




**PRESENTATION BY:**

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# HYPOTHALAMUS



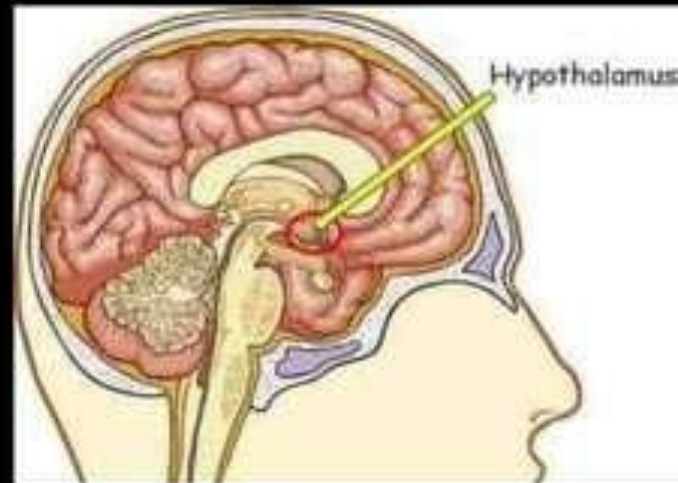
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# INTRODUCTION

## ▪ Hypothalamus

- Part of the brain
- Present in the posterior part of the forebrain
- Connects the midbrain with the cerebral hemisphere
- And encloses the third ventricle



- Extends from optic chiasma to Mamillary body
- Formed by a group of nuclei in the **wall and floor** of 3<sup>rd</sup> ventricle

# FUNCTIONS

- Concerned mainly with homeostasis of the body
- It regulates many vital functions of the body like endocrine functions, visceral functions, metabolic activities, hunger, thirst, sleep, wakefulness, emotion, sexual functions, etc

# 1. SECRETION OF POSTERIOR PITUITARY HORMONES

Hypothalamus



posterior pituitary



Antidiuretic hormone (ADH) + oxytocin



Transported by means of axonic or axoplasmic flow



Through the fibers of hypothalamo-hypophyseal tracts



To posterior pituitary

## 2. CONTROL OF ANTERIOR PITUITARY



- Growth Hormone **Releasing** Hormone (GHRH)
- Growth Hormone **Releasing** Polypeptide (GHRP)
- Thyrotropic **Releasing** Hormone (TRH)
- Corticotropin **Releasing** Hormone (CRH)
- Gonadotropin **Releasing** Hormone (GRH)
- Growth Hormone **Inhibitory** Hormone (GHIH) / Somatostatin
- Prolactin **Inhibitory** Hormone (PIH)

Transported to the anterior pituitary



by hypothalamo-hypophyseal portal blood vessels

### 3. CONTROL OF ADRENAL CORTEX

Paraventricular Nucleus Of Hypothalamus



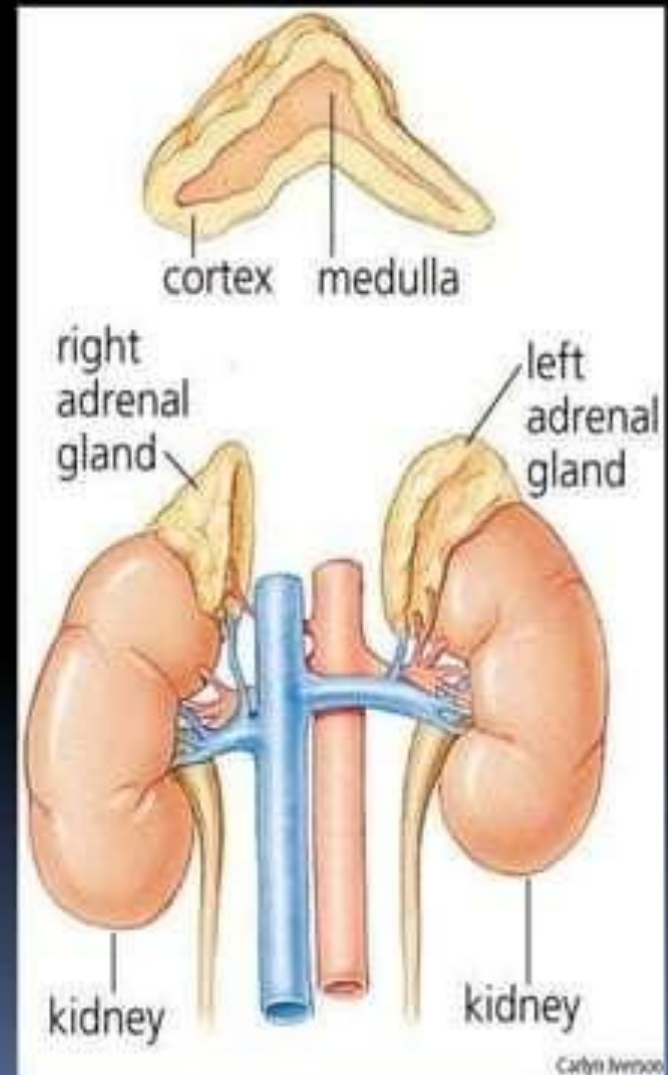
Corticotrophic Releasing Hormone (CRH)



