

ONSET AND PHYSIOLOGY OF LABOR

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Objectives:

- Define labor/labour (parturition).
- Recognize the factors triggering the onset of labor.
- Describe the hormonal changes that occur before and during labor.
- Describe the phases of uterine activity during pregnancy and labor.
- Know the clinical stages of labor.

Parturition

- Definition
 - ▣ Uterine contractions that lead to expulsion of the fetus to extrauterine environment
 - ▣ Towards the end of pregnancy the uterus become progressively more excitable and develops strong rhythmic contractions that lead to expulsion of the fetus.

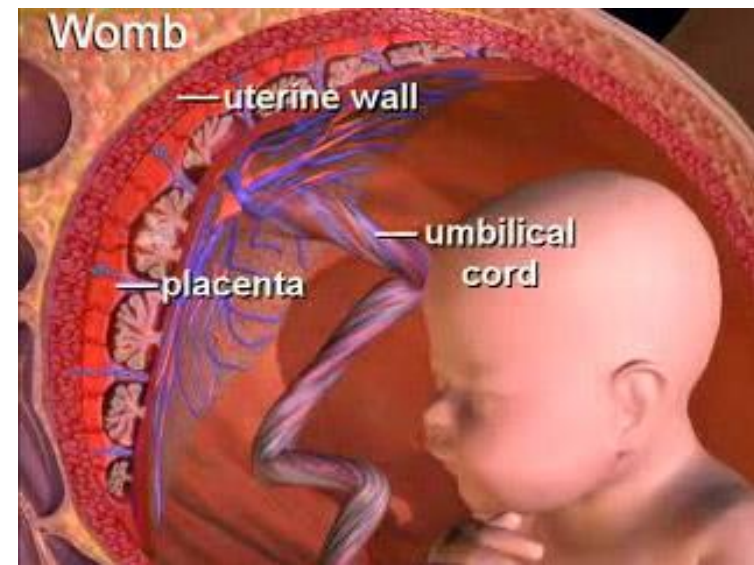
Small group activity

- Does non pregnant uterus contract?

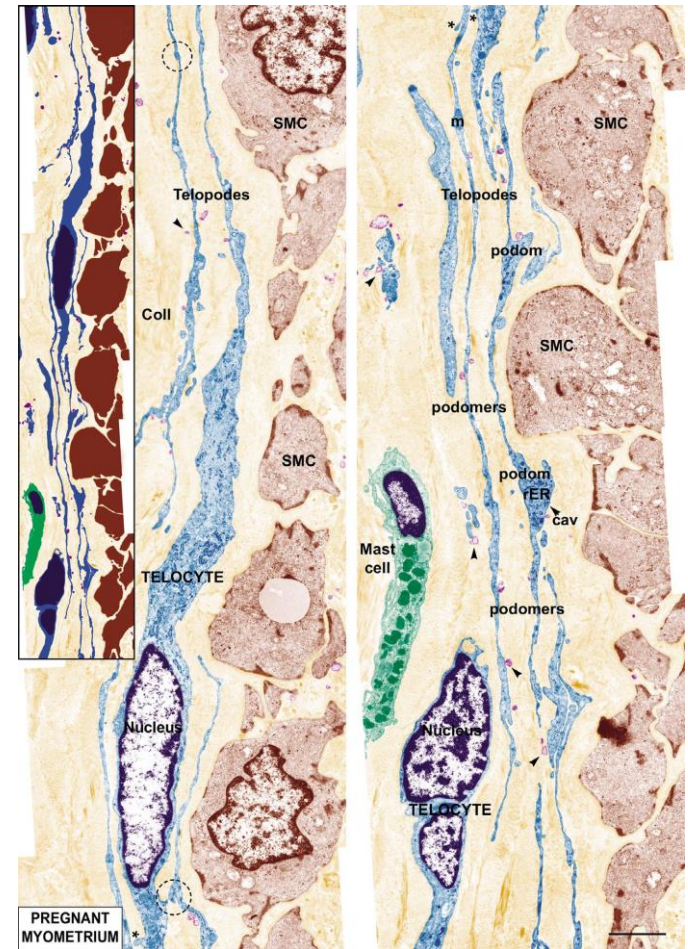
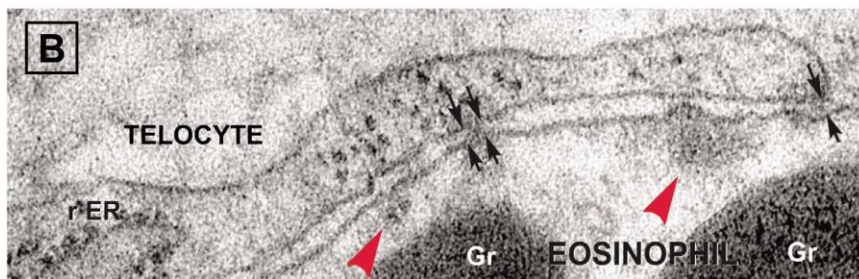
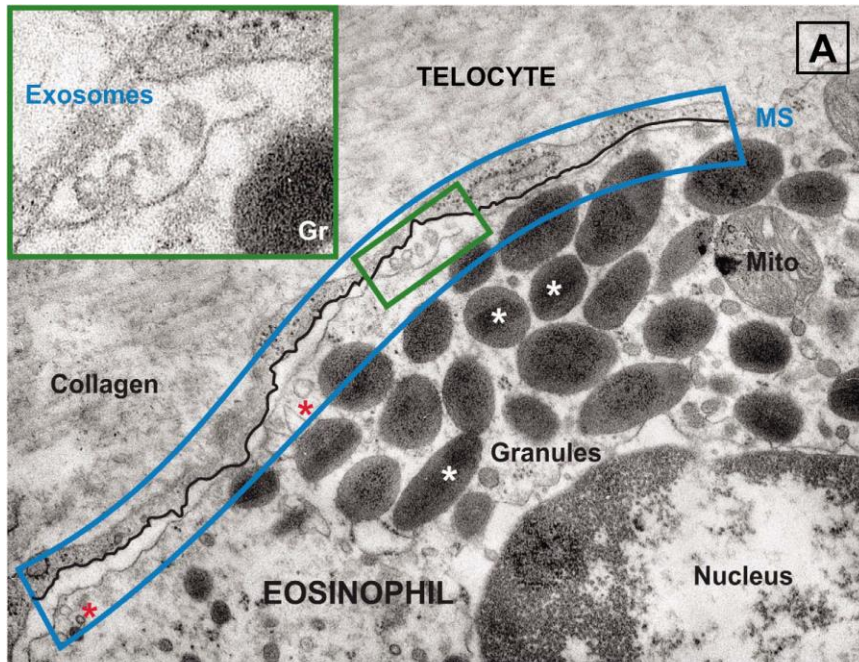


