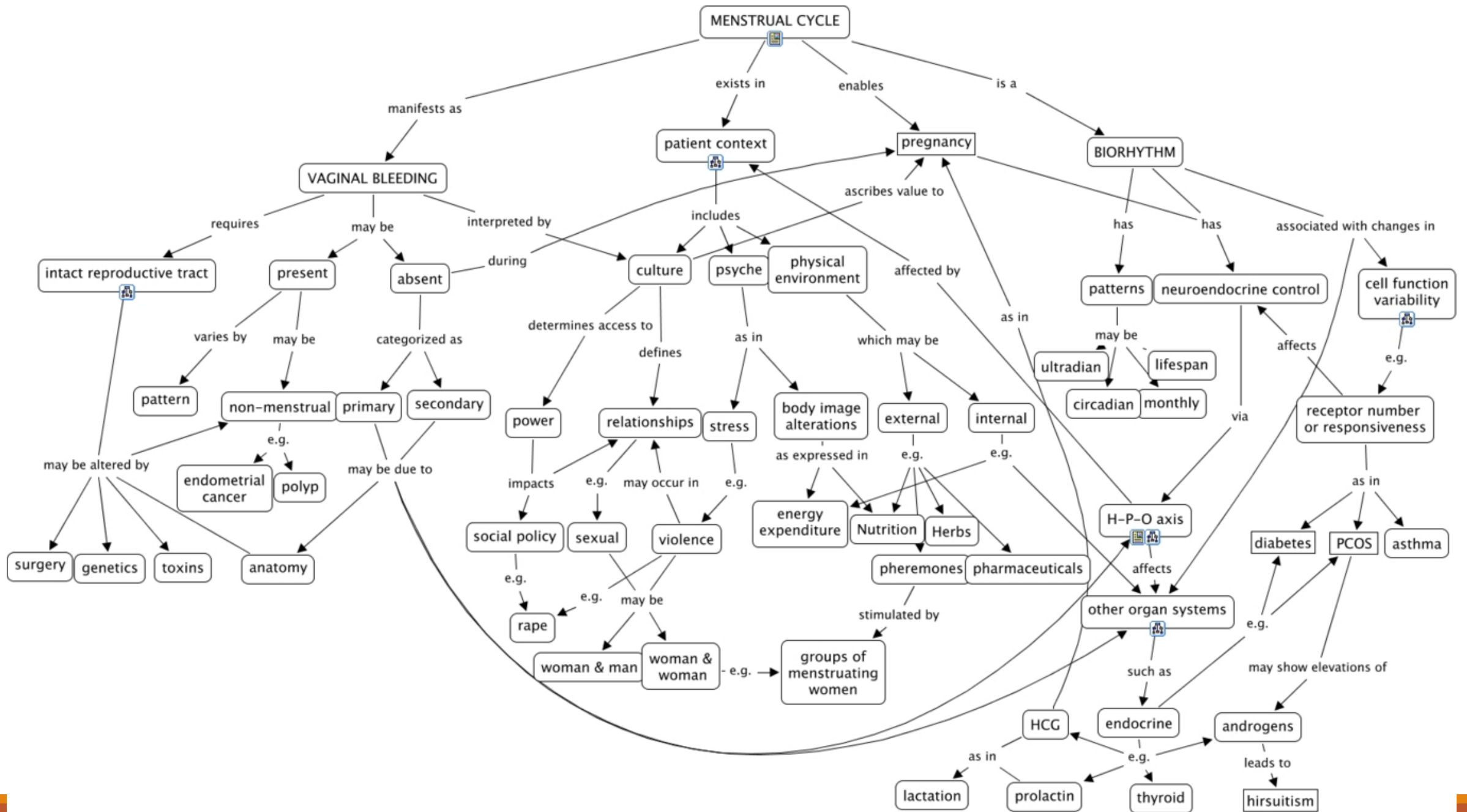


# Physiology of pregnancy

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NATHAN BLUE, MD

5.4.16



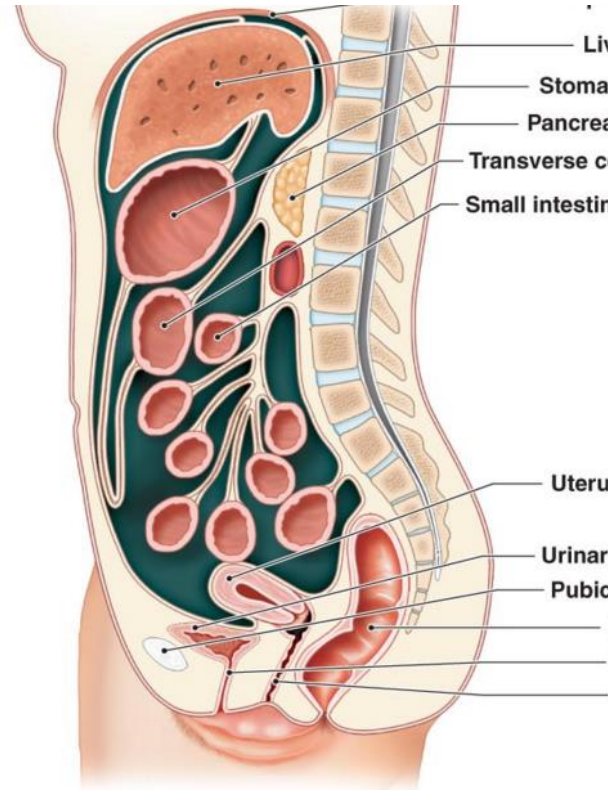
# Objectives

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1. Learn some stuff about pregnancy
  - Why / what / how
