Neuroendocrine Axis of Human Labor

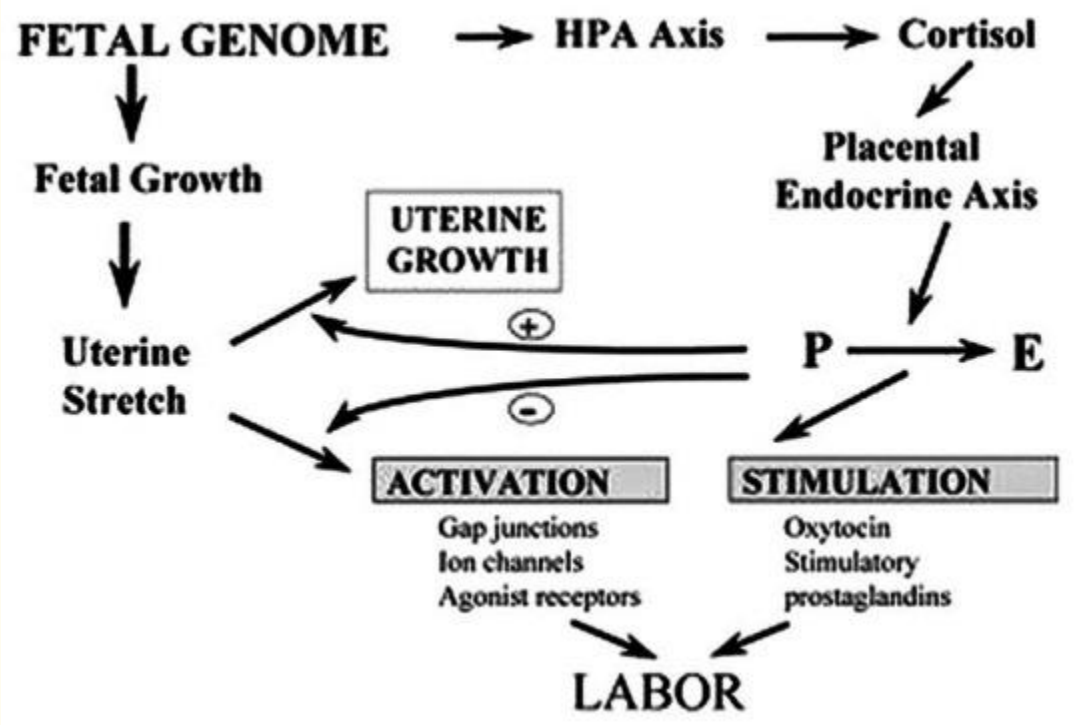
Brightside April, 2019

By Dr. Derek Conte

In response to last month's article, Are Mother and Baby Distinct Individuals? (March, 2019) showing the baby/fetus being a separate and distinct life, technically growing "outside" its mother, more information was requested to support the following quote taken from an article in Eternal Perspective Ministries (https://www.epm.org/resources/2010/Mar/29/unborn-part-mothers-body/): *"Dr. Peter Nathanielsz of Cornell University concurs. He says that the unborn's brain sends a message to his own pituitary gland which in turn stimulates the adrenal cortex to secrete a hormone which stimulates the mother's uterus to contract. A woman goes into labor not because her body is ready to surrender the unborn child, but because the unborn child is ready to leave her body."*

The diagram below seems complicated, but I will explain it. Look at it carefully for a while before you read on. The starting point is "FETAL GENOME". The end point is "LABOR". First follow it down the left side. That is the nine-month gestational side of baby/fetal development. Then start again and move to the right and then down. That is the side that shows baby/fetus activation of labor.

Endocrinology of Parturition (1)



(2)*Pathway by which the fetal genome controls the onset of labor through endocrine and mechanical signals. HPA-Axis = Hypothalamic Pituitary Adrenal - Axis, P=progesterone, E=estrogen* (1)

The diagram above shows baby/fetus brain signaling its mother to begin the labor process. Let's follow the chart first from the top left and go down. The "fetal genome" refers to the baby/fetus' genetic programming which instigates "fetal growth", "uterine stretching" and "uterine growth" as the baby/fetus grows. In pregnancy, the hormone progesterone (meaning "pro-gestation steroid") becomes elevated in order to support the growth of the uterus and placenta which feeds the baby/fetus. The hormone estrogen (meaning "coming into estrus" or "season") is suppressed because fertilization has taken place. Progesterone remains elevated and estrogen lowered until the very end of the term and delivery is imminent.

Now let's go back to the "fetal genome" again and move right on the diagram. After nine months, baby/fetus is ready to come and signals the release of cortisol from the hypothalamus and pituitary glands deep inside its brain along what is known as the "HPA-Axis" (Hypothalamic > Pituitary > Adrenal Axis). Cortisol is a powerful stress hormone that ignites a series of other hormonal releases, including oxytocin.

The placenta now increases estrogen levels to dominance over progesterone and sensitizes "Agonist receptors" to better bind "Oxytocin" in the uterine muscle, activating strong contractions in an (ever-increasing) positive feedback loop to promote delivery (it is interesting that the word "Agonist" has Greek roots meaning "agony", "anguish", "hero", or "one who struggles for victory").

The "Gap junctions" and "Ion channels" are pathways in membranes through which chemical ions flow and, in this case, relate to calcium involvement in the uterine muscle contractions. The placenta also releases irritating molecules called "prostaglandins" to assist the delivery of baby/fetus. The mother responds by releasing more oxytocin and the hormone "relaxin" from the ovaries to promote connective tissue stretching and opening of the pelvic bowl, allowing the baby/fetus to pass through the birth canal.

(1,2) Indian Journal of Endocrinology and Metabolism: "Endocrinology of Parturition", By Sunil K. Kota, Kotni Gayatri,[1] Sruti Jammula,[2] Siva K. Kota,[3] S. V. S. Krishna, Lalit K. Meher,[4] and Kirtikumar D. Modi

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