Anterior Pituitary

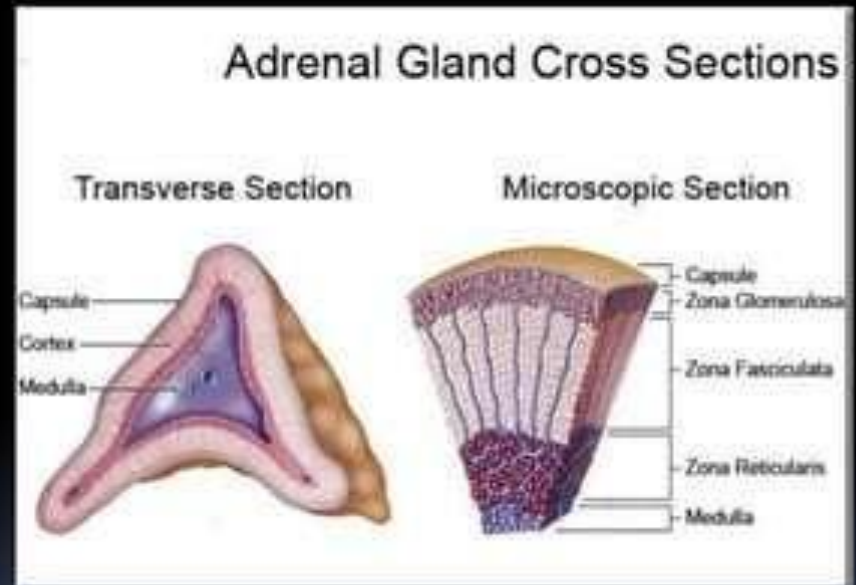
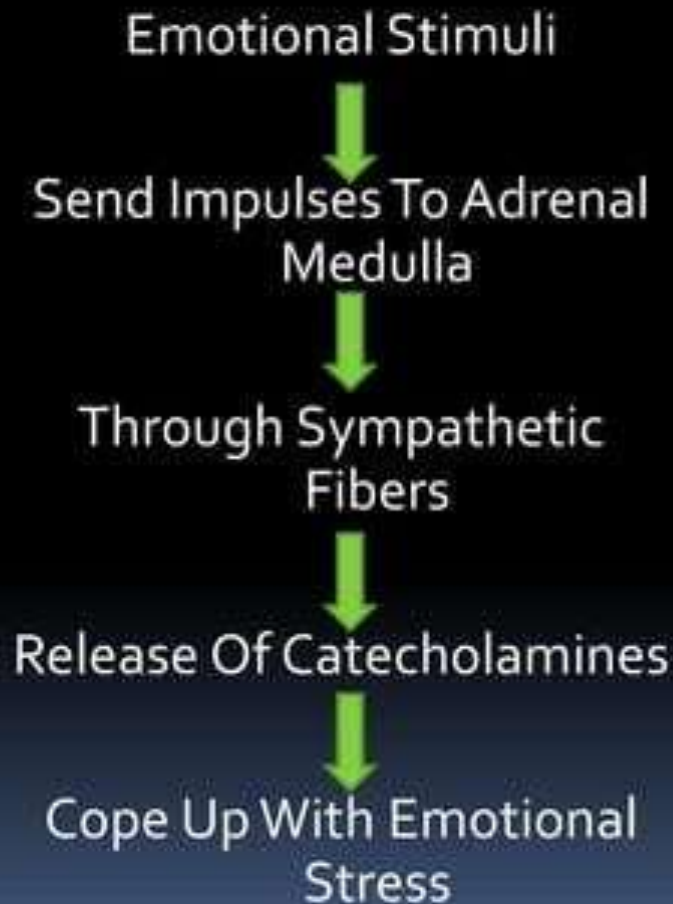