2. How pregnancy affects the:
  - Cardiovascular system
  - Lungs
  - Other stuff

# Pregnancy is SIMPLE

- WHY: UTERUS (+baby)
  - BIG
- WHAT: Compensation
  - Oxygen
  - Energy
  - Immunity



**Nonpregnant female**

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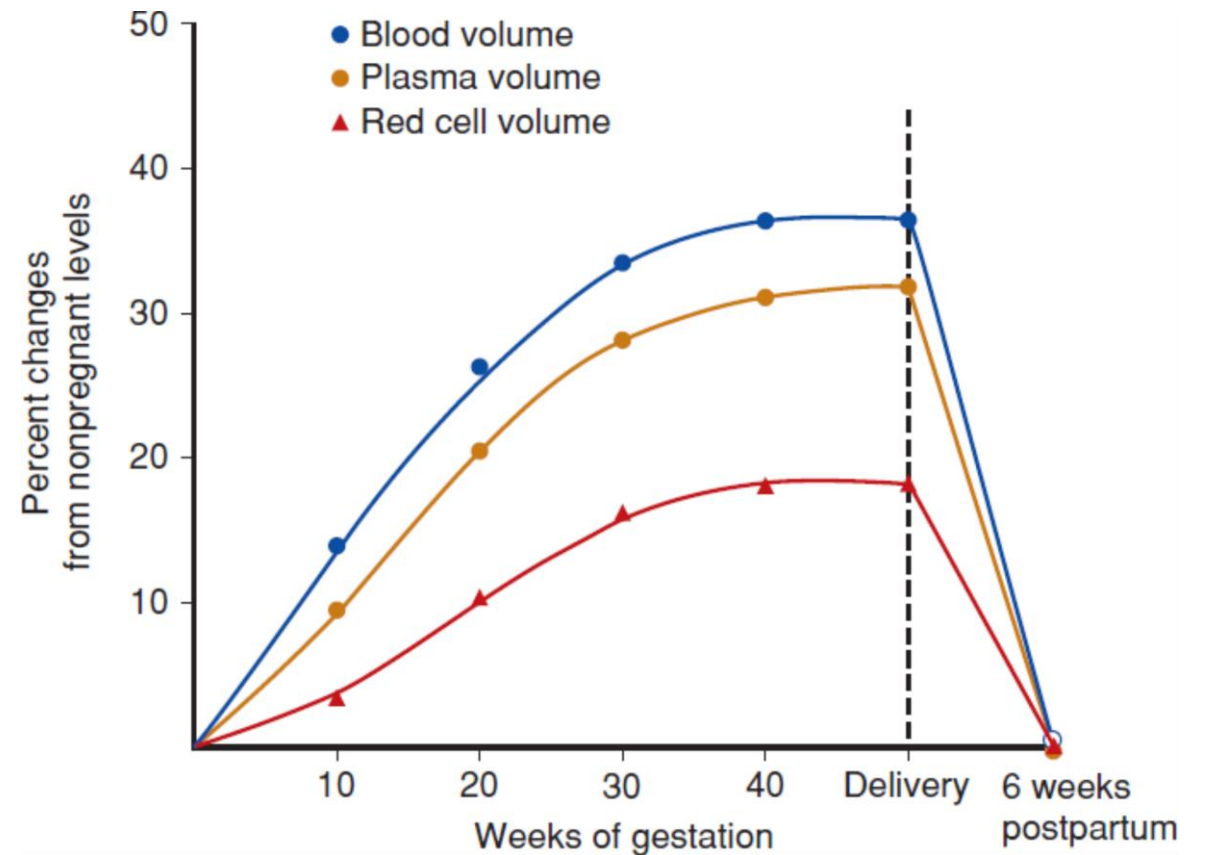
# But HOW??

