

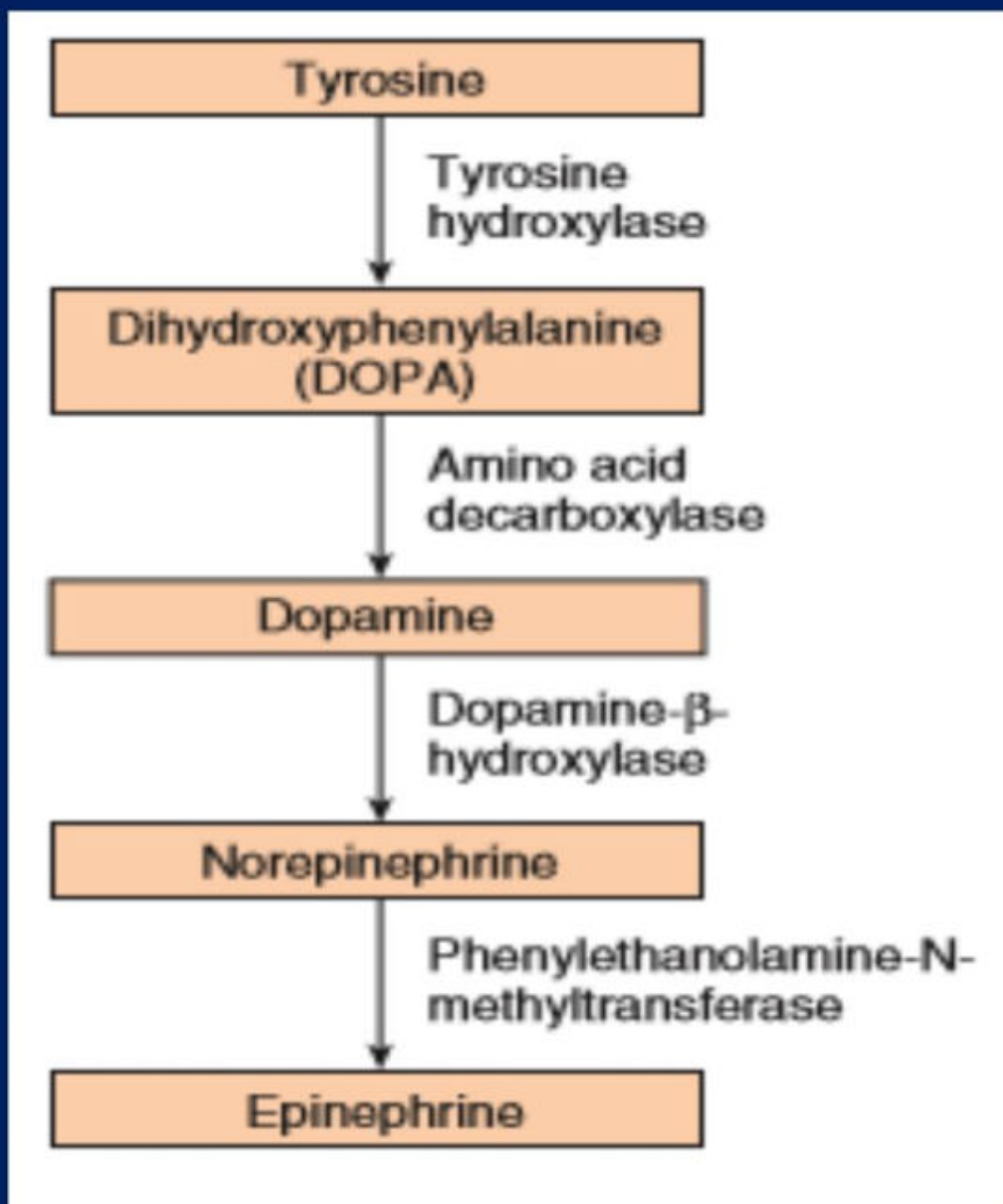
# Adrenal Medullary Hormones



## Secretions of the gland



- Catecholamines:
  - Epinephrine
  - Nor-epinephrine
  - Dopamine
- Adrenal medulla is a sympathetic ganglion in which the post ganglionic neurons have lost their axons and become secretory cells



