

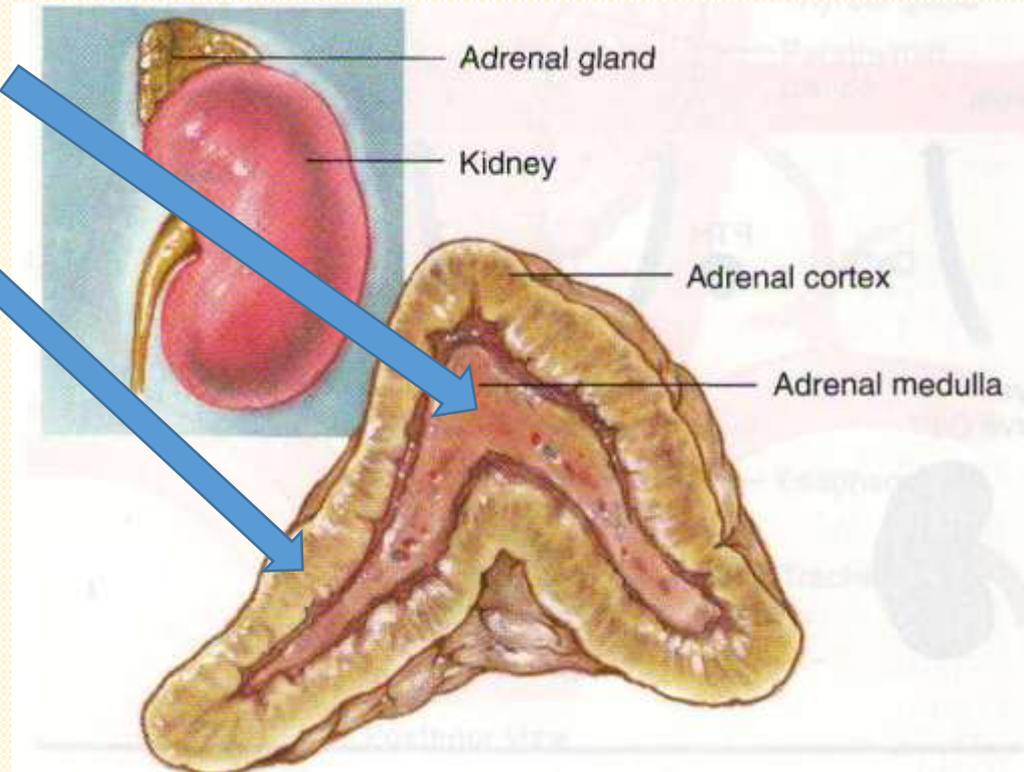


# ADERNAL GLANDS Disorders

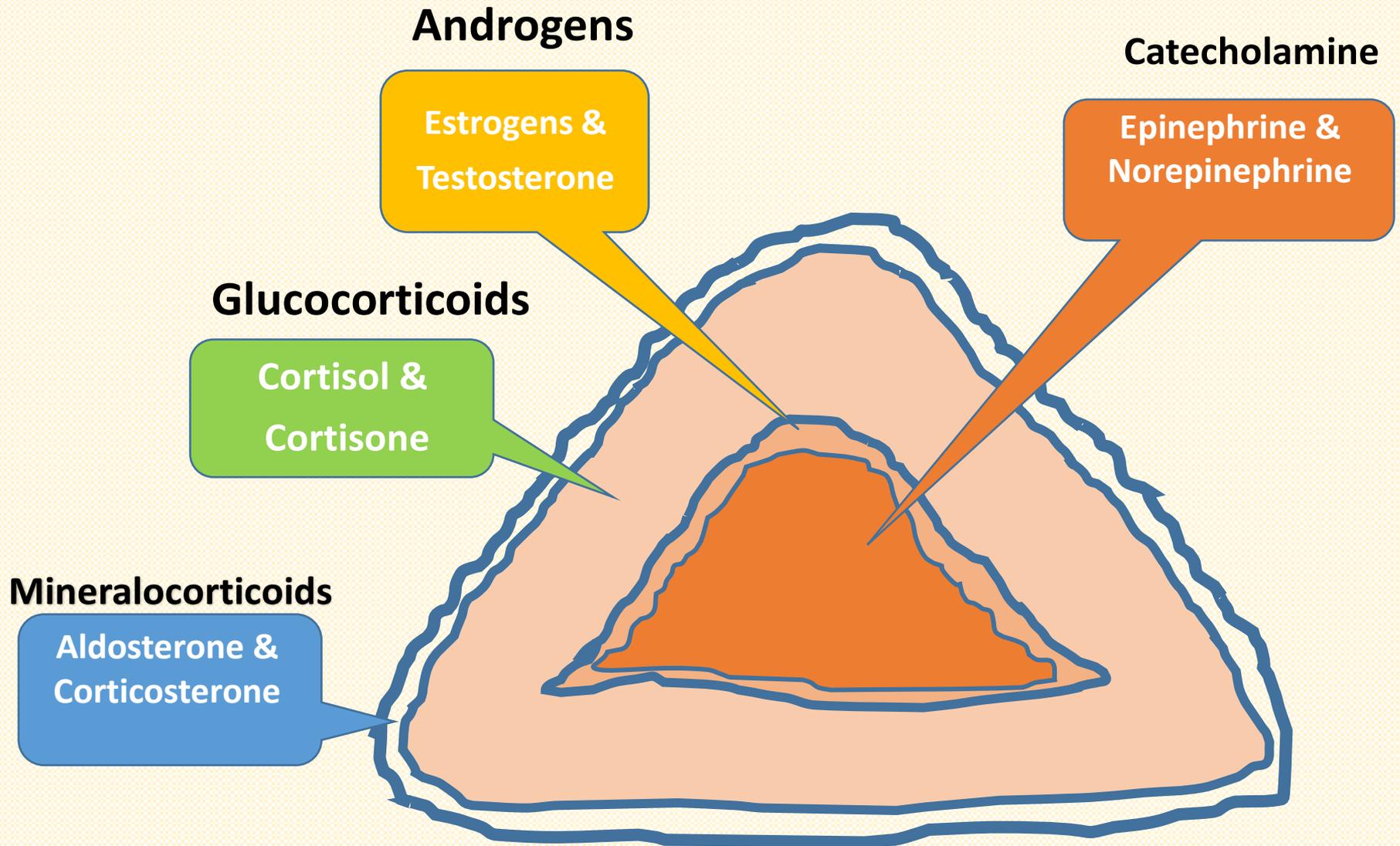
**Dr.Sundus Abdul wadood**  
**OMFS**  
**Basrah Dental College**

# ADRENAL GLANDS

- There are two adrenal glands; each one is located on top of each kidney .
- Each adrenal gland consists of two portions
- an inner adrenal medulla
- an outer adrenal cortex .