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- HORMONES
  - Smooth muscle = PROGESTERONE
  - Blood, skin, metabolism, liver... = ESTROGEN

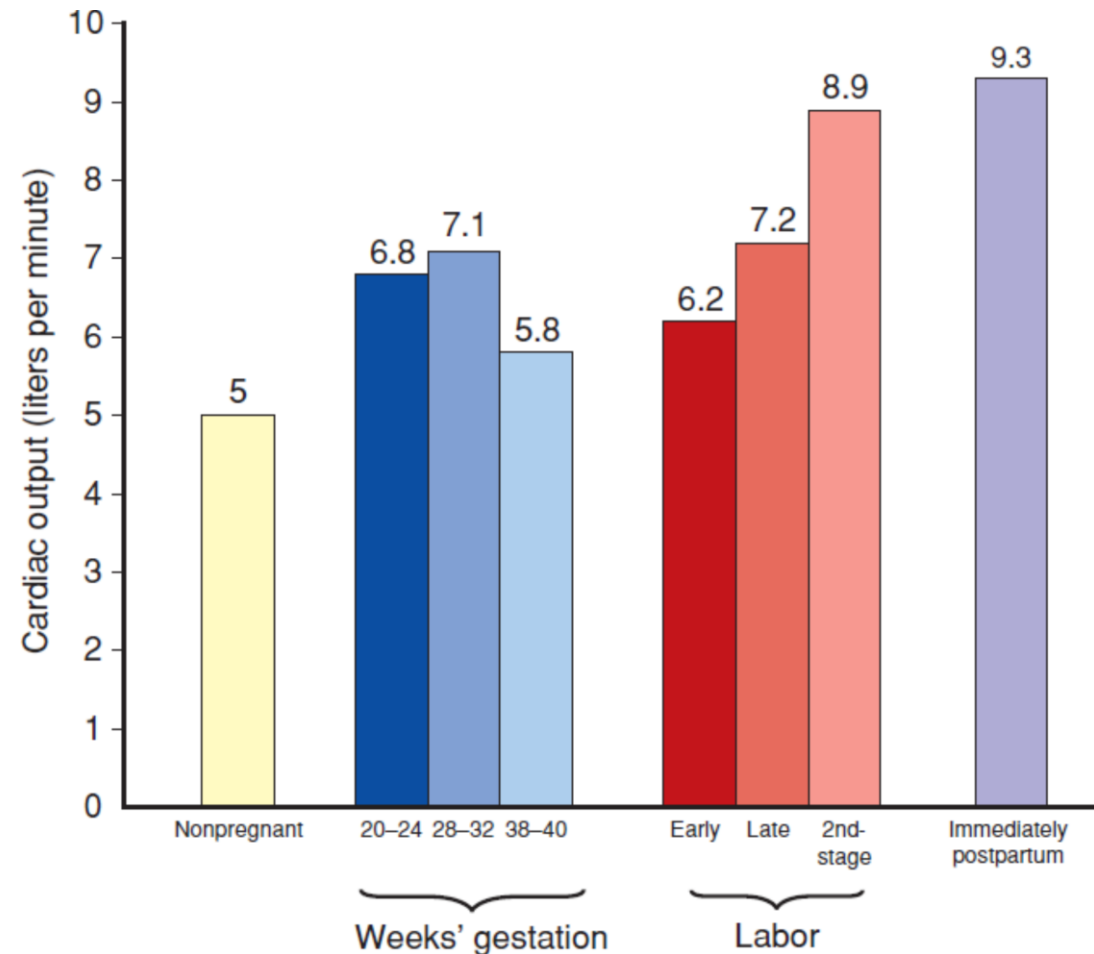
# Cardiovascular

- Blood volume
  - increases as early as 6-8wks
  - increases by 45% at term
  - 5-7 L at term
- Red cell mass
  - Increases by 20-30% at term