Parturition

- Uterus is spontaneously active.
- Spontaneous depolarization of pacemaker cells (Telocytes).
- Gap junctions spread depolarization
- Exact trigger is unknown
 - ▣ Hormonal changes
 - ▣ Mechanical changes



Telocytes



Hormonal changes

- Estrogen & Progesterone
 - ▣ Progesterone inhibit uterine contractility
 - ▣ Estrogen stimulate uterine contractility
- From 7th month till term
 - ▣ Progesterone secretion remain constant
 - ▣ Estrogen secretion continuously increase
 - ▣ Increase estrogen/progesterone ratio

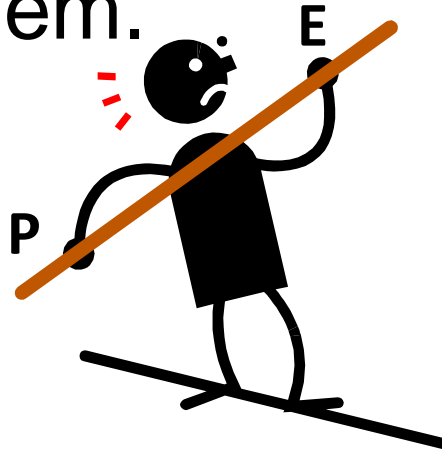
Hormonal changes

□ Progesteron

- ▼ GAP junctions
- ▼ Oxytocin receptor
- ▼ Prostaglandins.
- ▲ Resting mem. Potential

□ Estrogen

- ▲ GAP junctions
- ▲ Oxytocin receptors.
- ▲ Prostaglandins



Hormonal changes

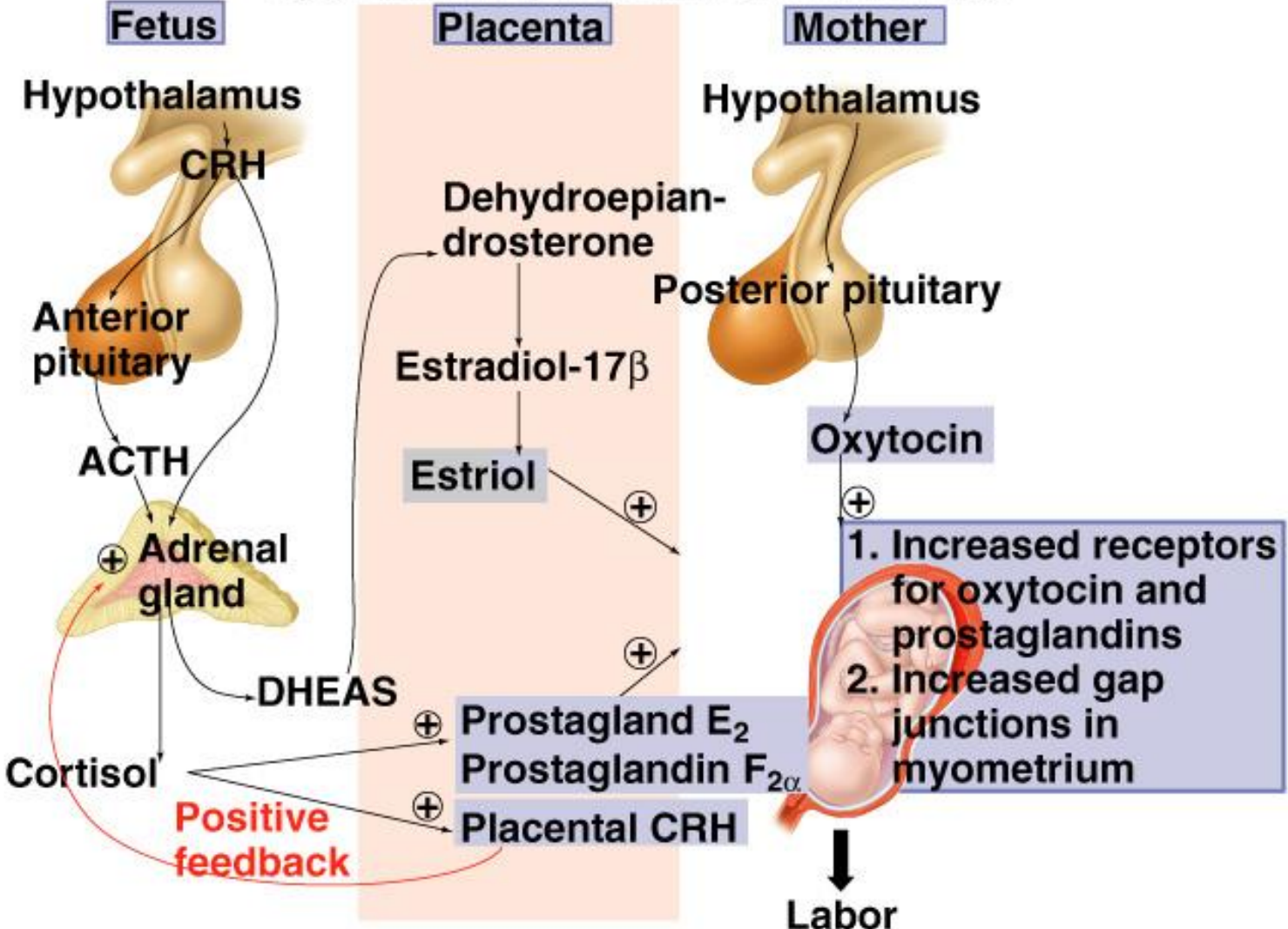
- Oxytocin
 - ▣ Dramatic ▲ of oxytocin receptors (200 folds)
 - gradual transition from passive relaxed to active excitatory muscle (↑responsiveness).
 - ▣ Increase in Oxytocin secretion at labor
 - ▣ Oxytocin increase uterine contractions by
 - Directly on its receptors
 - Indirectly by stimulating prostaglandin production

