Hormonal changes in puberty

- Puberty defined hormonally (vs adolescence which is defined socially)
- Hypothalamic pulses of GnRH
- Rise in LH and FSH from AP
- LH and FSH act on ovaries and testes
- Hormonal puberty takes place 1-2yrs later in boys

Hormonal changes at puberty: Male

**LH effects**
- Stimulates the leydig cells to produce T
- T stimulation leads testes to grow
- T → DHT then leads to pubic hair growth and penis enlarges and lengthens
- Facial and chest hair continue well past age 20
- Huge increase in muscle mass from T
- Voice deepens, larynx matures
- T → E: gynecomastia (breast enlargement) occurs in 80% of boys at puberty
- Ejaculation starts age 13-14
- Mature sperm and fertilization possible by age 15
- T also diffuses to seminiferous tubules…
### Hormonal changes at puberty: Male

**FSH effects**
- Targets sertoli cells (seminiferous tubules) to facilitate spermatogenesis
- $FSH \rightarrow$ increased androgen binding protein (ABP) in sertoli cells
- ABP binds testosterone
- ABP-testosterone necessary for spermatogenesis

### Hormonal changes at puberty: Female

**FSH effects**
- Targets ovarian follicles: egg maturation

**LH effects**
- Theca cells of ovaries $\rightarrow$ produce E
- First change is breast development age 9-10
- Fatty deposits also at the hips and buttocks
- Age 12-13, menarche begins – although not capable of becoming pregnant until ovulation begins (1-2 yrs later)
- Adrenal and ovarian E+T: hair

### Oogenesis

- Prenatally = 2 million oocytes
- At birth = 400,000 oocytes
- Few activated monthly starting at puberty
- Only 1 continues meiosis
Menstrual cycle

1. Follicular
   - High FSH stimulate follicles, bringing one egg to maturity
   - Mature egg secretes E
2. Ovulation
   - High E → GnRH → LH (+ve)
   - Follicle swells
   - Egg released
3. Luteal
   - LH causes follicle to become corpus luteum → P → reduces LH → corpus luteum degrades → E and P drop
4. Menstruation
   - Triggers shedding of endometrial lining

Some menstrual problems

- Dysmenorrhea = painful menstruation
- Endometriosis = when the endometrium of the uterus grows in a place outside the uterus
- Amenorrhea = absence of menstruation

Does Premenstrual Dysphoric Disorder exist?

- In DSM “requiring further study” section
- Interaction of serotonin and fluctuating gonadal hormones
- 3-9% of women

Concerns about PMDD

1. Is PMDD being confused with MDD?
2. Classification as a mental illness is stigmatizing
3. Pharmaceutical interests
Menstrual cycle changes that prepare for conception

- **Follicular**
  - Hypothalamus
  - LH, FSH
  - Pituitary
  - FSH
  - Ovaries
  - Secrete estrogen
  - Signal egg to ripen to maturity
  - Uterus: endometrial layer grows

- **Ovulatory**
  - Hypothalamus
  - LH, FSH
  - Pituitary
  - FSH
  - Ovaries
  - Secrete estrogen
  - Signal egg to ripen to maturity
  - Uterus: endometrial layer grows

- **Luteal**
  - LH
  - Follicle
  - Corpus Luteum
  - Secrete progesterone
  - P causes uterine endometrium to become covered with mucus
  - If fertilized, egg travels to prepared uterus; P levels remain high

- **Menstruation**
  - Does not occur if egg is fertilized given that P levels remain high (E levels are also elevated)

---

Phases of the menstrual cycle

- Characteristics of uterus and hormone levels at time of conception

Sexual desire, ovulation, and evolution

- Historically, menarche occurred later, lactation was longer, and lifespan was shorter → fewer ovulation opportunities
- Research on this inconsistent:
  - Peak of intercourse at ovulation (but depends on whether woman had menstrual problems or not)
  - Intercourse decreases at menstruation but masturbation increases
  - Sexual arousability not affected by menstrual cycle
- Methodological problems until recently:
  - How to accurately quantify ovulation?
  - How best to define sexual behaviour?
  - How to control for confounding variables?
Hypothesis #1:
- women’s sexual desire contains design features that function to motivate intercourse at high-conception times, and this depends on level of support available.