Adrenocorticotrophic Hormone (ACTH)





## 4. CONTROL OF ADRENAL MEDULLA



## 5. REGULATION OF AUTONOMIC NERVOUS SYSTEM

- Hypothalamus controls the ANS
  - The **sympathetic** division → regulated by posterior and lateral nuclei
  - The **parasympathetic** division → controlled by anterior group of nuclei

## 6. REGULATION OF HEART RATE

- Regulates heart rate
- Through vasomotor center
- In the medulla oblongata
  - Stimulation of posterior and lateral nuclei of hypothalamus
  - Stimulation of preoptic nucleus in anterior group

Increases the heart rate

Decreases the heart rate



## 7. REGULATION OF BLOOD PRESSURE

- By acting on the vasomotor center.

- Stimulation of posterior and lateral hypothalamic nuclei



**Increases** Arterial Blood Pressure

- Stimulation of preoptic area



**Decreases** The Blood Pressure



## 8. REGULATION OF BODY TEMPERATURE

- Hypothalamus sets the normal range of body temperature
- Body temperature in *normal physiological* conditions is  $37^{\circ}\text{C}$ .
- **Regulated by 2 centers in hypothalamus**
  - Heat **Loss** Center → present in preoptic nucleus of anterior hypothalamus.
  - Heat **Gain** Center → present in posterior hypothalamic nucleus.



# 9. REGULATION OF HUNGER AND FOOD INTAKE

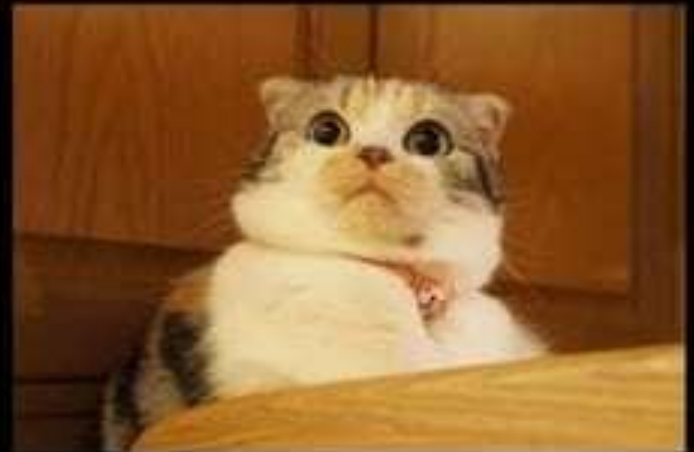
- Regulated by two centers of hypothalamus
  - Feeding center
    - Stimulation of this center leads to uncontrolled hunger -- **Obesity**
    - Destruction of this centre – **anorexia**
    - This center is **always active** – means has the tendency to induce food intake always
  - Satiety center
    - Visa versa
    - Hypothalamic obesity
    - After food intake – causes **inhibition** of feeding center



## 10. REGULATION OF SLEEP AND WAKEFULNESS

- **Wakefulness** Center ---  
Mamillary Body In Post.  
Hypothalamus
- Lesion Of Wakefulness  
Center Or Stimulation Of  
Ant. Hypothalamus ---

**Sleep**



## OTHER FUNCTIONS

- Role in emotional and behavior changes
- Regulation of sexual function
- Role in response to smell
- Role in circadian rhythm



# APPLIED PHYSIOLOGY

## 1. DIABETES INSIPIDUS

- Characterized by excretion of large quantity of water through urine.

## 2. DYSTROPHIA ADIPOSEGENITALIS

- Characterized by increased appetite and depressed secretion of gonadotropin
- Obesity and sexual infantilism
- Associated with dwarfism (if the condition occurs during growing period)
- It is also called Frohlich's syndrome.

### 3. KALLMANN'S SYNDROME

- Is a genetic disorder characterized by hypogonadism associated with anosmia (loss of olfactory sensation) or hyponmla (decreased olfactory sensation).
- It is also called hypogonadotropic hypogonadism since it occurs due to deficiency of gonadotropin releasing hormones secreted by hypothalamus

### 4. LAURENCE-MOON-BIEDL SYNDROME

- Characterized by moon pro-face ,obesity, polydactylism, mental retardation and hypogonitalism.