Hormonal changes

- Prostaglandins
 - Central role in initiation & progression of human labour
 - Locally produced (intrauterine)
 - Oxytocin and cytokines stimulate its production
 - Prostaglandin stimulate uterine contractions by:
 - Direct effect:
 - Through their own receptors
 - Upregulation of myometrial gap junctions
 - Indirect effect:
 - Upregulation of oxytocin receptors

Parturition

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Mechanical changes

- Stretch of the uterine muscle
 - ▣ Increases contractility
 - Fetal movements
 - Multiple pregnancy
- Stretch of the cervix
 - ▣ Increases contractility (reflex)
 - Membrane sweeping & rupture
 - Fetal head
 - Positive feedback mechanism

Initiation of Labor

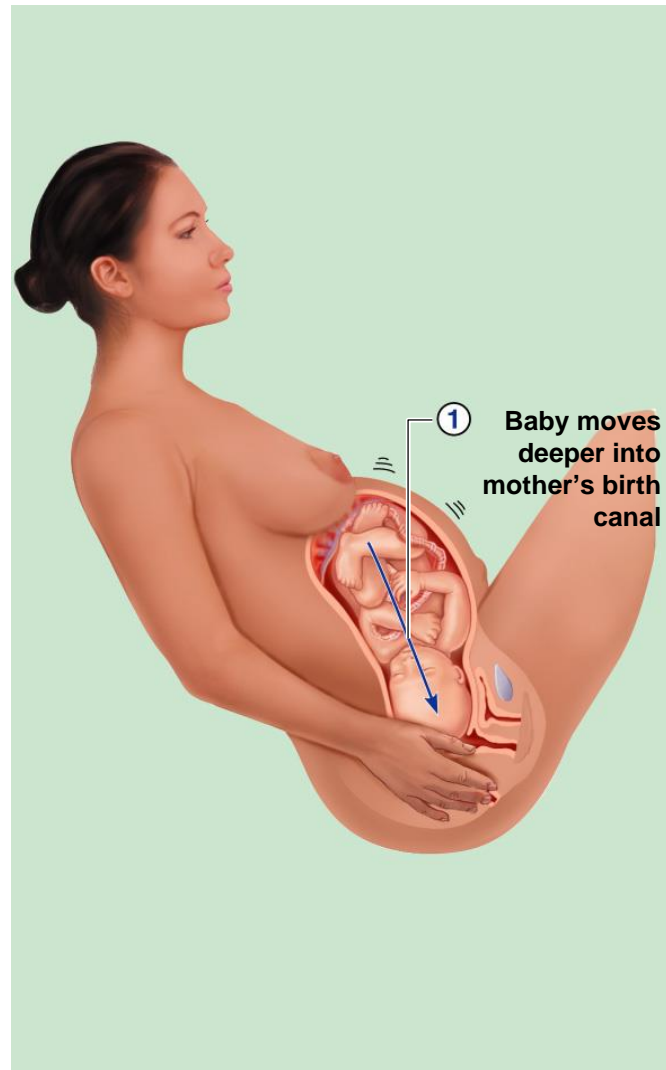


Figure 16.19, step 1

Initiation of Labor

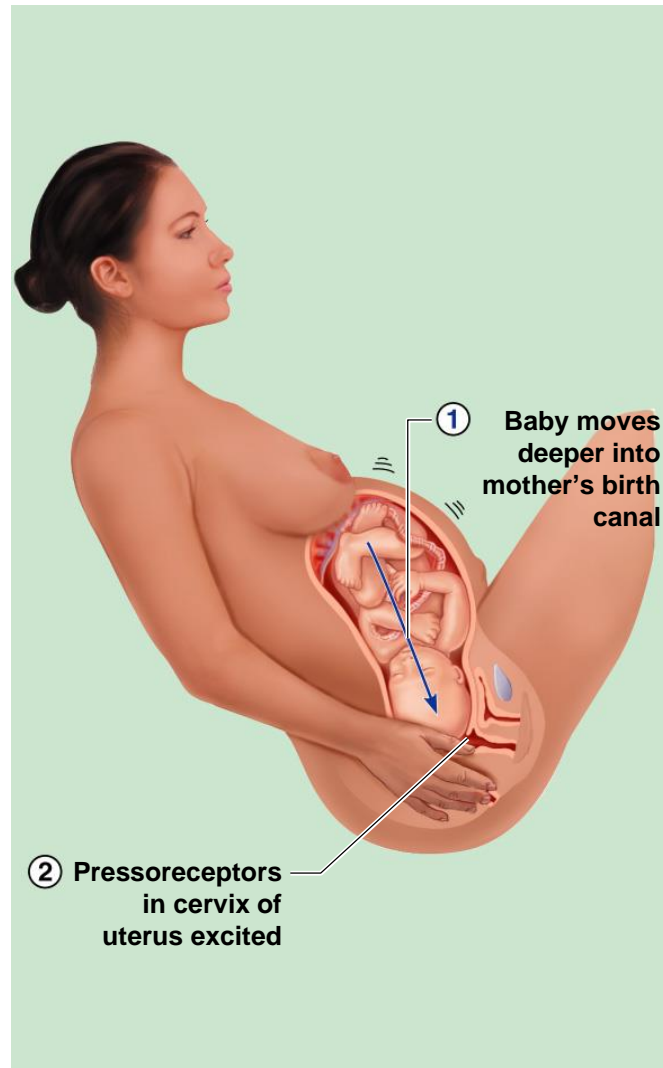


Figure 16.19, step 2

Initiation of Labor

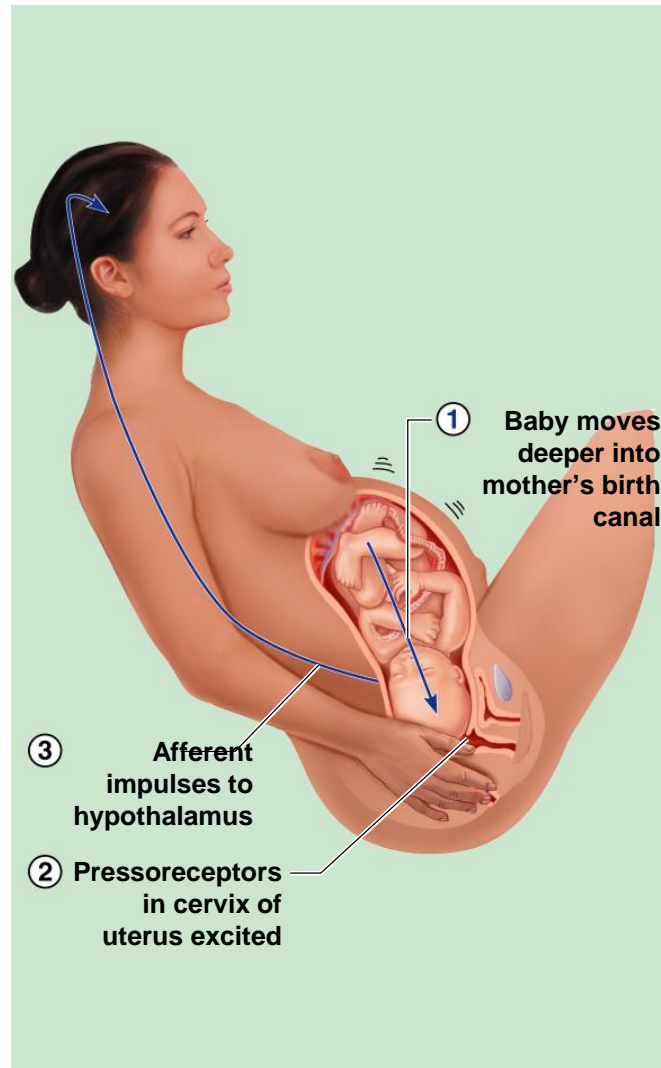


Figure 16.19, step 3

Initiation of Labor