## Catecholamines

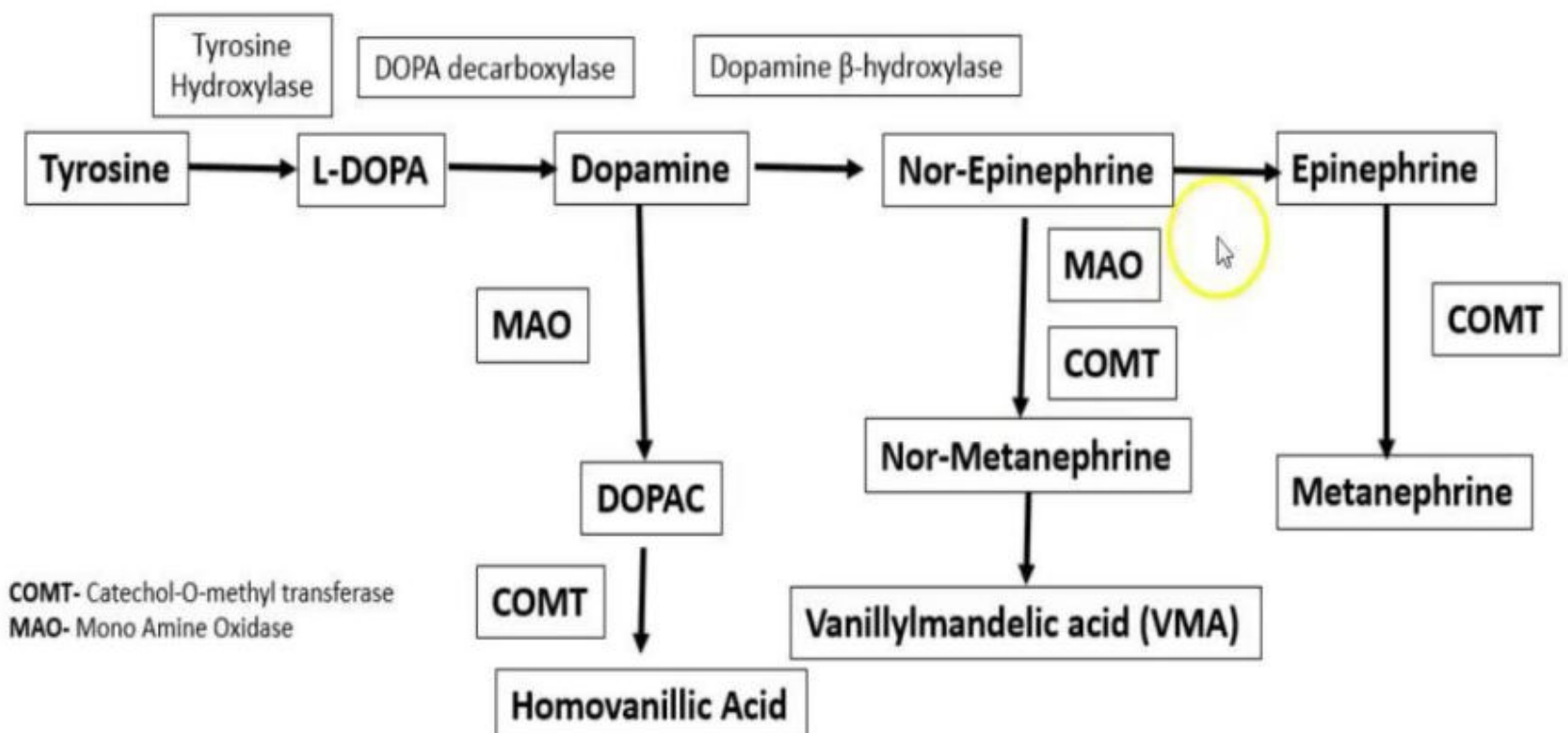
- PNMT is found in brain and adrenal medulla
- Adrenal PNMT is induced by glucocorticoids
- After hypophysectomy, epinephrine concentration decreases
- In 21 β-hydroxylase deficiency adrenal medulla is dysplastic

# Catecholamines

- 95% dopamine and 70% Nor-epinephrine and epinephrine is conjugated to sulfate
- On standing the levels of free nor-epinephrine increases by 50-100%
- After adrenalectomy, plasma nor-epinephrine levels remain unchanged but free epinephrine level falls

## Adrenergic Neurotransmission and Drugs affecting it

### Synthesis and Metabolism of Catechol amines





- Catecholamines are stored in granules with ATP
- Granules also contain chromogranin A, opioid peptides
- Adrenomedullin is also found

### Catecholamines

Dopamine	D <sub>1</sub> , D <sub>5</sub>	↑Cyclic AMP	
	D <sub>2</sub>	↓Cyclic AMP	↑K <sup>+</sup> , ↓Ca <sup>2+</sup>
	D <sub>3</sub> , D <sub>4</sub>	↓Cyclic AMP	
Norepinephrine	α <sub>1</sub>	↑IP <sub>3</sub> , DAG	↓K <sup>+</sup>
	α <sub>2</sub>	↓Cyclic AMP	↑K <sup>+</sup> , ↓Ca <sup>2+</sup>
	β <sub>1</sub>	↑Cyclic AMP	
	β <sub>2</sub>	↑Cyclic AMP	
	β <sub>3</sub>	↑Cyclic AMP	

# Regulation of catecholamines



- Reduced in sleep
- Increased in emergency situations
- **W.B.Cannon** called it “ **The emergency function of sympathoadrenal system**”
- Drugs
- NE is increased by emotional stresses with which the individual is familiar
- Epinephrine rises in stresses due to unexpected situation

