Human Sexual Behavior

- What makes sexual behaviors different between adult males and females?
  - Hypothesis: activational effect of hormones (during development)

- Females
  - Rats: Hormones (estradiol + progesterone) control the behavior (e.g. lordosis) and the motivation.
  - Primates: hormones do not control the behavior, but perhaps the motivation.
  - Female motivation/initiation is highest when estradiol is high. In primates: corresponds to period of high male selectivity.

- Males
  - Key hormone: testosterone
  - Testosterone controls both the physiology (sperm production, erection) and motivation (initiation, overall interest)
    - GnRH blocker (antagonist) in men → loose sperm/erection + loose sexual interest
    - GnRH blocker (antagonist) in monkeys → loss depends on rank (i.e. previous experience. Low ranking have largest loss)
    - Testosterone levels increase with psychological anticipation.
  - Testosterone is involved in other male behaviors (aggression)
  - Testosterone levels decrease with age
• Sexual Orientation (gender of preferred sexual partner. Homosexual vs. Heterosexual)
  o Other dimensions of sexual preferences: monogamy, polygamy, age...
    ▪ Prenatal exposure to androgens and genetic factors contribute to sexual orientation.
  o EVIDENCE FOR THIS - Genetic Females:
    ▪ Congenital Adrenal Hyperplasia: too much androgens prenatally.
      • Mild physical effects (looks like a normal female) (e.g. enlarged clitoris)
      • Increased likelihood for homosexual preference.
      • Increased likelihood for male ‘behaviors’ (e.g. toys)
      • Sexually dimorphic behavior
    ▪ VIDEO (Oxytocin Communication and child with CAH)
      • Nature and nurture work in constant.
      • Doctor says they shouldn’t be nature vs. nurture
      • Separation
        o Boy throws fit – wants to push down wall
        o Girl cries – doesn’t try to push down wall.
      • Doll’s arm fell off
        o Girl feels responsible and wants to fix are, she feels guilt.
        o Buy doesn’t feel responsible and laughs, he doesn’t feel guilt.
      • Girls and women – use their personal thoughts to understand.
      • Girl with CAH
were overactive in the womb with testosterone

Refuses to wear a dress

Likes sports more

She is going under treatment for more estrogen intake – it has affected her weight.

Genetic Males

- Failure of androgenization: Androgen Insensitivity Syndrome
  - XY looking female.
  - Internal testes produce testosterone (but there are no receptors)
  - Production of estrogens (small amounts) produce feminization.
  - Normal female sex lives/behaviors.
  - \(\rightarrow\) XY genes not sufficient for heterosexual behaviors. Lack of androgens sufficient for homosexual behaviors (but not necessary).

- Genetic Factors
  - Twin studies: significantly more monozygotic (identical) twins are both homosexual when compared to fraternal twins.
    - Genetic component for both male and female homosexual orientation.
  - There are sexual dimorphisms in the brain, but they (as of today) do not explain sexual orientation.

Brain Difference
- Men vs. Women: corpus callosum (denser in women) + few other areas (including hypothalamus)

- Hetero vs. Homo-sexuals: inconclusive (or to the very least: indirect) there aren’t any anatomical or physiological differences.

- VIDEO (Fingers)
  - Genes that develop fingers are responsible for development of genitalia.
  - High testosterone alters the right side of brain.
  - Men have a better sense of space because of testosterone.
  - Estrogen is preventative of early heart attack but highly permits breast cancer.
  - Testosterone leads to a better cardiovascular system

- Do animals show homosexual behaviors?
  - Homosexual behaviors vs. ‘being’ homosexual
  - 500-1500 species
  - Homosexual behavior for dominance.
  - Homosexual behavior for bonding.

- Neural Control of Sexual Behavior
  - Males
    - Medial Preoptic Area (MPA): evidence from recording, stimulation and lesion studies – during sexual behavior there is an increase of activity, stimulate it you produce sexual behavior.
    - Sexually Dismorphic Nucleus of MPA: androgen-induced and enlarged in males, grows more when stimulated.
- Sensory Inputs
  
  From the spinal cord, Vomernasal organ & medial amygdala → produce MPA → two pathways (one is inhibitory/PGi and stimulates the spinal cord = double inhibition (two negatives make a positive), (the other inhibitory/PAG leads to PGi then to Spinal Cord)

- Mostly inhibitory pathway. Normal behavior: PGi needs to be constantly inhibited.

- PeriA

  o Male Sexual Behavior
    
    - The amygdala receives sensory inputs, and inputs indicative of sexual behavior (information about stimuli and performance of sexual behavior)
    
    - The amygdala sends its outputs to the MPA (‘emotional’ control of sexual behavior)
    
    - ‘Fos protein expression’ = ‘neurons were active’

  o Females
    
    - VentroMedial nucleus of the Hypothalamus: lesions and stimulation studies.
    
    - Estradiol and progesterone (in rats) act in VMH.

- Sensory Inputs
  
  - From the spinal cord, Vomernasal organ, Medial Amygdala → VMH → PAG/PGi → Spinal cord → Lordosis Vaginal Secretions

- Mostly excitatory pathway. Normal behavior: PGi needs to be exited.

- PAG is most active in human female sexual behavior (orgasms in scanner)

  o Female Sexual Behavior
As in males, sensory inputs converge in the amygdala

- **Neural Control of Bonding**
  - 5-7% mammalian species are monogamous (possibly ‘serially monogamous’)
  - Prairie voles monogamous, Meadow voles are polygamous.
  - In voles: monogamy = high levels of oxytocin (females) and vasopressin (males).
  - In human: oxytocin increases trust. Involved in Empathy.
  - VIDEO (Dimorphic behaviors, Oxytocin, Language, CAH)
    - Women produce more oxytocin, especially during birth.
    - More empathy in women.

- **Parenting Behavior**
  - Parturition: set of behavior at and immediately after giving birth (nesting, hiding, cleaning, nursing...)
    - Example: rat milk production equivalent to 2 gallons of milk per day. Urine recycling of the pups and fluid exchange between mother and pups. Chemical signals from pups to mothers (saliva of pup is communicating to mothers body through the nipples about their health)
  - Hormones and maternal behaviors:
    - Rats: prolactin (maternal behavior) and oxytocin (maternal bonding)
    - Humans: postpartum depression affects 13% of women after birth, they feel distant from their baby.
    - Neural structures and parenting behaviors:
      - MPA: Lesion studies affect maternal but not sexual behaviors.
MPA, oxytocin and prolactin also involved in paternal behaviors

WHAT IF WE HAD A QUIZ

1. Estradiol is an androgen. FALSE
   a. It is Estrogen

2. The vomernasal organ is involved in vomiting. FALSE
   a. Communication through pheromones.

3. In order to develop normal male internal organs, the testes produce an anti-____ hormone which has a _______ defeminizing/masculinizing) effect, and a pro-_____ which has a _______ (defeminizing/ma\culinizing) effect.
   a. Mallarian, wolffian

4. The MPA is involved in Male sexual behavior, maternal behaviors, paternal behaviors.