Gestation is an Autonomic and an Intrinsic Biologic Reproductive Cycle with Constant Intervals and Circadian Timers Secondary to Light-Dark Cycle Modulation of the Interactive Inhibitory and Stimulatory Systems: A Hypothesis

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Abstract

- The mechanisms responsible for maintaining pregnancy and initiating parturition have not been fully elucidated in any species. Failures in understanding uterine functions during pregnancy are a major shortcoming of modern healthcare.
- This study investigated the current evidence-based literature and research that may support our proposed hypothesis. A 40-second 3D animation was developed in conjunction with a Houston-based medical company to support this hypothesis. https://www.youtube.com/watch?v=0e00RQFdj6w&t=93s
- Gestation is divided into five clinical phases, growth, maturation, transition, parturition, and involution secondary to light-dark cycle modulation of the interactive inhibitory and stimulatory systems. The *growth phase* is from conception until 30 weeks, during which the inhibitory system is dominant.
- During the nocturnal period of *the maturation phase* (30-37 weeks), the inhibitory system which maintains the pregnancy transiently wears off due to cortisol modulation. Meanwhile the modulation of melatonin and oxytocin, and the latter induces contractions of the stimulatory system, resulting in nocturnal synchronization and synergy of the two systems which makes the cervix to lose its strength by transforming it into the lower uterine segment.
- Pregnancy interval and circadian timers are achieved by a single mechanism, that is, exponential uterine wall tension (EUWT) failure, secondary to the complete loss of cervical resistance, nocturnally. The creation, autonomic maintenance, and eventually autonomic termination of the EUWT by light-dark cycle modulation make gestation an autonomic cycle with constant intervals and circadian timers.
- The transition phase is the time between EUWT failure and the onset of labor which varies from a few hours to a few days depending on the maturity of the stimulatory system. Intrinsic myometrial cell character (IMCC) initiates labor when EUWT fails. IMCC ensures that parturition is an autonomic, intrinsic, and interactive repetitive contraction and relaxation cycle, secondary to myometrial tension changes that cause labor progression and protect the fetus against hypoxia.
- EUWT and IMCC interaction ensure that the maintenance of pregnancy is autonomic and that is the termination of pregnancy is autonomic, intrinsic, obligatory, and deterministic. The malfunction of any EUWT component terminates pregnancy prematurely or leads to post-term or dystocia in labor. Most of the current therapeutic preterm strategies are focused on preventing premature EUWT failure.
- EUWT is measured by Laplace's law and Pascal's principle, which might be the laws of physics that genetically control human gestation. There is evidence-based support for the hypothesis which will have a major impact on obstetric practice and should be of interest to obstetricians, researchers, midwives, neonatologists, and those involved in maternal and family welfare.