  - 450mL



# Cardiovascular:

- Cardiac output
  - Increases by 8wks
  - ↑ by 30-50% at term
  - ↑ *another* 50% in labor
- Heart rate
  - ↑ by 15-20 beats in third trimester



# IMPORTANT!!!

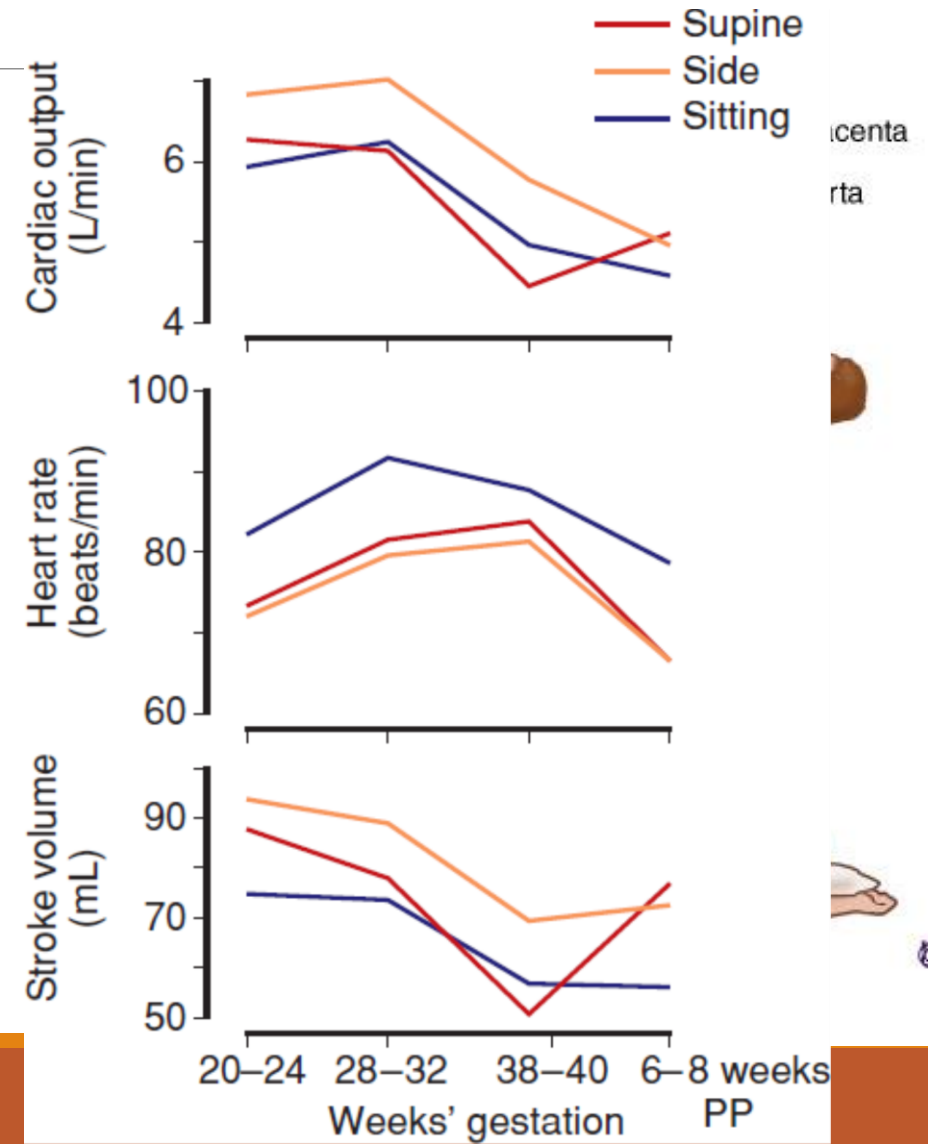
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- POSITION
- POSITION
- POSITION
- POSITION

