



- Love is nature's way of tricking people into reproducing. Love and reproduction are needed to enhance genetic diversity and development of the offspring.
- Things which accompany love and happen in the body are:
  - Faster heart rate (tachycardia).
  - Changes in hormonal secretions.
  - Changes in appetite.
  - Butterflies in the stomach.
- Which brain parts are activated/deactivated in love?
  - **Inhibited:**
    - ✓ Prefrontal cortex: it will be deactivated and this explains why a person who falls in love becomes stupid and has decreased judgment power).
    - ✓ Amygdala: it is inhibited and thus resulting in decreased alertness and vigilance (الحذر والاحتراس) → this is important to let the partner feels that he is trusted.
  - **Activated:**
    - ✓ Hypothalamus: it is activated and might result in stimulation of sexual feelings.
    - ✓ Hippocampus.
    - ✓ Ventral tegmentus and basal nuclei.
    - ✓ Insula is also activated and this might explain why we get the (butterflies in the stomach) feeling.

**Note: the pattern of brain activation in males and females is different.**

- Hormones which are responsible for love feeling:
  - **Oxytocin:** which is also the hormone responsible for social bonding (females have a lot of oxytocin). Studies showed that males might be secreting oxytocin in their semen thus making females fall in love with them.
  - **Vasopressin.**  
Note: quantities of these hormones differ in monogamy (individual has only one partner during his lifetime) and polygamy (individual has more than one partner during his lifetime). Dopamine is responsible for causing addiction to the person you love.
- Is the love of a mother to her children is the same as romantic love? → NO, pattern of brain activity is totally different in motherhood love:
  - **Prefrontal cortex is active.** Therefore, judgment power is not reduced in mothers.
  - **Hippocampus and hypothalamus are not active.** Therefore, sexual system will not be activated.
  - **Amygdala is activated.**
- Whom to love?
  - **Females:** they have substantial preference for high social status and wealth.
  - **Males:** they marry females with physical beauty and youth.
- First-look (crush on):
  - The first hormone which will be released is **norepinephrine** (causing increased heart rate and blood pressure when you see the person you love).
  - Then, **oxytocin** hormone will be released to improve the relationship (make a bond) → giving the feeling of “mating with this specific partner is great”.
  - **Dopamine** is released when making love. Notice that:
    - ✓ Males during sex will only release dopamine (there is no release of oxytocin). Therefore, they will enjoy having sex without feeling bonded to the partner (in contrast, females will have this feeling due to the release of both hormones dopamine + oxytocin during sex).



- **Course of true love:**

- **Phase I (falling in love: lasting for 6 months):** there is elevated level of cortisol to overcome initial neophobia. Testosterone will be decreased in males and elevated in females (until they reach nearly same levels!!).
- **Phase II (passionate love: lasting for several years):** testosterone, cortisol and serotonin levels will return back to normal. They key-players of this phase are oxytocin and vasopressin as they are responsible for the formation of strong long-term pair-bonds:
  - ✓ Oxytocin: it has anxiolytic, stress-reducing effect and induces partner bonding in females.
  - ✓ Vasopressin: it increases fear, stress response and induces partner bonding in males (mothers care and fathers protect against danger).
  - ✓ Dopamine:
    - ❖ *D1-receptor*: preventing polygamy.
    - ❖ *D2-receptor*: important for the formation of pair bonding.
- **Phase III (companionate love):** characterized by growth of commitment and decrease in intimacy and passion. The hormones which are responsible for this phase are also oxytocin and vasopressin. This phase is referred to as (empty love).
- **Breaking-up:** there are increased levels of stress hormones. This phase will result in depression and symptoms similar to drugs withdrawal.

- V1a receptor is present in many varieties in males and this made it inactive (therefore, making males worse in pair bonding). Notice that dopamine D4 receptor have the same effect in males.

- **Love syndromes:**

- **Cupid-Erotomania:** delusional belief of a person (usually a women) that a man, typically of higher social, political or economic status, is in true love with her ☺!
- **Stockholm syndrome:** inappropriate feeling from a victim towards an aggressor.
- **Altruism (التضحية):** action performed by an individual for the benefit of others. Does it really exist?!
- **Narcissistic personality disorder:** lack of empathy as well as a need for admiration and a pervasive or widespread pattern of grandiosity.

- **Administrating oxytocin hormone as a drug to males will show no effects because they don't have the receptors.**

- **Love vaccine for females = oxytocin blocker ☺**