Bullivant, 2004
- Problem in prior studies: crude measure of ovulation
- Measured ovulation comprehensively
  - preovulatory LH surge in urine (daily collections of urine beginning 1 week before the expected date of LH surge)
  - vaginal secretions and cervical mucus through a daily diary
  - basal body temperature
  - measured hormone levels of pregnanediol-3-glucoronide using immunoassay (this hormone rises after ovulation has occurred)

Bullivant, 2004 (cont.)
- Correlated these with diary of sexual activity
  - sexual activity was highest during follicular phase and lowest during the first 3 days of menstruation
  - female-initiated sexual activity peaked during the 3-day period ending on the day of the LH surge onset
- Is ovulation correlated with sexual desire?
  - only partnered women reported higher desire for sexual activity during ovulation
  - BUT, no increase in male-initiated behaviours
Conception facts

- Takes about 5 days for the egg to reach the uterus if it has been fertilized
- Unfertilized egg disintegrates
- Sperm swim 1-3cm/hour. They are propelled by flagellation of the tail and contractions of the uterus
- Sperm meets the egg in the fallopian tube near the ovary
- 300 million sperm in ejaculate → 2000 reach the correct fallopian tube
- Sperm live for 5 days inside woman; eggs live for 12-24 hours after ovulation

When sperm meets egg

- **Zona pellucida** is a strong membrane that forms around an ovum as it develops in the ovary
- sperm must penetrate the thinning zona pellucida
- Many sperm produce an enzyme called **hyaluronidase** which dissolves the zona pellucida and allows one sperm to enter the egg
- If fertilization takes place, the membrane disappears to permit implantation in the uterus
- Fertilized egg = **zygote**
- First 8 weeks of life = **embryo**
- After 8 weeks = **fetus**
Planning conception

- Limit alcohol consumption to increase sperm
- Calculate when ovulation will occur:
  - Calendar (rhythm method) – estimating ovulation (between 9 – 17 days before period)
  - Basal body temperature method – BBT falls 1-2 days before ovulation and rises 1-2 days after
  - Cervical mucus method (Billings method) –before and during ovulation, mucus increases and is thinner, slippery, clear, and stretchy
  - Hormone monitoring – measure urine LH
  - Combined methods (Symptothermal method) – BBT, cervical mucus, hormone monitoring, physical signs of ovulation

Pregnancy tests

URINE
- Based on human chorionic gonadotropin (hCG) which is secreted by the placenta
  - In clinic: 98-99% accurate
  - At home: high false +ve and false --ve rate

BLOOD
- Based on beta-hCG in blood
- Radioimmunoassay
- In laboratory: can detect pregnancy very early

Pregnancy characteristics:
1ST Trimester (weeks 1 – 12)

EMBRYO/FETUS
- Rapid cell division
- organ and CNS development
- formation of all extremities

MOTHER
- Most changes due to increase in E and P
- missed period, tender breasts, occasional cyclic bleeding, nausea, vomiting, emotionality
- Fear of miscarriage
- Psych changes due to:
  - Attitude to pregnancy
  - SES
  - Social support

Umbilical cord and placenta

- umbilical cord attaches baby to placenta
- placenta attaches to wall of uterus
### Pregnancy characteristics: 2nd Trimester (weeks 13-26/27)

**Fetus**
- Detect heartbeat
- Movement, “quickening”
- Cycle between sleep and wakefulness

**Mother**
- Most physical symptoms dissipate
- New ones: constipation and nosebleeds, edema
- Colostrum from nipples (yellow fluid)
- General feeling of well-being

### Pregnancy characteristics: 3rd Trimester (weeks 27/28-40)

**Fetus**
- Fat deposits and rapid growth from 7th month onwards
- Changes position to “face down”

**Mother**
- Difficulties sleeping from size
- Pressure from uterus on other organs → shortness of breath, indigestion, heart strain, navel protrudes, fatigue.
- Braxton-Hicks contractions.
- Baby “engages”

### Pregnancy symptoms in men

**Couvades syndrome (or sympathy pregnancy)**
- Indigestion, gastritis, nausea, change in appetite, headaches
- 11-22% of first-time fathers
- Higher prolactin (facilitates bonding)
- Lower testosterone post-natally (less aggression and greater responsiveness to the infant)

### Potential theories of Couvades

- Expression of anxiety over birth
- Sympathy/empathy for the partner
- A method of bonding with baby
- An assertion of paternity
- Outward display of ambivalence towards fatherhood
Sexuality and Pregnancy

<table>
<thead>
<tr>
<th>IC freq per week</th>
<th>Pre-preg</th>
<th>12 wks preg</th>
<th>24 weeks preg</th>
<th>36 weeks preg</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0%</td>
<td>11%</td>
<td>8%</td>
<td>36%</td>
</tr>
</tbody>
</table>

- Sex is generally safe during pregnancy
- Arousal may increase in 2nd trimester
- Why the overall decline?
  - Physical complaints reduce desire
  - Partner perceptions (fears) about hurting fetus
  - Woman’s large shape
- Gokyildiz, 2005 – 150 interviews with women in 34th week
  - Women had less initiation of sexual activity
  - Duration of intercourse reduced
  - Satisfaction dropped from 70% pre-pregnancy to 20% in T3
  - BUT, vaginal dryness decreased with pregnancy!