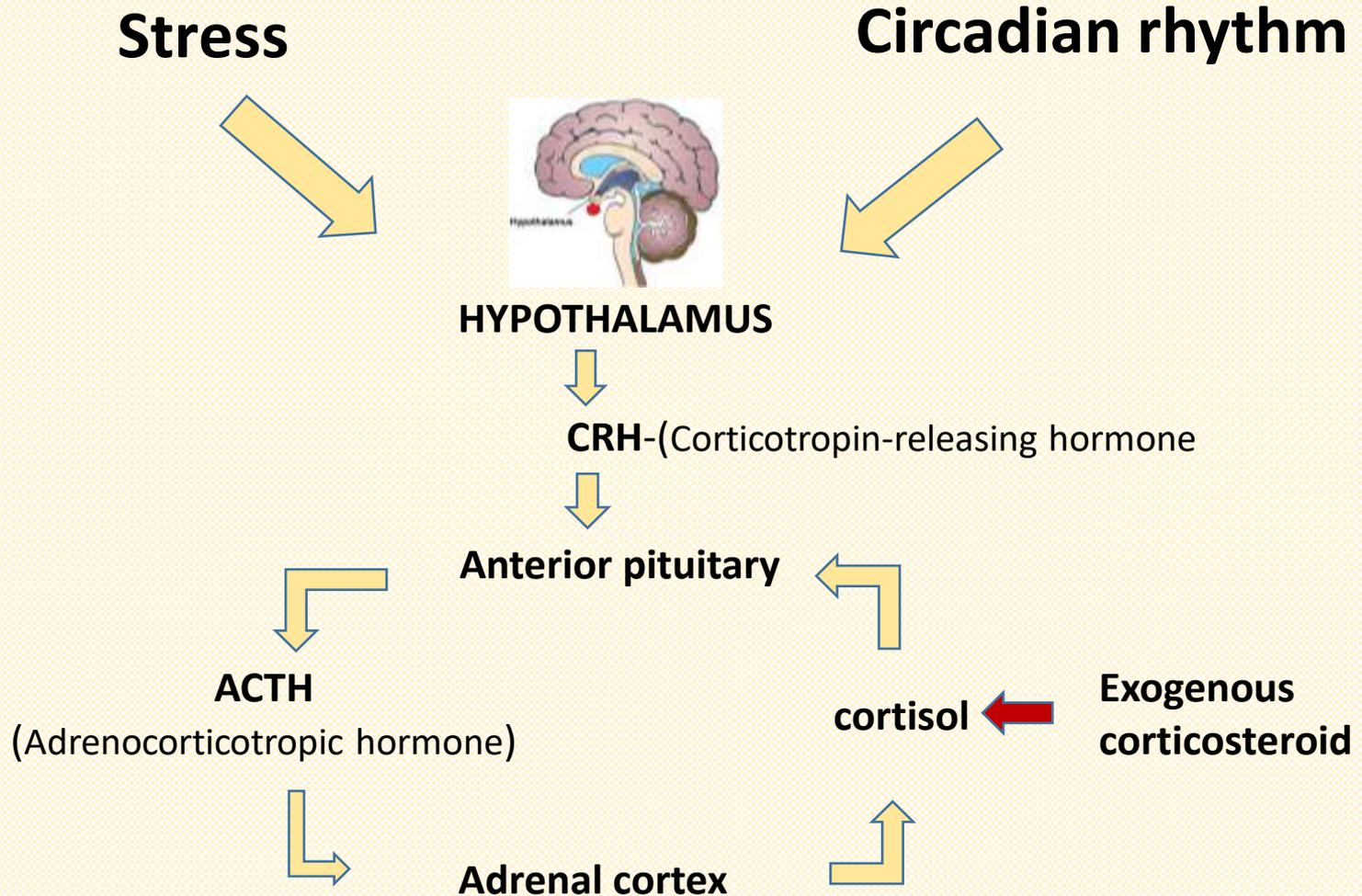
# ADERNAL GLANDS HORMONES



# Hormones of the Adrenal Medulla

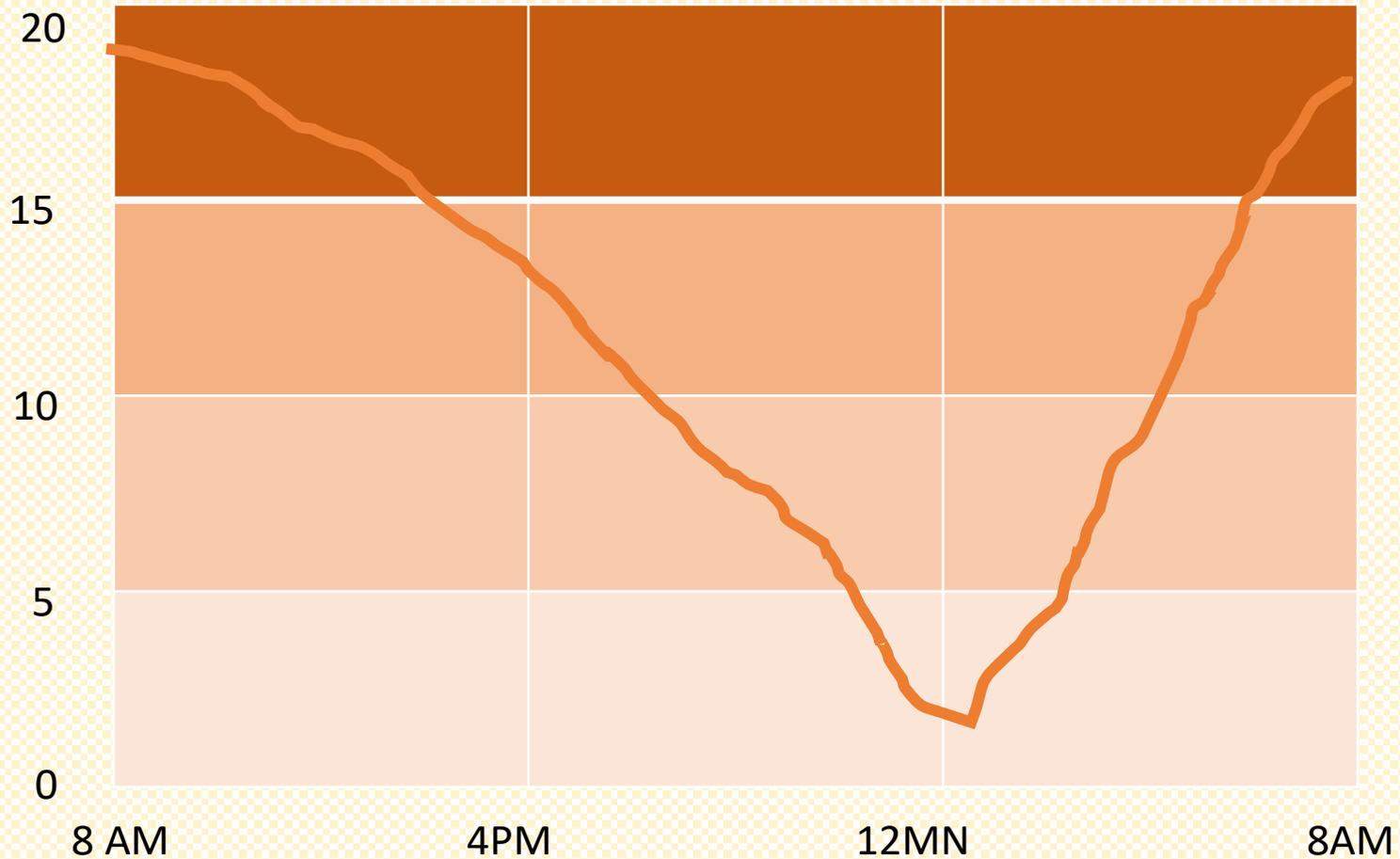
- ❑ Adrenal medulla secretes *epinephrine* and *norepinephrine*, two closely related hormones that have very similar actions on target cells.
- ❑ Epinephrine forms about 80% of the medullary secretions.
- ❑ The sympathetic division of the autonomic nervous system regulates the secretion of adrenal medullary hormones.
- ❑ They are secreted whenever the body is under stress, and they duplicate the action of the sympathetic division.
- ❑ The medullary hormones have a stronger and longer-lasting effect in preparing the body for “fight or flight”.
- ❑ The effects of epinephrine and norepinephrine include:
  - 1-  in **blood flow to the viscera and skin.**
  - 2-  in **blood flow to the skeletal muscles, lungs, and nervous system.**
  - 3- **Conversion of glycogen to glucose level in the blood.**
  - 4-  in **the rate of cellular respiration.**