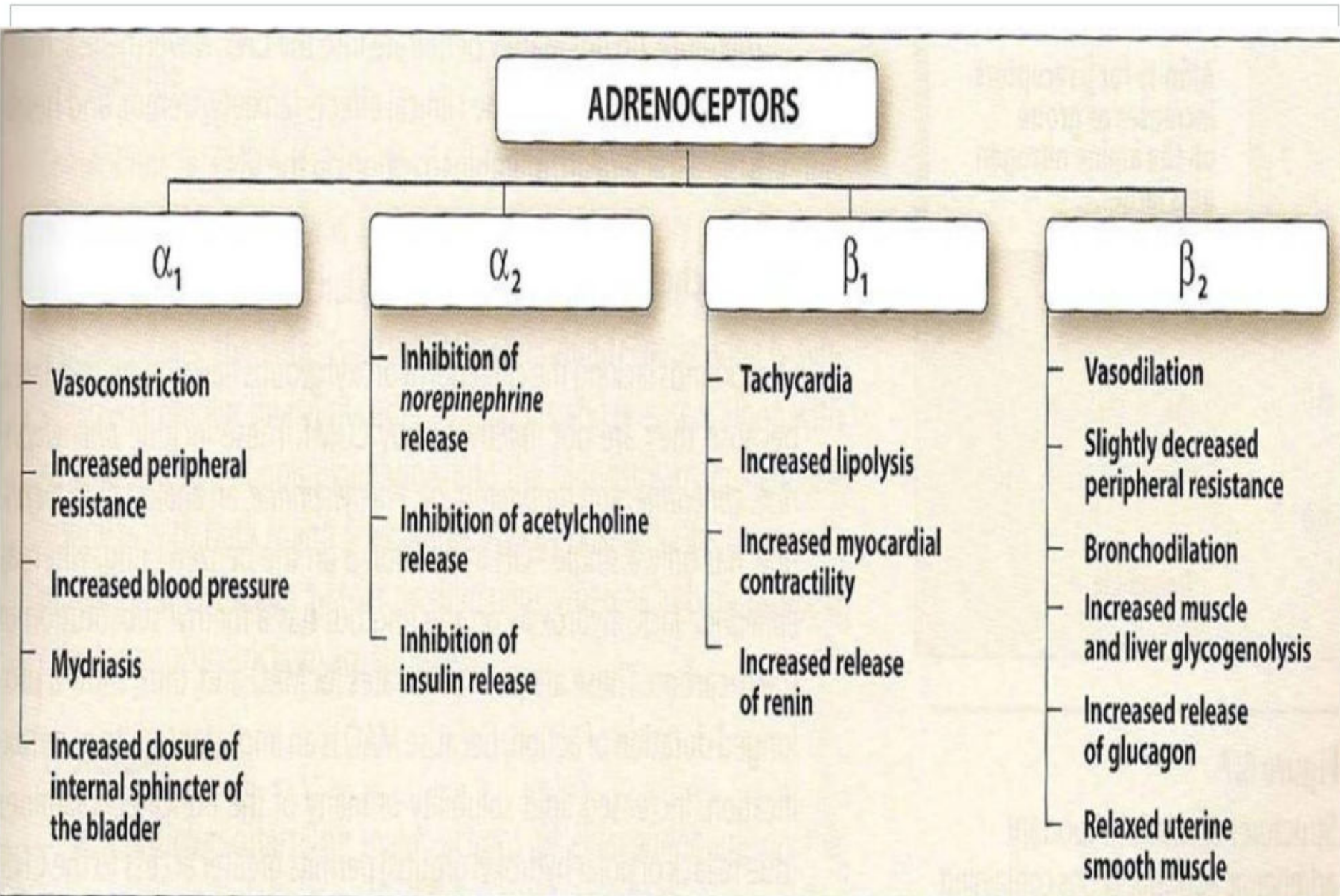
## Effects of Catecholamines



- Increases glycogenolysis in liver and skeletal muscles
- Increases insulin and glucagon secretion by  $\beta$ -adrenergic mechanisms
- Decreases insulin and glucagon secretion by  $\alpha$ -adrenergic mechanisms
- Increases FFA mobilization
- Increases plasma lactates
- Stimulates metabolic rate

# Effects of Catecholamines

- NE and Epinephrine both increase rate and force of myocardial contraction
- Increases myocardial excitability
- Can lead to extrasystoles and arrhythmias
- NE produces vasoconstriction
- Epinephrine causes vasodilatation



# Effects of Catecholamines

- Catecholamines increase alertness
- Increases metabolic rate due to vasoconstriction and lactate oxidation
- When injected increases potassium levels and later decreases
- Dopamine causes **renal and mesenteric vasodilatation**
- Elsewhere DA causes vasoconstriction
- DA has positive inotropic effect on heart
- DA is useful in treatment of shock