

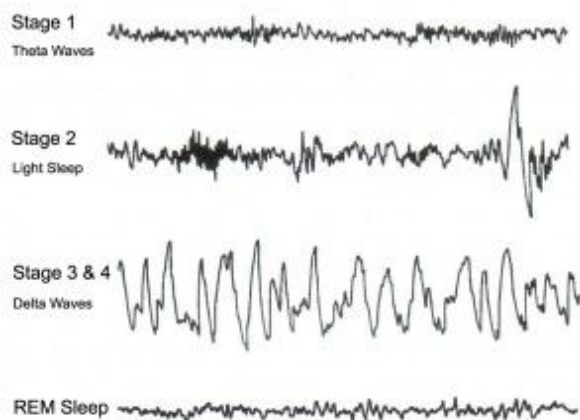
MT3 Review

8.1.17

Review

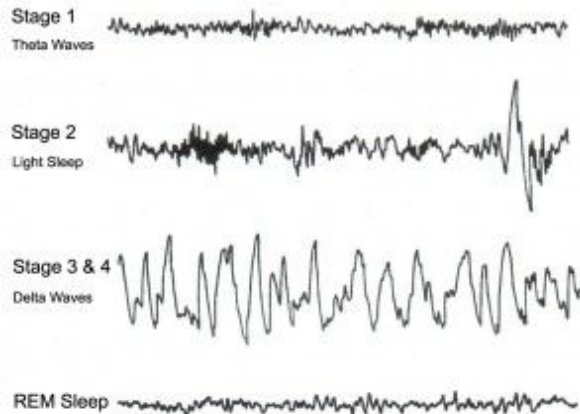
Sleep

Sleep stages



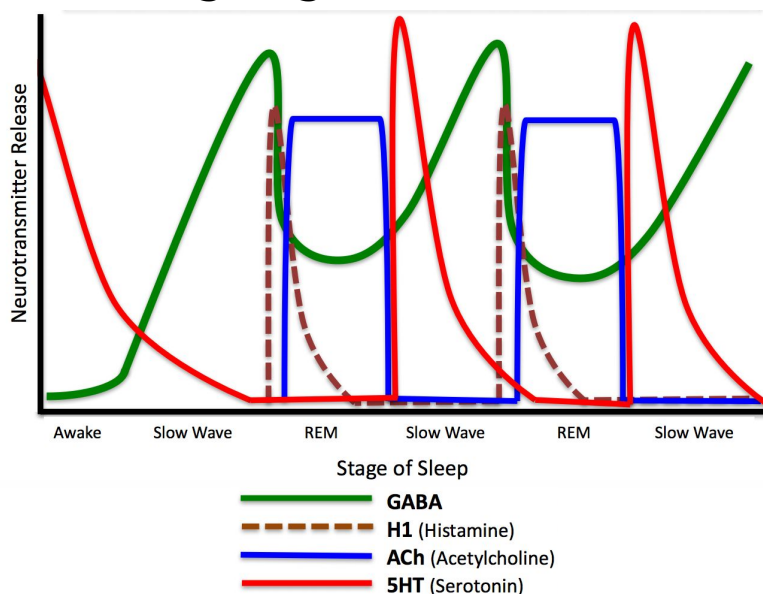
- What's going on in Stage 1 sleep?
- What characterizes the theta waves of Stage 2 sleep?
- What is deep sleep (Stage 3 & 4) also known as?
- Why is REM sleep called paradoxical sleep?