Birth

- Signs of labour = discharge, bloody mucus, ruptured membranes
- Leading theory: antiprogesterone reduces P levels → uterine contractions occur
- Stage 1: effacement and dilation of cervix, increasingly intense contractions, cervix dilates to 10cm, lasts 12-15 hours

Stage 2: Baby’s head “crows”, urge to push, delivery (+/- episiotomy), no need for umbilical

Stage 3: afterbirth (delivery of placenta)

Postpartum period

- Major physiological changes:
  - Placenta during pregnancy → high levels of estrogen and progesterone; drops significantly after birth
- Psychological adjustment
  - 50-80% of women have maternal blues
  - 10-20% of women have postpartum depression
  - Lasts up to 2 months: depressed mood, insomnia, tearfulness, feeling inadequate, irritability, fatigue
  - < 1% have postpartum psychosis
  - Postpartum obsessive compulsive disorder (especially in those with prior history of OCD)
Sexuality in the postpartum

<table>
<thead>
<tr>
<th>Behavior</th>
<th>2nd trimester</th>
<th>1mon pp</th>
<th>4mon pp</th>
<th>12mon pp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercourse (%)</td>
<td>90</td>
<td>77</td>
<td>89</td>
<td>92</td>
</tr>
<tr>
<td>Intercourse freq/mon</td>
<td>6.37</td>
<td>6.32</td>
<td>5.37</td>
<td>5.12</td>
</tr>
<tr>
<td>Masturbation (%)</td>
<td>20</td>
<td>13</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>Pussy (%)</td>
<td>45</td>
<td>34</td>
<td>36</td>
<td>27</td>
</tr>
<tr>
<td>Cunnilingus (%)</td>
<td>20</td>
<td>14</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>Masturbation %</td>
<td>3.76</td>
<td>3.35</td>
<td>3.36</td>
<td>3.33</td>
</tr>
<tr>
<td>Increased desire freq.</td>
<td>1.71</td>
<td>1.60</td>
<td>1.19</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Hyde, 1996

Sexuality and breastfeeding

- 2 hormones involved in breastfeeding:
  - prolactin (ant pit) involved in milk production
  - oxytocin (post pit) stimulates breasts to eject milk in response to suckling

- Breast feeding rates:
  - 1963: 38%
  - 1995: 73%
  - 2003: 85%

Disadvantages of breastfeeding

<table>
<thead>
<tr>
<th></th>
<th>BF women</th>
<th>NBF women</th>
<th>Partner BF</th>
<th>Partner NBF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mon PP</td>
<td>3.29</td>
<td>3.36</td>
<td>2.95</td>
<td>3.46**</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>2.69</td>
<td>2.86</td>
<td>2.57</td>
<td>2.81*</td>
</tr>
<tr>
<td>Phys affect</td>
<td>2.09</td>
<td>2.38*</td>
<td>2.16</td>
<td>2.46*</td>
</tr>
<tr>
<td>Sex rel</td>
<td>3.37</td>
<td>3.45</td>
<td>3.14</td>
<td>3.59**</td>
</tr>
<tr>
<td>4 mon PP</td>
<td>2.64</td>
<td>2.89*</td>
<td>2.64</td>
<td>2.84*</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>2.35</td>
<td>2.63*</td>
<td>2.37</td>
<td>2.67**</td>
</tr>
<tr>
<td>Phys affect</td>
<td>3.45</td>
<td>3.85*</td>
<td>3.14</td>
<td>3.59**</td>
</tr>
<tr>
<td>Sex rel</td>
<td>2.89*</td>
<td>3.14</td>
<td>2.64</td>
<td>2.84*</td>
</tr>
</tbody>
</table>

Byrd, 1998

BF = breastfeeding
NBF = non-breastfeeding

- 28% of non-BF resumed intercourse
- 14% of BF resumed intercourse

• Advantages of breastfeeding:
  - quicker shrinking of the uterus
  - reduced likelihood of becoming pregnant
  - return of normal menstrual cycles is delayed
  - mild arousal that can be troublesome or acceptable
  - convenience
  - psychological bonding with baby
  - rest time
  - Associated with reduced likelihood of ovarian and breast cancer
Why would sexuality decrease with breastfeeding?

- **biological:**
- **psychological:**
- **social:**