNA methylation, embryo, epigenetics, in vitro fertilization, maternal stress, neurodevelopmental risk, oocyte, preconception stress, cumulus

CATEGORIZED AS

- **Biotechnology**
  - Genomics

- Correlates maternal hormone measures with oocyte/embryo epigenetic alterations to connect physiological stress with molecular outcomes.
- Improves ART/IVF embryo selection by incorporating epigenetic risk profiling to increase implantation and live-birth rates.
- Reduces oxidative-stress damage in culture by supplementing media with specialized peptide to enhance embryo developmental competence.
- Standardizes methylation sequencing and analysis via dedicated kits/reagents for consistent clinical and research workflows.
- Overcomes low sensitivity in detecting subtle, locus-specific epigenetic changes driven by maternal preconception stress.
- Bridges the gap between maternal physiological stress markers and oocyte/embryo molecular signatures.
- Replaces invasive sampling with noninvasive or minimally invasive biomarker approaches for reproductive-cell and embryo risk assessment.
- Upgrades IVF embryo selection beyond morphology by adding epigenetic risk stratification.
- Mitigates IVF performance losses caused by oxidative stress and suboptimal culture conditions.

- Health
- **Medical**
  - Diagnostics
  - Disease: Genetic Diseases and Dysmorphic Syndromes
  - Screening
- **Research Tools**
  - Nucleic Acids/DNA/RNA
  - Screening Assays

RELATED CASES

2026-426-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Diagnostic to Predict Autism in Newborn Blood Spots

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