Sleep stages

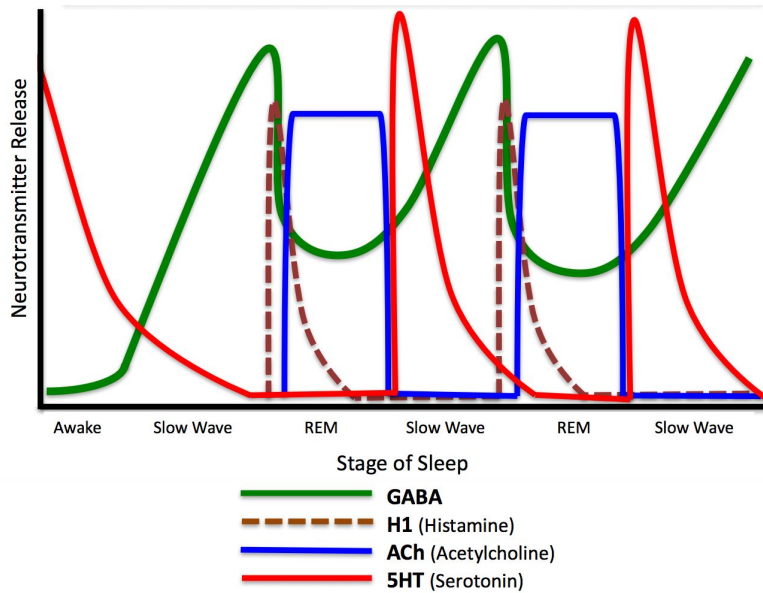


- What's going on in Stage 1 sleep?
Eye movement slows, muscles begin relaxing, drowsiness
- What characterizes the theta waves of Stage 2 sleep?
K-complexes and spindles
- What is deep sleep (Stage 3 & 4) also known as? **Slow-wave sleep**
- Why is REM sleep called paradoxical sleep? **Eye movement is rapid, heart rate/breathing variable, EEG waves variable**

What's going on with each of these NTs?



What's going on with each of these NTs?



- **GABA:** Inhibitory, high during SW sleep
- **H1:** Excitatory, spikes at end of SW sleep to initiate REM
- **ACh:** Excitatory, high during REM, low at end of REM
- **5HT:** Inhibitory, spikes to shut off REM, then lowers during deep sleep

Circadian Rhythms

- Controlled by what region?
- This photopigment receives info about ambient light.
- Leads to production of what hormone by the pineal gland that causes sleepiness?
- Why do we experience jetlag when traveling from east-west and vice versa?

Circadian Rhythms

- Controlled by what region? **Suprachiasmatic Nucleus (SCN)**
- This photopigment receives info about ambient light. **Melanopsin**
- Leads to production of what hormone by the pineal gland that causes sleepiness? **Melatonin**
- Why do we experience jetlag when traveling from east-west and vice versa? **24-hour circadian rhythm thrown off by differences in ambient light in different time zones, affects production of melatonin**

Caffeine in the brain

- GABA is in opponency with ACh/5HT.
- What molecule builds up in cells to cause tiredness and inhibits this NT?
- Caffeine does what?

Caffeine in the brain

- GABA is in opponency with **ACh**/5HT.
- What molecule builds up in cells to cause tiredness and inhibits this NT? **Adenosine**
- Caffeine does what? **Mimics adenosine to block adenosine receptors and prevent inhibition of ACh**

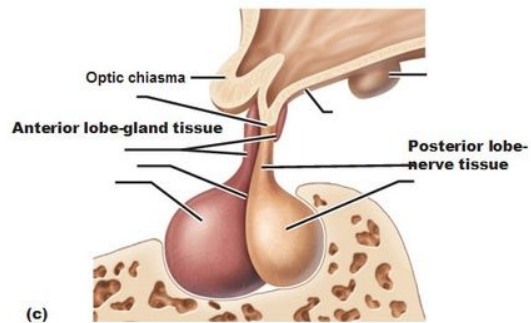


Sex Development & Behavior

Region that produces sex hormones

- This gland is the “master gland” and produces sex hormones.

- It is part of this brain region



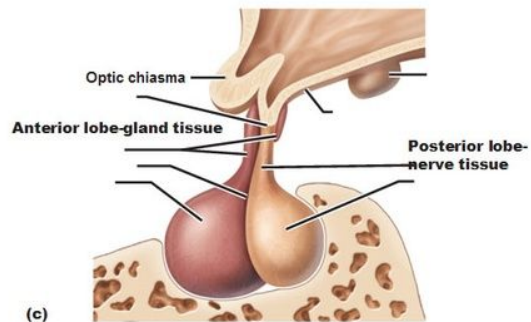
Region that produces sex hormones

- This gland is the “master gland” and produces sex hormones.

Pituitary gland

- It is part of this brain region.

Hypothalamus



How we become female or male

- (Female/Male) is the default sex.
- In female, the (Muellerian/Wolffian) system develops into female reproductive organs. In males the (Muellerian/Wolffian) system develops into male reproductive organs.
- A fetus will only develop as male if this enzyme is present.
- In fetus, testosterone converted to estradiol. Why aren't all fetuses masculinized because of this?

