

Laplace Law Controls Pregnancy Intervals, Circadian Timers, and Mode of Delivery Through Exponential Uterine Wall Tension and Hormonal Milieu: A Hypothesis 1

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Abstract

Background Despite a considerable body of literature gathered from the few species that have been studied, the mechanisms responsible for the maintenance of pregnancy and the initiation of parturition have not been fully elucidated. Failure to understand uterine function during pregnancy is a major shortcoming in healthcare. **Objective** To support the hypothesis. **Study Design** This study investigated the current evidence-based literature and research that may support the hypothesis, accompanied by 40-second 3D animations. **Results** The isthmus of the cervix does not seem to exist embryologically, anatomically, histologically, or functionally. The isthmus of the cervix may be a flaw in the concept of human parturition, which creates a block barrier that prevents understanding of uterine function. Mechanotransduction is the process by which cells sense physical forces and translate them into biochemical and biological responses. Uterine mechanotransduction has functional and molecular components, wherein intrinsic myometrial cell character (IMCC) is the molecular component and Exponential uterine wall tension (EUWT) is the functional component. IMCC enables the uterus to control its functions autonomically and intrinsically, secondary to changes in tension, where high tension induces relaxation and low tension induces contraction. EUWT is created and maintained by a complex interaction between the gestational sac, uterus, and cervix, for which the primary function is to maintain EUWT. EUWT mechano-transduction and progesterone/estrogen induce the stretch-dependent inhibitory system, and indirectly, they also induce the stimulatory system by inducing myometrial hyperplasia and hypertrophy. Pregnancy is mainly maintained through a stretch-dependent inhibitory system, in addition to direct myometrial relaxants. Contractions of the stimulatory system in the presence of the foetus create direct and indirect uterine-cervical interactions (DIDUCI). DIDUCI transforms the cervix into the lower uterine segment through TYVU pattern formation and causes EUWT failure. So, the functional components of the stimulatory system (DIDUCI) are the uterus corpus, fetus, cervix, and bony pelvic inlet. **Conclusion** Pregnancy is a state of balance between the two opposing and interactive inhibitory and stimulatory systems secondary to EUWT mechanotransduction and progesterone/estrogen stimulation. EUWT is measured using Laplace's law, which might be the law of physics that controls uterine function during pregnancy.

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