## 5. NARCOLEPSY

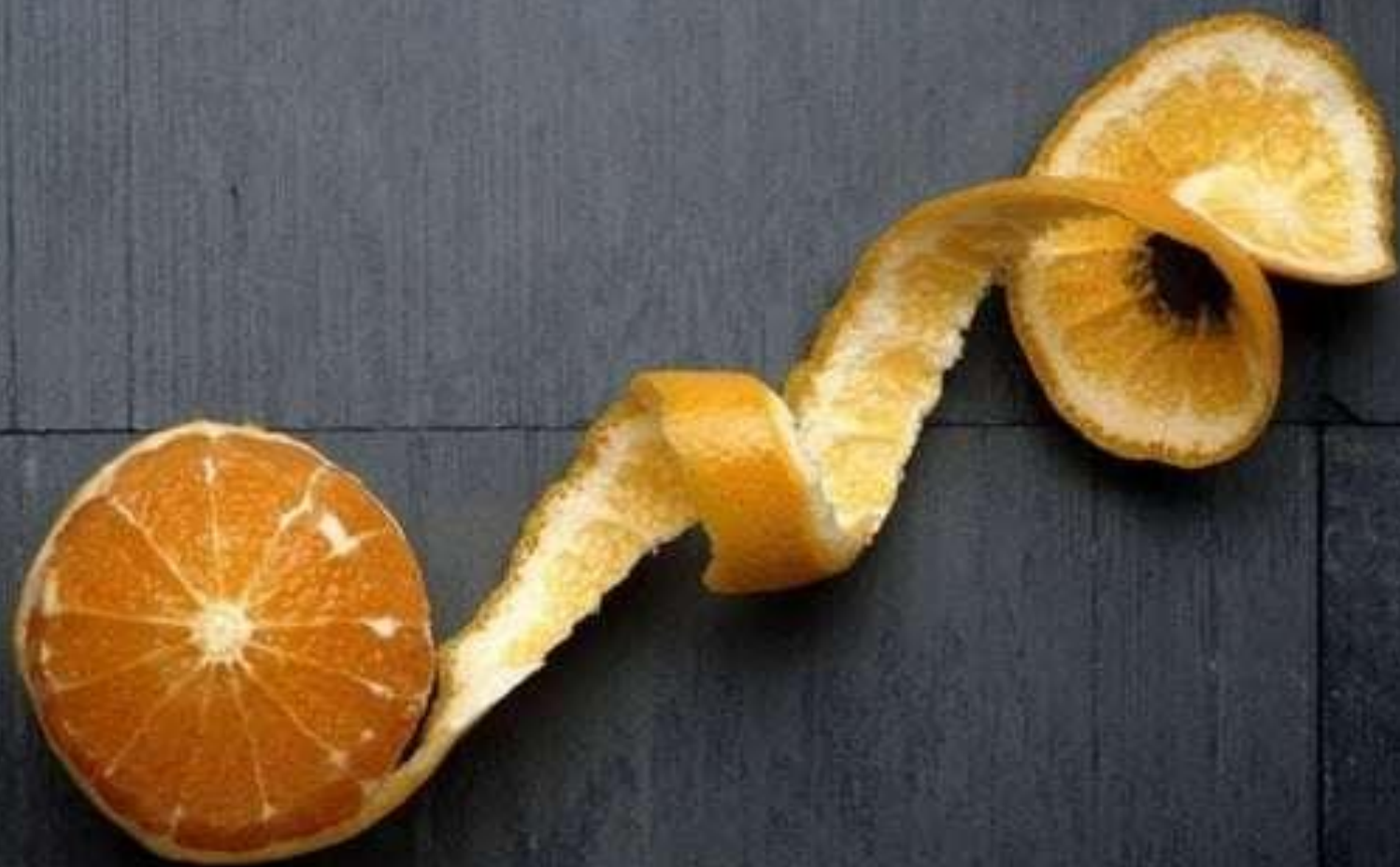
- Abnormal sleep pattern.
- Sudden attack of uncontrollable desire for sleep and, the person suddenly falls asleep
- It occurs in the daytime
- The sleep may resemble the normal sleep
- Duration of sleep is very short. It may be from few sec. to 20 minutes.
- In night, sleep may be normal but is disturbed or there may be insomnia

## 6. CATAPLEXY

- It is the sudden uncontrolled outbursts of emotion
- Associated with narcolepsy.
- The person becomes completely exhausted with muscular weakness.
- The attack is brief and last for few seconds to a few minutes,
- The consciousness is not lost.

## REFERANCE

- Essentials Of Medical Physiology --- 5<sup>th</sup> Edition --- k sembulingam --- PG NO: 819



***THANK YOU....***