How we become female or male

- (**Female**/Male) is the default sex.
- In female, the (**Muellerian**/Wolffian) system develops into female reproductive organs. In males the (Muellerian/**Wolffian**) system develops into male reproductive organs.
- A fetus will only develop as male if this enzyme is present.
Testis-Determining Factor (TDF)
- In fetus, testosterone converted to estradiol. Why aren't all fetuses masculinized because of this? **Apha-feta protein**

Puberty in Adolescence

- Hypothalamus stimulates anterior pituitary by releasing what hormone?
- Anterior pituitary releases which 2 hormones?

Puberty in Adolescence

- Hypothalamus stimulates anterior pituitary by releasing what hormone?
Gonadotropin-releasing hormone (GnRH)
- Anterior pituitary releases which 2 hormones? **Lutenizing hormone/Follicle-stimulating hormone**
- These hormones lead to more testosterone in males, production of sperm in testes, and physical changes (voice drop, secondary hair growth, muscle enlargement)
- In females, these hormones lead ovaries producing estrogens, ovulation/menstrual cycle, and physical changes (pubic hair growth, breast development)

The brain during sex

- Males:
 - Reward circuit between VTA and Nucleus Accumbens and the (MPOA/VMH)
 - At ejaculation and orgasm, what hormones released?
- Females:
 - Reward circuit between VTA and Nucleus Accumbens and the (MPOA/VMH)
 - Endorphins/5HT released from PAG during sex.
 - At orgasm, what hormone released?

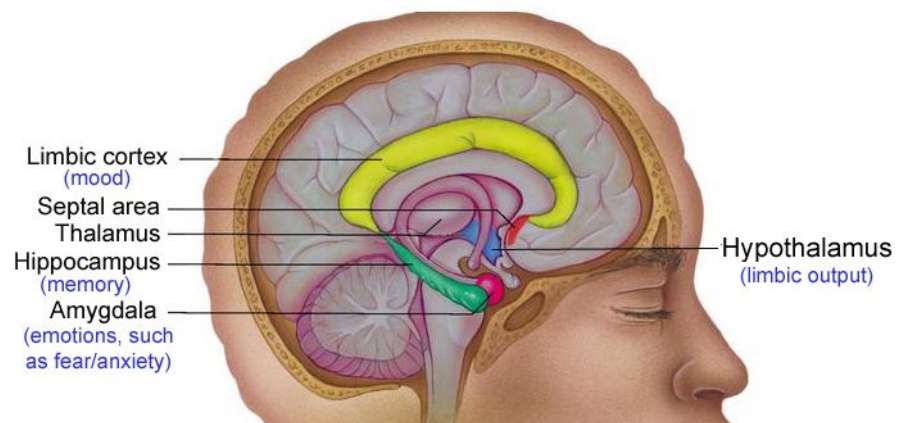
The brain during sex

- Males:
 - Reward circuit between VTA and Nucleus Accumbens and the (MPOA/VMH)
 - At ejaculation and orgasm, what hormones released?
Oxytocin and Prolactin
- Females:
 - Reward circuit between VTA and Nucleus Accumbens and the (MPOA/VMH)
 - **Endorphins**/5HT released from PAG during sex.
 - At orgasm, what hormone released? **Oxytocin**

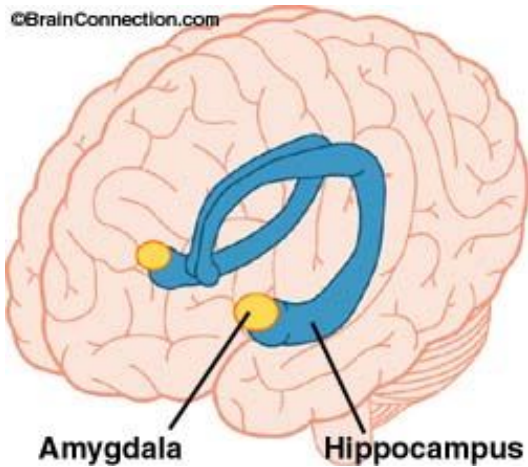
Emotions

The emotional brain

Limbic System

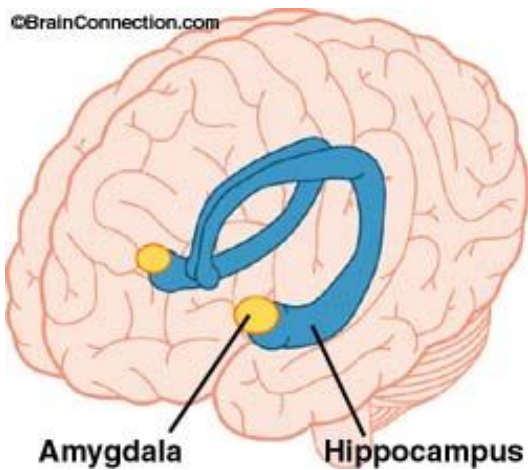


The amygdala



- Lateral nuclei associated with:
- Corticomedial area associated with:
- Central and basolateral nuclei associated with:

The amygdala



- Lateral nuclei associated with: **Startle reflex**
- Corticomedial area associated with: **Rage**
- Central and basolateral nuclei associated with: **Conditioned fear**

What is this region and what is its role in emotion?