# Hypothalamic-pituitary-adrenal axis (HPA) and the regulation of cortisol secretion



# Normal pattern of cortisol secretion over 24-hour period

## Circadian rhythmicity



## Glucocorticoids and their relative potency

Name	Glucocorticoid potency	<u>Terminal half-life</u> (hours)
<u>Cortisol (hydrocortisone)</u>	1	8
<u>Cortisone</u>	0.8	8
<u>Prednisone</u>	3.5–5	16–36
<u>Prednisolone</u>	4	16–36
<u>Triamcinolone</u>	5	12–36
<u>Fludrocortisone acetate</u>	15	24
<u>Methylprednisolone</u>	5–7.5	18–40
<u>Betamethasone</u>	25–30	36–54
<u>Dexamethasone</u>	25–80	36–54

# Function of cortisone

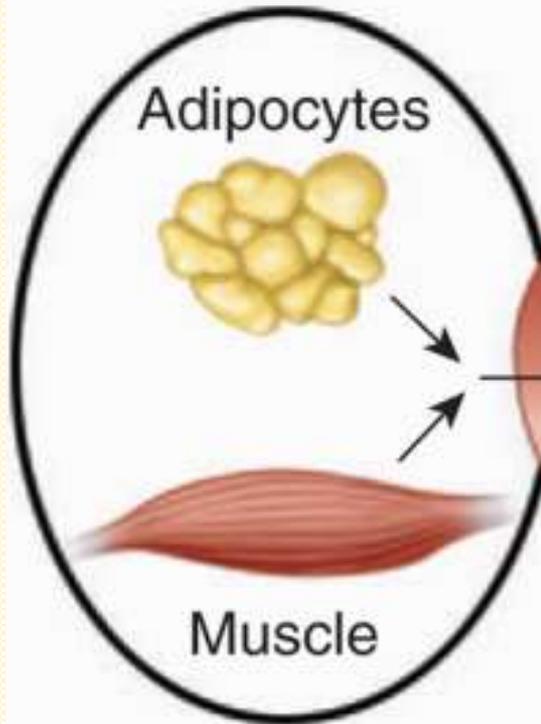
## **Cortisol acts as an insulin antagonist,**

- 1)increasing blood levels and peripheral use of glucose;**
- 2)increasing liver glucose output;**
- 3)initiating lipolysis, proteolysis, and gluconeogenic mechanisms.**

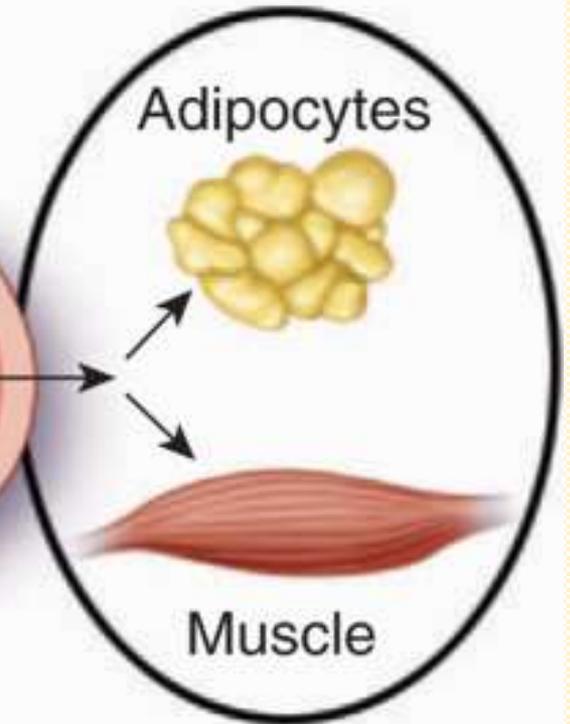
## **The anti-inflammatory action of cortisol is modulated by its inhibitory action on:**

- (1)lysosome release,**
- (2)prostaglandin production,**
- (3)eicosanoid and cytokine release,**
- (4)endothelial cell expression of intracellular and extracellular adhesion molecules (ICAMs and ECAMs,respectively) that attract neutrophils,**
- (5)the function of leukocytes.**