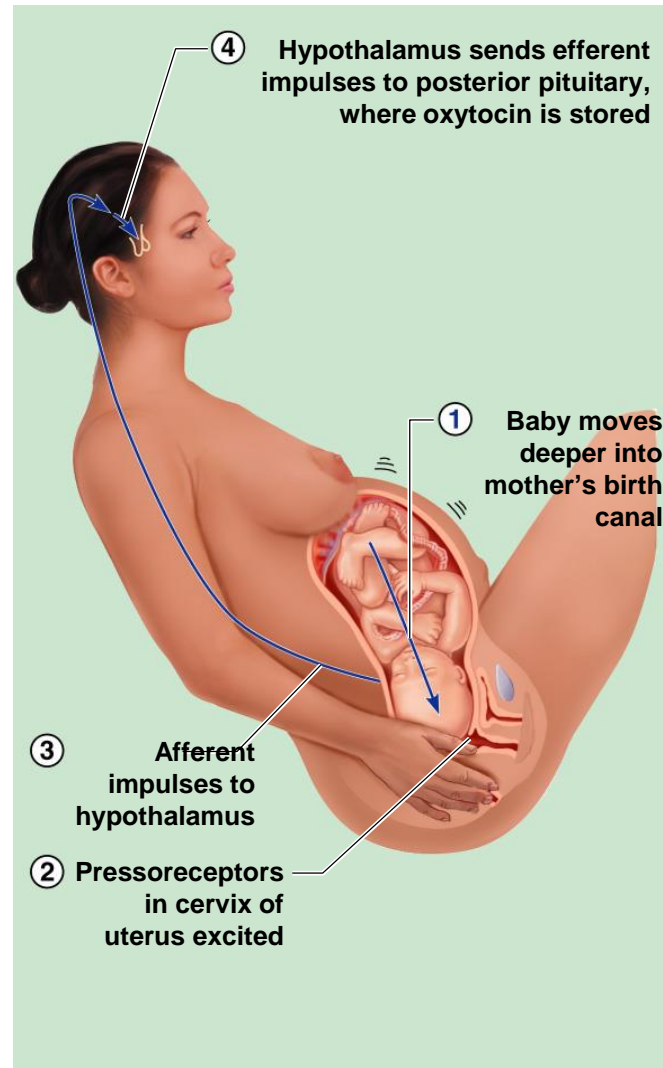


Figure 16.19, step 4

Initiation of Labor

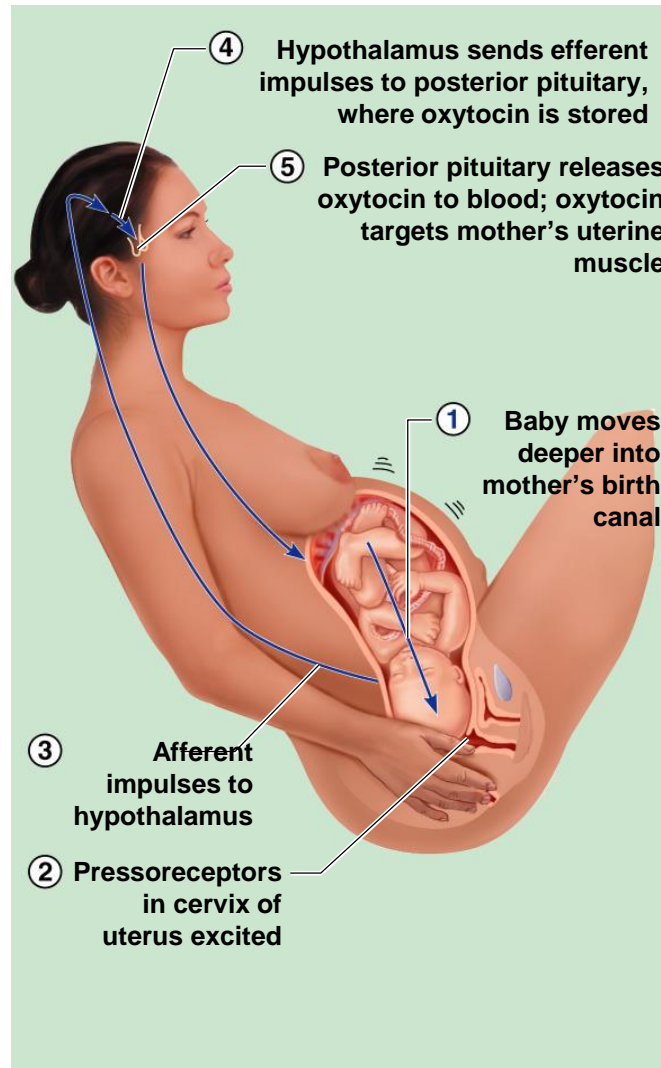


Figure 16.19, step 5

Initiation of Labor

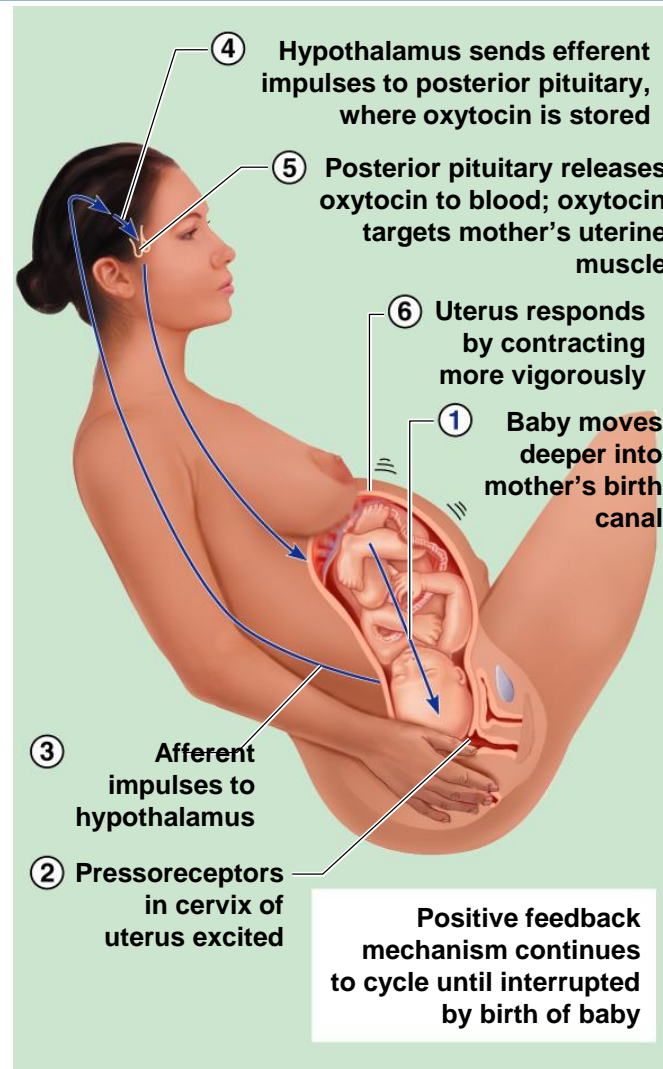


Figure 16.19, step 6

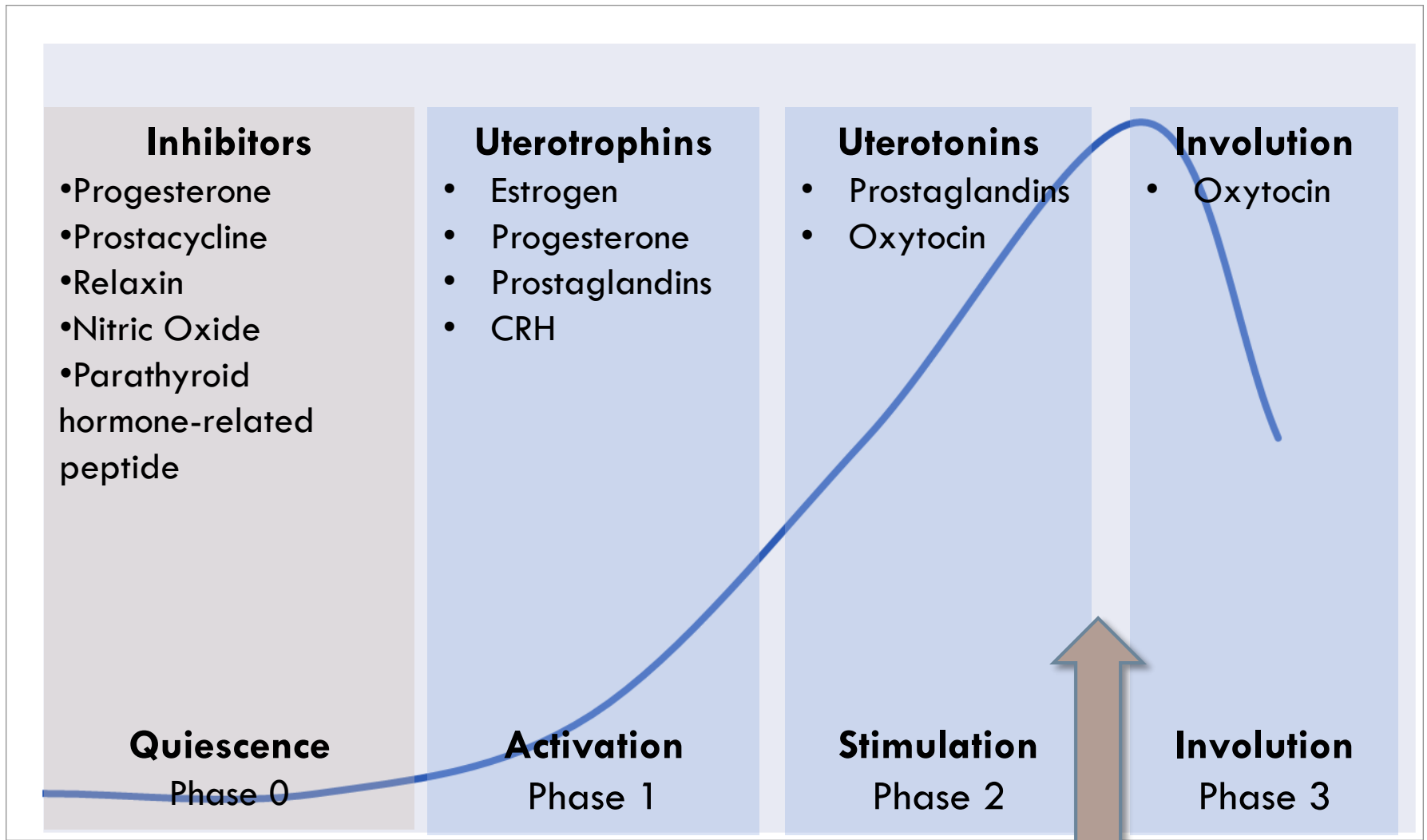


Phases of parturition

- Phase 0
 - ▣ Pregnancy: uterus is relaxed (quiescent)
- Phase 1
 - ▣ Activation
- Phase 2
 - ▣ Stimulation: stage 1 & stage 2
- Phase 3 = stage 3
 - ▣ Delivery of the placenta and uterine involution