What is this region and what is its role in emotion?



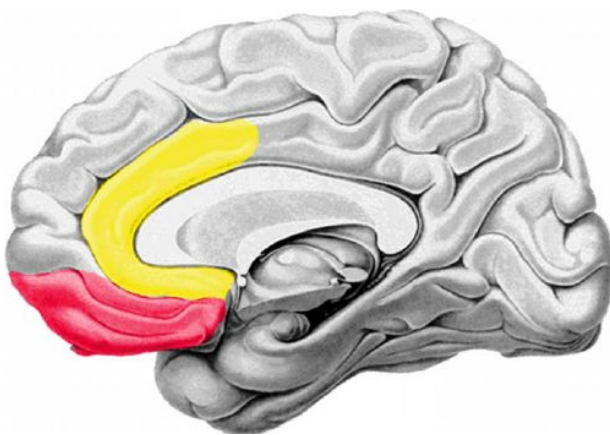
- **Insula**
- **Emotional expression in social contexts**
- Impairment to insula can lead to emotional facial paresis, which is the inability to what?

What is this region and what is its role in emotion?



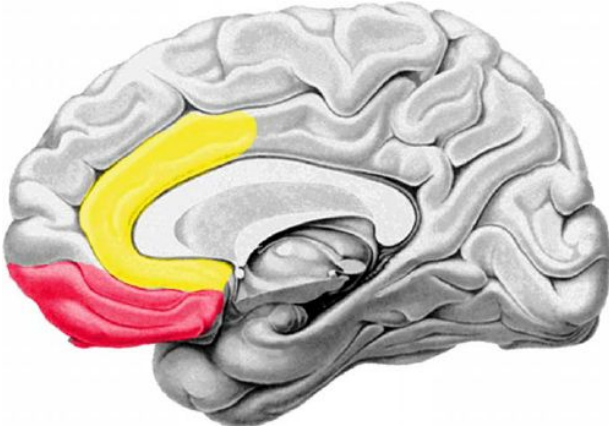
- **Insula**
- **Emotional expression in social contexts**
- Impairment to insula can lead to emotional facial paresis, which is the inability to what? **Produce a spontaneous smile**

Emotional circuit



- Amygdala, OFC, insula, and anterior cingulate gyrus make up a circuit involved in risk assessment, self control, etc.
- What cells connect anterior cingulate to insula?

Emotional circuit



- Amygdala, OFC, insula, and anterior cingulate gyrus make up a circuit involved in risk assessment, self control, etc.
- What cells connect anterior cingulate to insula? **Von Economo**

Describe learned helplessness

- Helplessness under duress can cause ulcers and depression, also known as what? (hint: sympathetic/parasympathetic nervous system)
- But lesion to this region will prevent these effects.

Describe learned helplessness

- Helplessness under duress can cause ulcers and depression, also known as what? (hint: sympathetic/parasympathetic nervous system)
parasympathetic rebound
- But lesion to this region will prevent these effects. **PFC**

NTs & Emotion

- 5HT typically (enters post-synaptic cell/is reuptaken in pre-synaptic cell). Low 5HT associated with impulsive behavior and rapid aggression.
- What drugs prevent the reuptake of 5HT? Give an example.
- GABA is inhibitory and (hypo/hyper)-polarizes the cell. GABA-agonists reduce anxiety in cells.
- CCK is excitatory hormone involved in appetite (suppression/enhancement). Can lead to anxiety.

NTs & Emotion

- 5HT typically (enters post-synaptic cell/**is reuptaken in pre-synaptic cell**). Low 5HT associated with impulsive behavior and rapid aggression.
- What drugs prevent the reuptake of 5HT? Give an example. **SSRIs, Prozac**
- GABA is inhibitory and (hypo/**hyper**)-polarizes the cell. GABA-agonists reduce anxiety in cells.
- CCK is excitatory hormone involved in appetite (**suppression**/enhancement). Can lead to anxiety.