

# Implantation

## I. Fertilization

- A. Several **hundred** sperm might make it to the egg, only **one** will **fertilize** the egg
- B. **Acrosome** releases its **enzymes** which break through the **outer** layer of the egg
- C. **Plasma** membranes of the **egg** and sperm **fuse**, and the nucleus from the **sperm** enters the egg
- D. **Sperm** nucleus fuses with the **egg** nucleus
- E. New individual is called a **zygote**

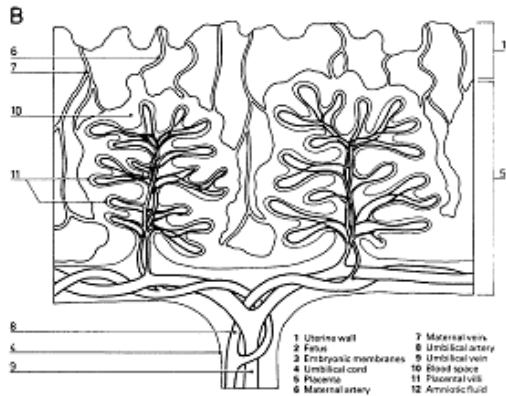
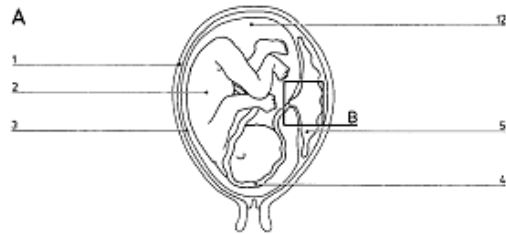
## II. Implantation

- A. Fertilized egg develops as travels down **oviduct** to **uterus**
- B. Fertilized egg attaches to **endometrium (implantation)** several days after fertilization



C. Developing offspring needs to **grow** in the **uterus** undisturbed, the **menstrual** cycle must be interrupted for **9** months

1. Hormones are produced by the **zygote** to **prevent** menstruation



a. **HCG - Human Chorionic Gonadotrophin**

i. Maintains the **corpus luteum**, which continues to produce **estrogen** which prevents the **endometrium** from **shedding**

ii. Pregnancy test uses monoclonal **antibodies** to test for this hormone

iii. **Corpus luteum** persists for 3 - 6 months

D. Placenta forms from both **maternal** and **fetal** tissues

1. Provides **exchange** of molecules between **fetal** and **maternal** blood

2. Continues production of **HCG**, and also produces **progesterone** and **estrogen**

i. Higher levels of these 2 hormones shut off release of **FSH** from **anterior pituitary** preventing **ovulation** and maintaining the **endometrium**

ii. **Birth control pill** does this too

### III. In Vitro Fertilization

- A. Where the egg is **removed** from the mother by means of **laparoscopy** and fertilized by the male's sperm which has been collected
- B. Egg and sperm are mixed and the egg is cultured for a few days and then **implanted** into the uterus



### Pregnancy and Oxytocin

#### I. Fetus

- A. **Fetus** rotates with **head** pointed toward **cervix**
- B. If not in position, **breech** birth (rump first) may require **Cesarean** section
- C. End of **ninth** month, the fetus averages:
  - 1. Length: **525 mm** (20 inches)
  - 2. Weight: **3,380 grams** (7.5 pounds)

## II. Labour

- A. **Mild**, indiscernible **contractions** occur throughout pregnancy
- B. Contractions become **stronger** and more **frequent** near end of pregnancy
- C. **LABOR** involves contractions lasting over **40** seconds occurring every **15 - 20** minutes
- D. Trigger of childbirth involves **PROSTAGLANDINS** and **OXYTOCIN** (though we don't have all the details worked out yet) from mother's **pituitary**

[Ted-ed The Three Different ways Mammals Give Birth](#)



### III. Oxytocin

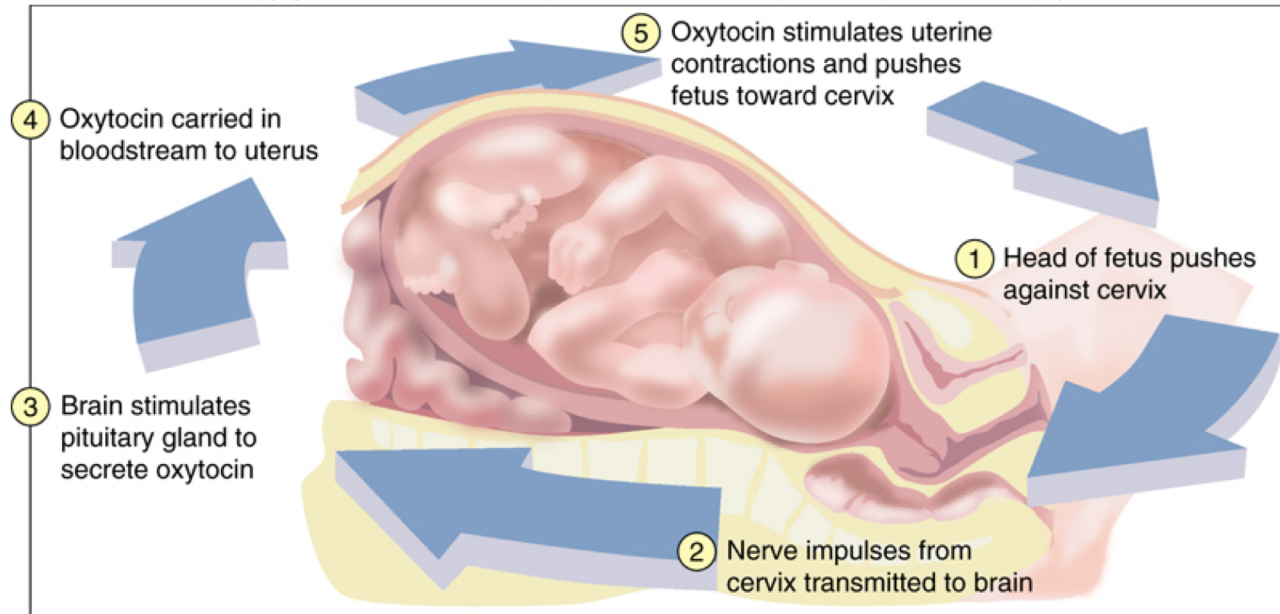
- A. A hormone made in the **hypothalamus**
- B. Stored in the **posterior pituitary gland**
- C. Functions:
  - 1. Causes the **uterus** to **contract**
  - 2. Used to artificially induce **labour**
  - 3. Stimulates the release of **milk** from the **mammary glands** for nursing
- D. Controlled by a **positive** feedback system
  - 1. In a positive feedback system, the level of the hormone in the blood feeds back to the **posterior pituitary** and increases release of **Oxytocin**
  - 2. Just before birth, the growing baby's **head** exerts pressure against the **cervix**
  - 3. This pressure triggers sensory nerves in the cervix to send a nerve signal to the **posterior pituitary** to release **oxytocin**
  - 4. The oxytocin is released into the **blood**