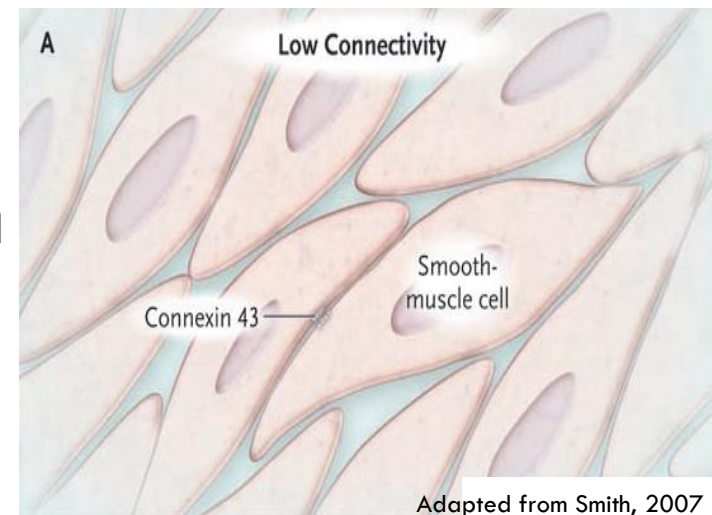
Uterine Activity During Pregnancy

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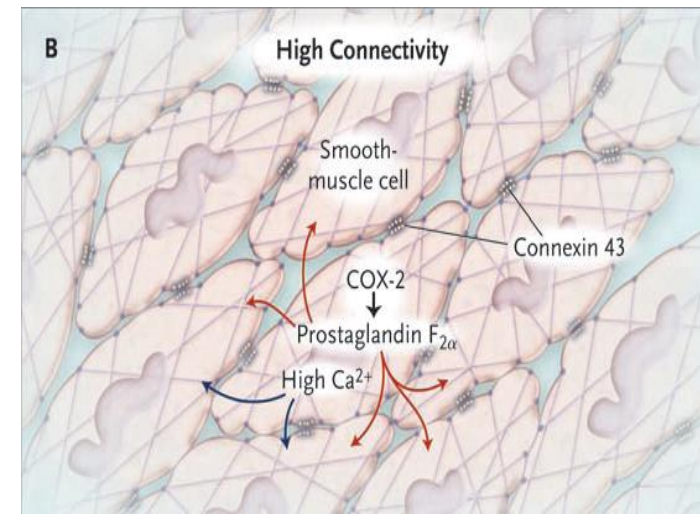
Phases of parturition

- Phase 0 (pregnancy)
 - ▣ Increase in cAMP level
 - ▣ Increase in production of
 - Prostacyclin (PGI_2) cause uterine relaxation
 - Nitric oxide (NO) cause uterine relaxation



Phases of parturition

- **Phase 1 (activation)**
 - Occurs in third trimester
 - Promote a switch from quiescent to active uterus
 - Increase excitability & responsiveness by
 - Increase expression of gap junctions
 - Increase G protein-coupled receptors
 - Oxytocin receptors
 - PGF2 alpha receptors



Phases of parturition

- **Phase 2 (stimulation)**
 - ▣ Occurs in last 2-3 gestational weeks
 - ▣ Increase in synthesis of uterotonins
 - Cytokines
 - Prostaglandins
 - Oxytocin
 - ▣ Includes 2 stages:
 - Stage 1
 - Stage 2

Phases of parturition

- **Phase 3 (uterine involution)**
 - ▣ Pulsatile release of oxytocin
 - ▣ Delivery of the placenta
 - ▣ Involution of the uterus
 - Occurs in 4-5 weeks after delivery
 - Lactation helps in complete involution

Mechanism of parturition

- Contractions start at the fundus and spreads to the lower segment
- The intensity of contractions is strong at the fundus but weak at the lower segment
- In early stages: 1 contraction/ 30 minutes
- As labor progress: 1 contraction/ 1-3 minutes
- Abdominal wall muscles contract
- Rhythmical contractions allows blood flow