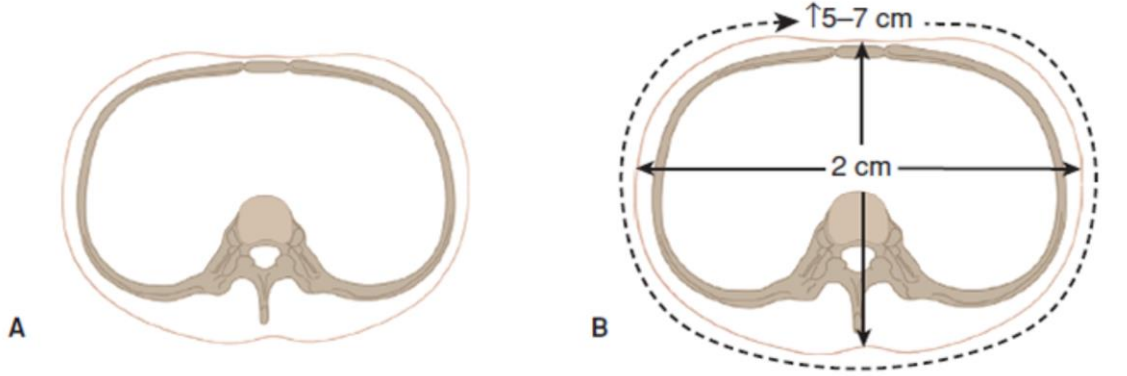
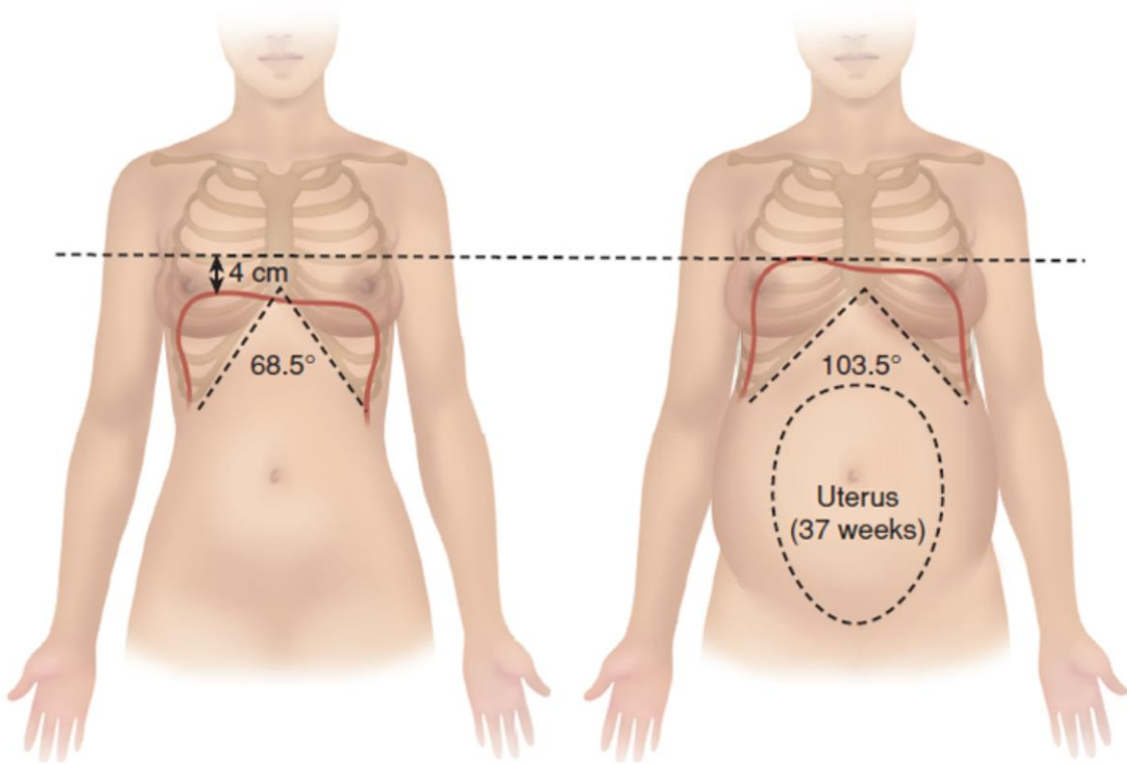