5. When it gets to the uterus, it causes stronger uterine **contractions**, which causes greater stimulation of the sensory nerves, which causes **more** oxytocin to be released, which causes **stronger uterine** contractions, and so on
6. The cycle **ends** when the baby is pushed out of the **uterus**, stopping the stimulation of sensory nerves to the pituitary
7. A **positive** feedback system is unstable and does not lead to **homeostasis**

#### IV. Childbirth (called Parturition)

##### A. Childbirth includes **labor** and **expulsion** of fetus

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B. **Three** stages Movie

1. Stage 1

- a. Cervix **dilates**
- b. **Mucus plug** from cervical canal is **expelled**
- c. **Amniotic** membrane ruptures to release **amniotic fluid** ("water" breaks)
- d. Stage ends when cervix is fully **dilated**

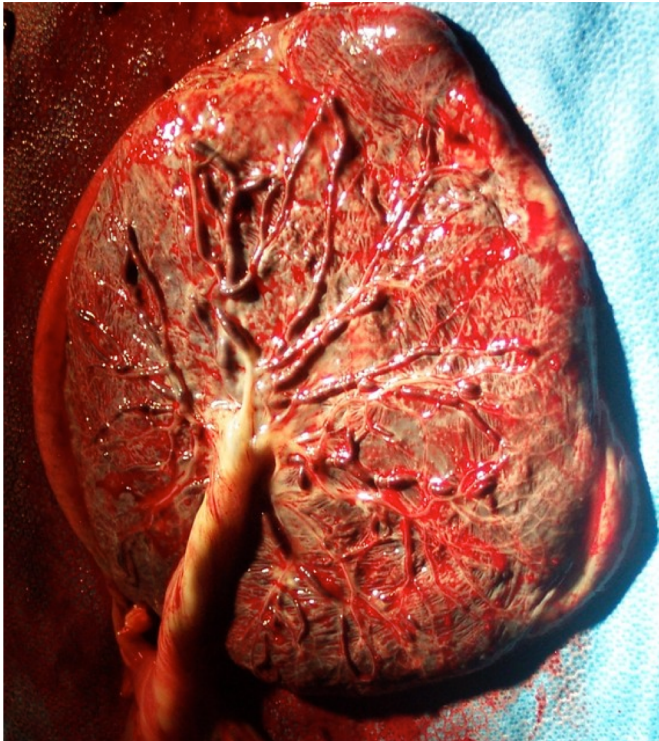
2. Stage 2

- a. Baby emerges from uterine contractions that occur every **1 - 2** minutes lasting one minute each

- b. If vagina cannot expand enough, an **episiotomy** is performed and baby is born
- c. **Umbilical cord** is cut, shriveling and leaving scar that becomes **navel**

3. Stage 3

- a. **Placenta** (afterbirth) is expelled from uterus about **15** minutes after delivery of baby



## V. Breasts

- A. Produce **milk**
- B. Contains **one** to **two dozen** lobules, each with many mammary ducts that end in blind sacs called **alveoli**
- C. **Areola** (pigmented area of nipple) lacks **hair** and **sweat** glands but has **saliva-resistant lubricant**
- D. **Prolactin** hormone:
  - 1. Stimulates **alveoli** to produce **milk**
  - 2. Feedback **inhibition** suppresses milk production during **pregnancy**
- E. During couple of days after childbirth and before milk production is underway, a watery, yellowish- white fluid termed **COLOSTRUM** is secreted
  - 1. Contains more **protein** and **less** fat

## VI. Menopause

- A. **Ovarian** and **uterine** cycles cease
- B. Occurs when the ovaries do not respond to **FSH** and **LH**
- C. Stop producing **estrogen** and **progesterone**
- D. Occurs between ages **45** and **55**
- E. Menstruation becomes **irregular**
  - 1. Menopause completed after **one** year of no menstrual cycle
  - 2. Highly variable symptoms include:
    - a. "**hot flashes**" from irregular circulation
    - b. **dizziness**
    - c. **headaches**
    - d. **depression**
    - e. either **insomnia** or **sleepiness**
    - f. Increased **sex** drive due to androgens produced by adrenal cortex
    - g. ...or **no** symptoms at all!