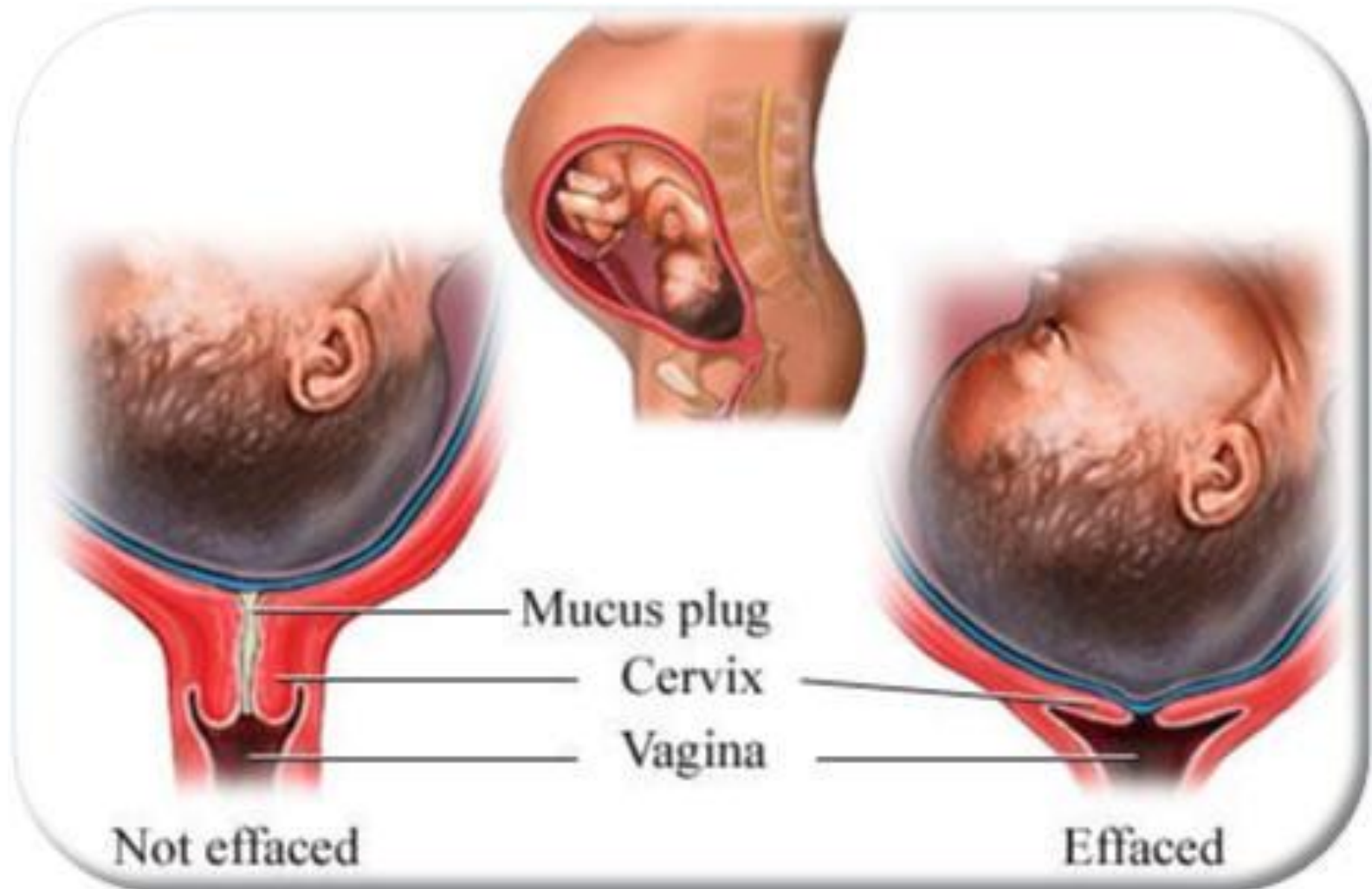
Onset of labor

- During pregnancy
 - ▣ Periodic episodes of weak and slow rhythmical uterine contractions (Braxton Hicks) 2nd trimester
- Towards end of pregnancy
 - ▣ Uterine contractions become progressively stronger
 - ▣ Suddenly uterine contractions become very strong leading to:
 - Cervical effacement and dilatation

Stages of Labor

- Dilation (stage 1)
 - Cervix becomes dilated
 - Full dilation is 10 cm
 - Uterine contractions begin and increase
 - Cervix softens and effaces (thins)
 - The amnion ruptures (“breaking the water”)
 - Longest stage at 6–12 hours

Cervical effacement and dilatation



Stages of Labor

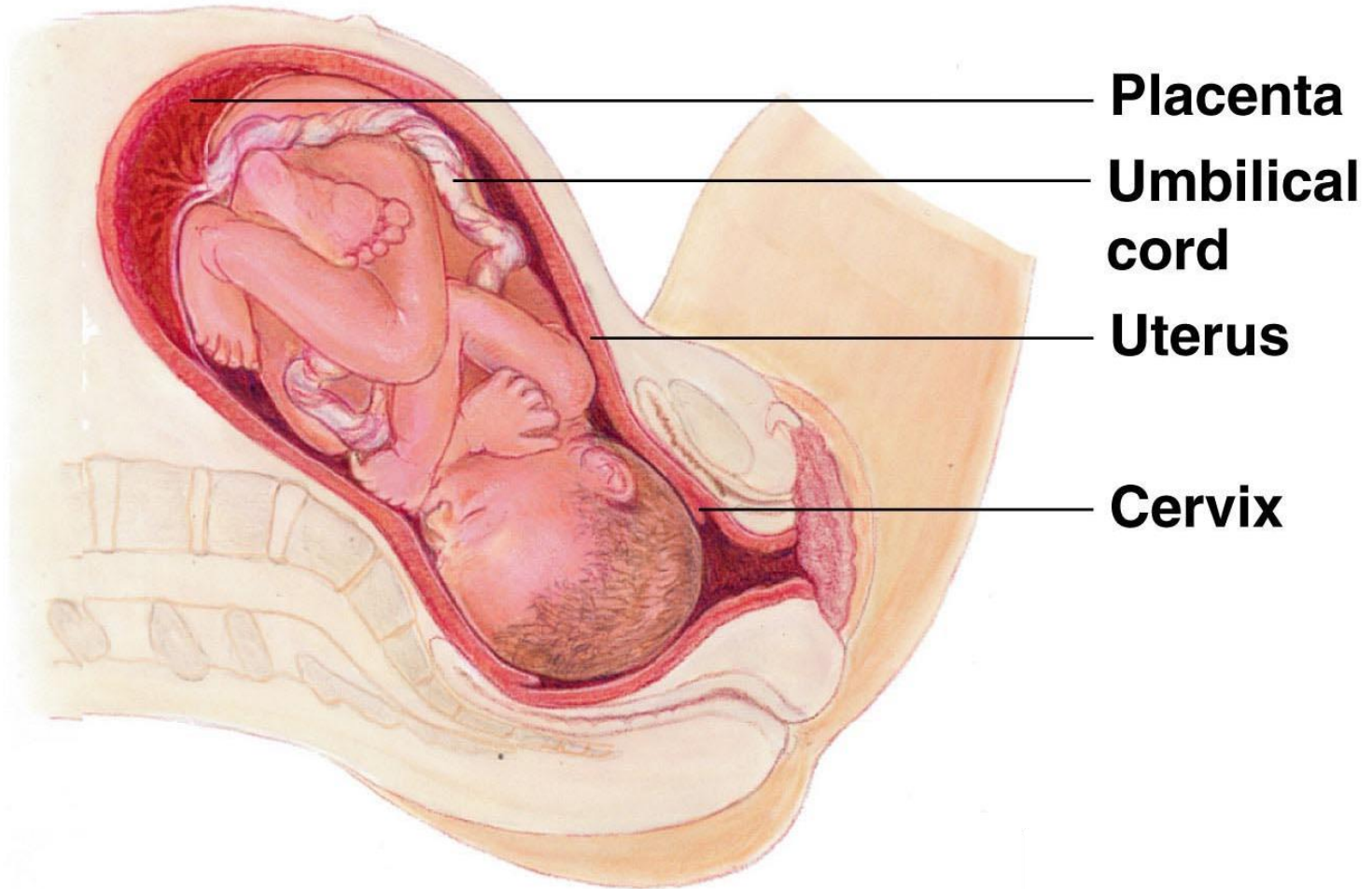


Figure 16.20 (1 of 3)

