

# ***Adrenal Medulla***

## **Objectives:**

- 1. To study the adrenal medulla hormone secretion.**
- 2. To verify the effects of catecholamines and the disorders of their secretion.**

## **The adrenal gland consists of 2 parts:**

- 1. The outer part: the adrenal cortex which is part of the endocrine system,**
- 2. The inner part: the adrenal medulla which is part of the autonomic nervous system.**

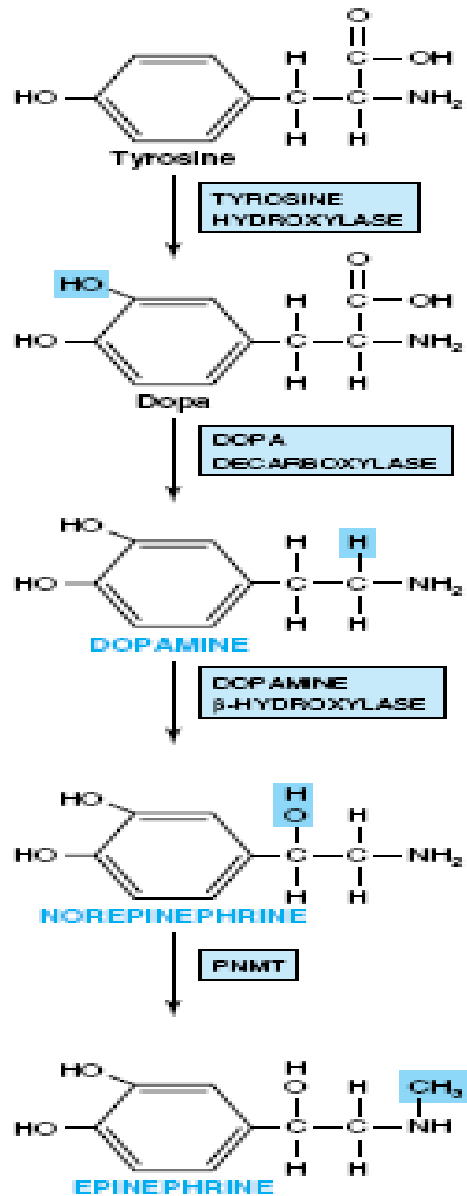
## **The adrenal medulla secretes catecholamines:-**

- 1. Epinephrine ( Adrenaline)***
- 2. Norepinephrine ( Noradrenaline)***
- 3. Dopamine***

**Epinephrine is the major product of adrenal medulla and constitute 80% of catecholamines in the medulla and is not made in extramedullary tissues.**

**Catecholamines synthesis and secretion are regulated by neural impulses. They are synthesized from Tyrosine.**

## Biosynthesis of Catecholamines



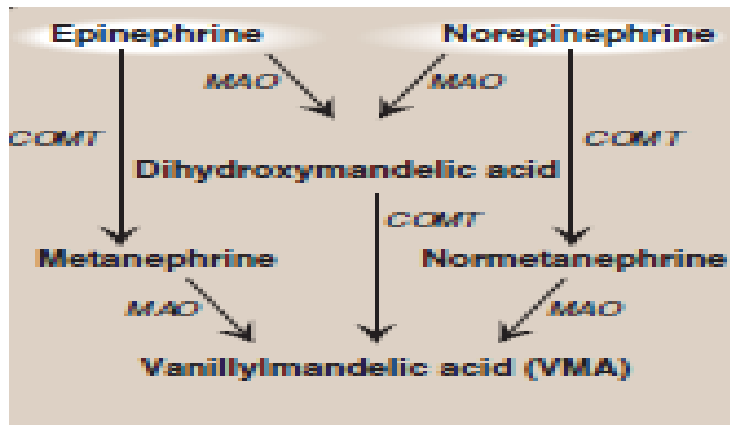
Granner DK. Diversity of the endocrine system. In: Murray RK, Granner DK, Mayes PA, Rodwell VW, eds. Harpers's Illustrated Biochemistry. 26th edn, New York: Lange Medical Books/McGraw-Hill; 2003: 434-455.

## Metabolism of Catecholamines

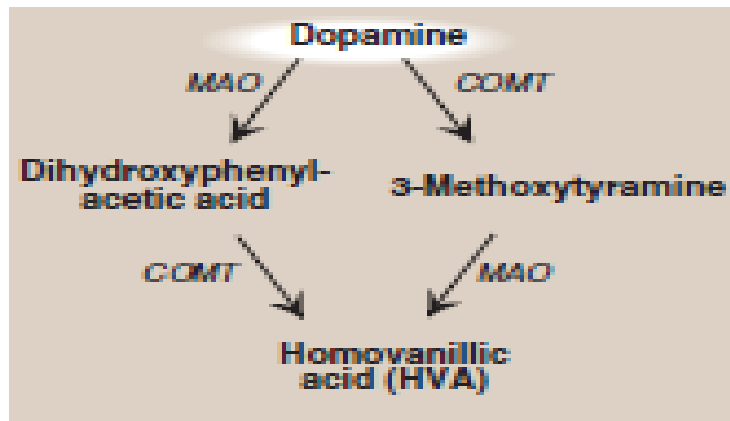
Catecholamines are inactivated by:

1. Oxidative deamination catalyzed by monoamine oxidase (MAO), and:
2. O-methylation carried out by catechol-O-methyl transferase (COMT).

### Metabolism of Epinephrine and Norepinephrine



### Metabolism of Dopamine



Harvey RA, Ferrier DR. Lippincott's Illustrated Reviews: Biochemistry. 5th edn. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins; 2011: 277-290.



### **Effects mediated via BETA-2 adrenergic receptors:**

- 1. Stimulation of hepatic gluconeogenesis
- 2. Stimulation of hepatic and muscle glycogenolysis
- 3. Smooth muscle relaxation in: Bronchi

Blood vessels

Gasrointestinal tract

Genitourinary system

- 4. Stimulation of secretion of: Insulin  
Renin  
Glucagon

### **Effects mediated via BETA-3 adrenergic receptors:**

- Stimulation of lipolysis

## ***Pathophysiology***

### ***Phaeochromocytoma:***

This tumour is associated with excessive secretion of catecholamines, and is responsible for < 0.1% of causes of hypertension.

The patient presented with paroxysmal hypertension or with it's complications.

#### **Investigations:**

- 1. 24 hr Urinary Metanephrines.**
- 2. Plasma Metanephrines.**