# IMPORTANT!!!

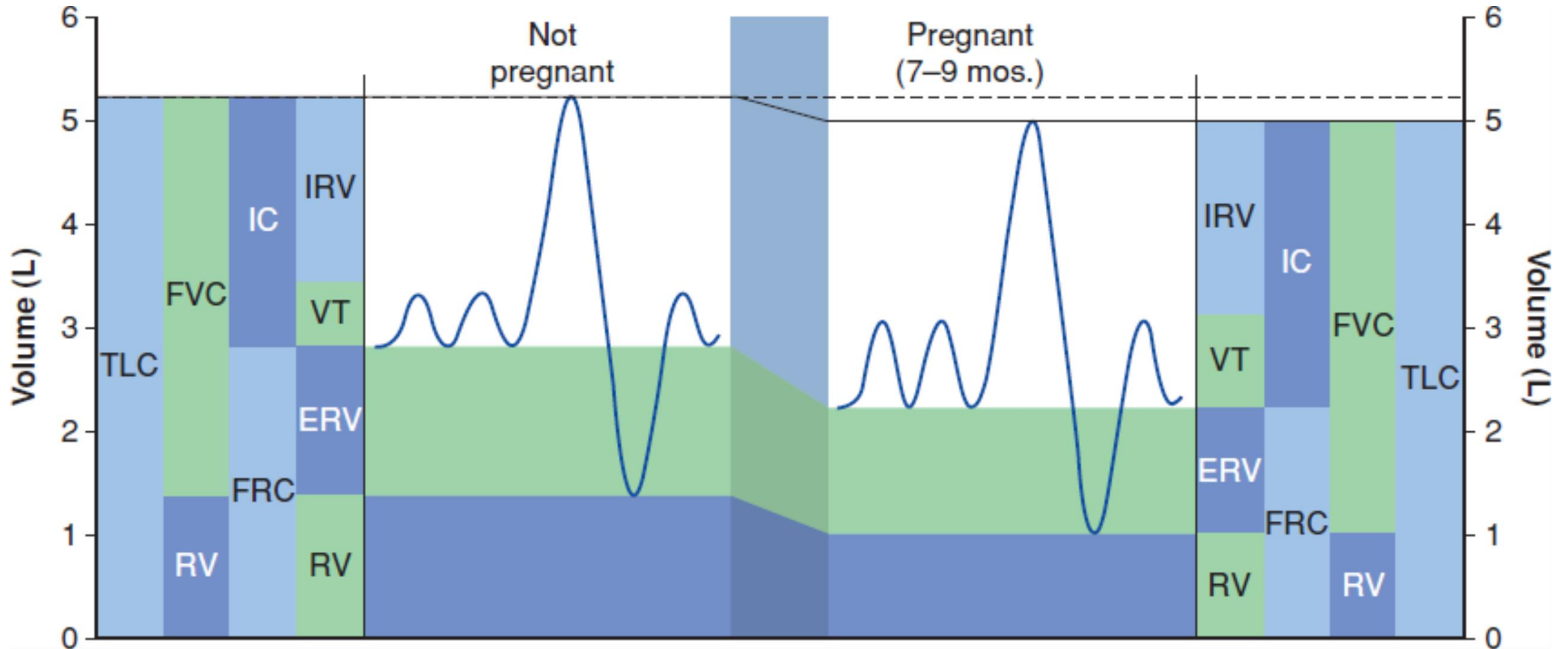
- Supine → left lateral recumbent
  - Increase maternal cardiac output by 20%
  - Increase uterine artery flow by 30%
  - Increase fetal oxygenation by 10%!