① Dilation of the cervix

Stages of Labor

- Expulsion (stage 2)
 - ▣ Infant passes through the cervix and vagina
 - ▣ Can last as long as 2 hours, but typically is 50 minutes in the first birth and 20 minutes in subsequent births
 - ▣ Normal delivery is head first (vertex position)
 - ▣ Breech presentation is buttocks-first

Stages of Labor



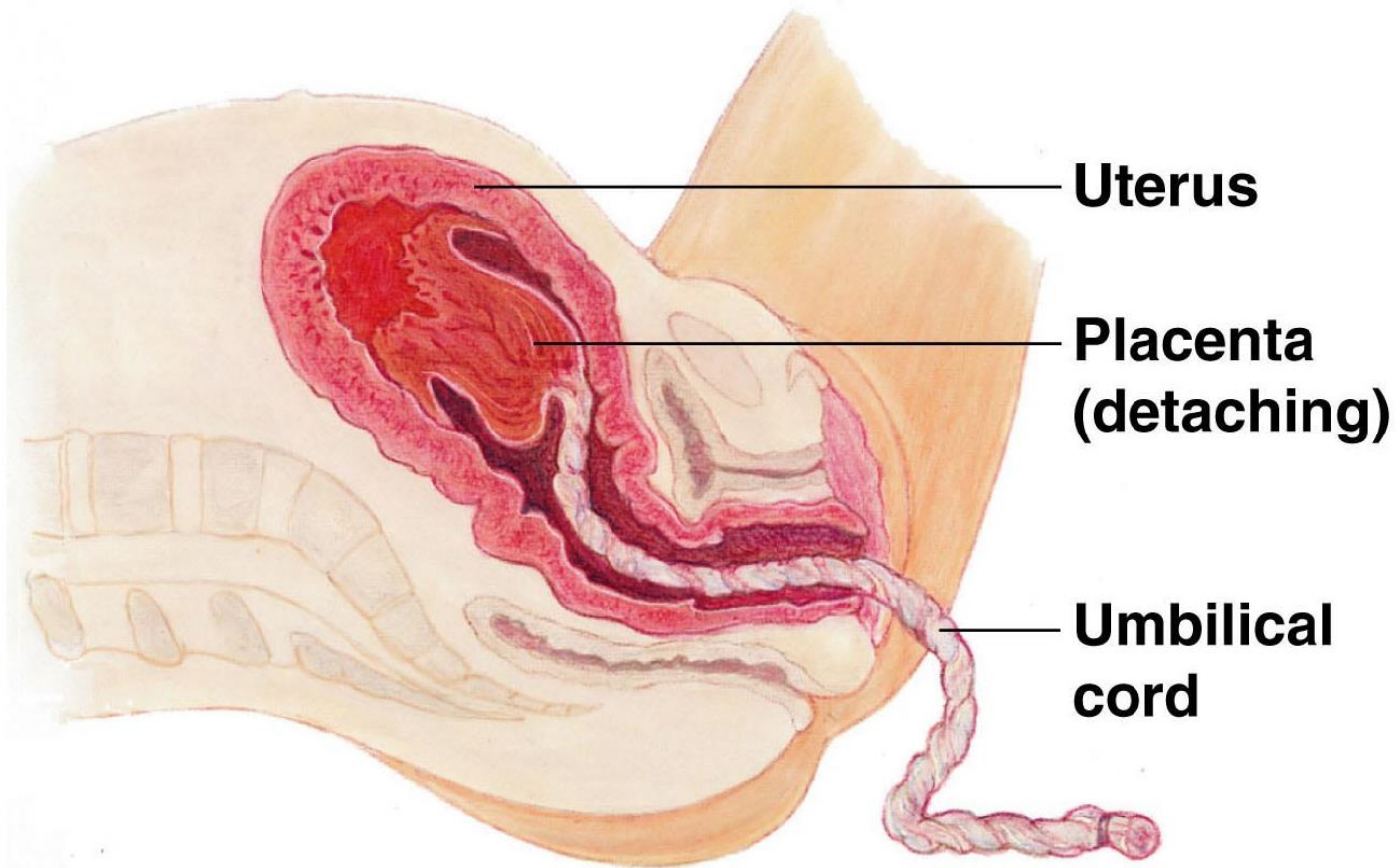
② Expulsion: delivery of the infant

Figure 16.20 (2 of 3)

Stages of Labor

- Placental stage (stage 3)
 - ▣ Delivery of the placenta
 - ▣ Usually accomplished within 15 minutes after birth of infant
 - ▣ Afterbirth—placenta and attached fetal membranes
 - ▣ All placental fragments should be removed to avoid postpartum bleeding

Stages of Labor



③ Delivery of the placenta

New arrival



{فَأَجَاءَهَا الْمَخَاضُ إِلَى جِذْعِ النَّخْلَةِ قَالَتْ يَا لَيْتَنِي مِتُّ قَبْلَ هَذَا وَكُنْتُ
نَسِيًّا مَّنْسِيًّا {23} فَنَادَاهَا مِنْ تَحْتِهَا أَلَّا تَحْزَنِي قَدْ جَعَلَ رَبُّكِ تَحْتَكِ
سَرِيًّا {24} وَهَزِّي إِلَيْكِ بِجِذْعِ النَّخْلَةِ تُسَاقِطُ عَلَيْكَ رَطْبًا جَنِيًّا {25}
فَكُلِي وَاشْرَبِي وَقَرِّي عَيْنًا { سورة مريم..}