# Respiratory



# Respiratory



# Respiratory

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- ↓ total lung capacity
- ↑ tidal volume
- ↑ minute ventilation → respiratory alkalosis
- ↓ total pulmonary resistance
- ↑ peak expiratory flow rate

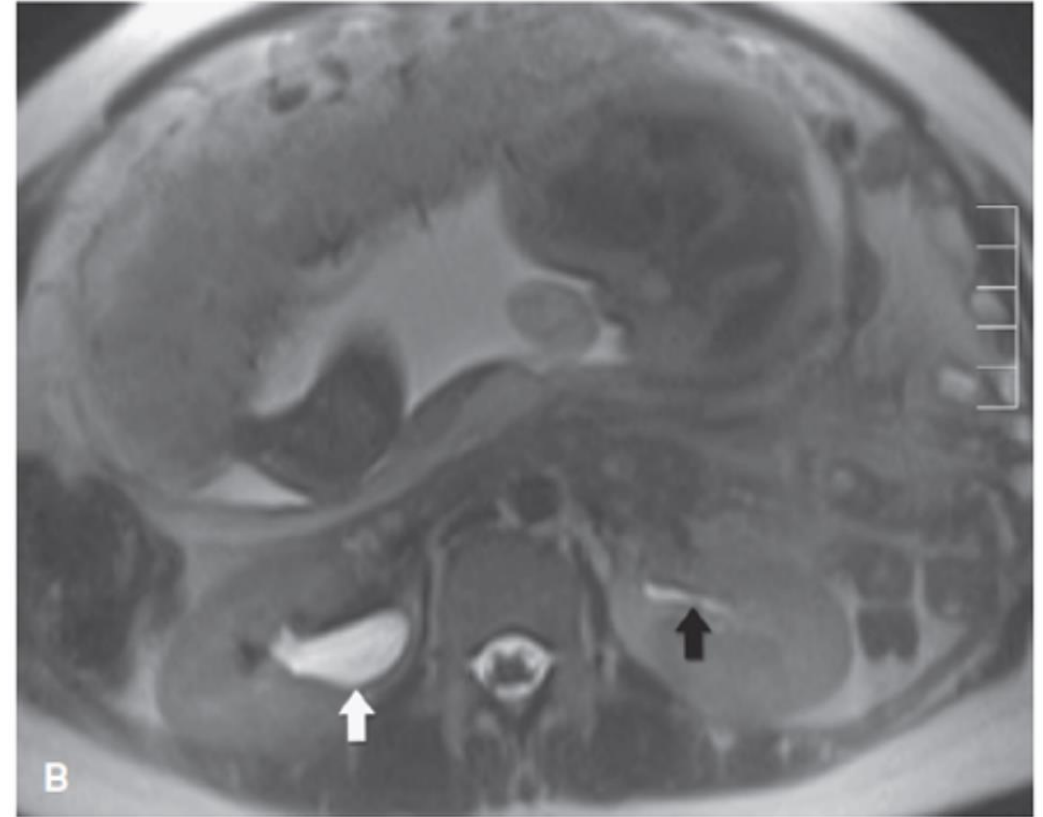
HOW??

**HORMONES!!!**

# Renal

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- GFR
  - By 4wks: increases by 25%
  - By 14wks: increases by 50%
- Serum creatinine:
  - decreases (mean 0.5mg/dL)
- Hydro-ureter
- Hydronephrosis



# Other stuff

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- Immune system: depressed
- Clotting: HYPERcoagulable
- MSK: ligaments loosen
- GI: smashed, decreased motility, hemorrhoids
- Endocrine: cortisol, RAAS all increased

# Summary:

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1. WHY: BIG UTERUS (+baby)
2. WHAT: compensating for #1
3. HOW: HORMONES
  - Smooth muscle = progesterone
  - Everything else = estrogen