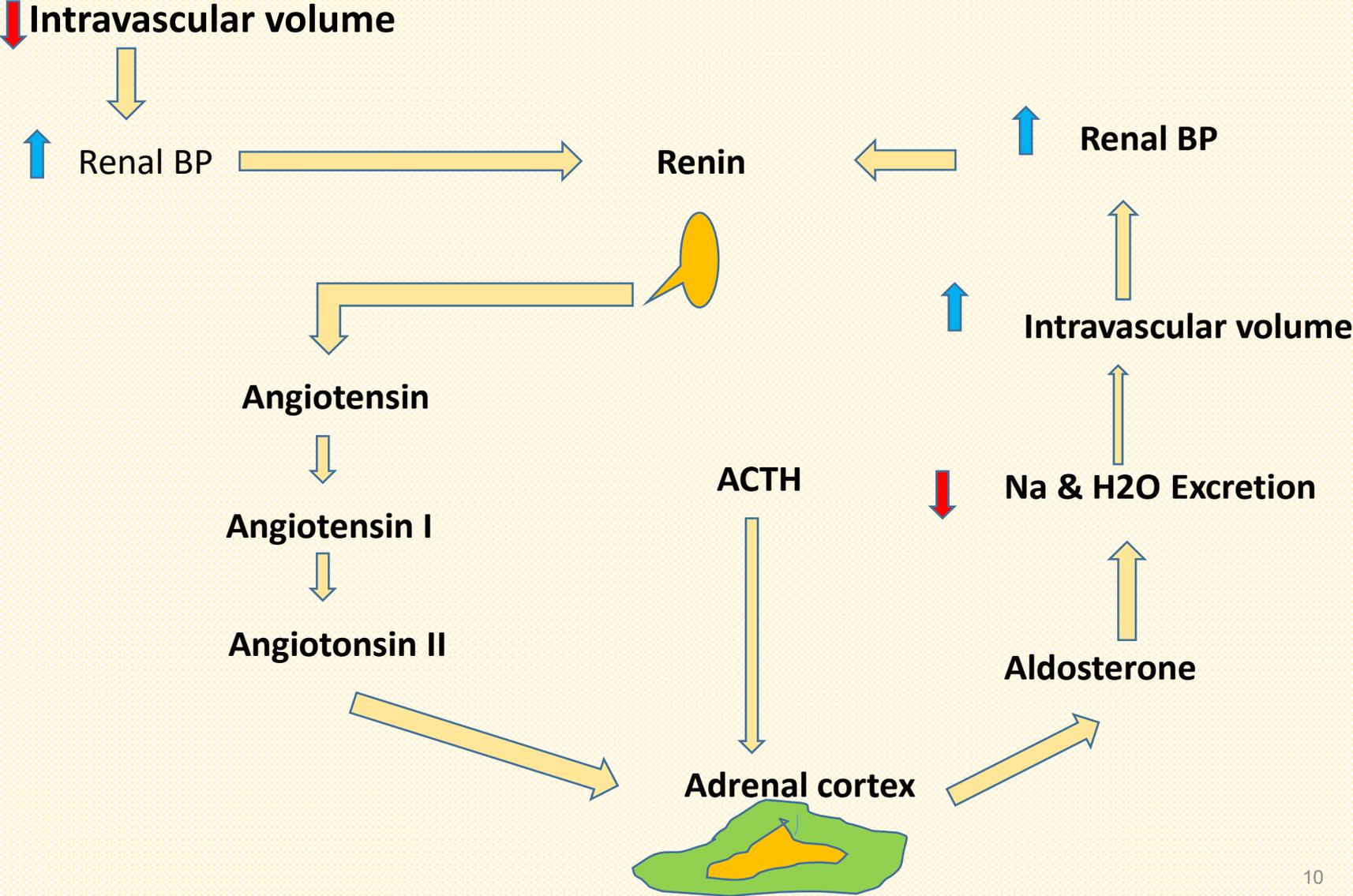
Action of cortisol



Action of insulin



# Regulation of aldosterone secretion



**Table 10.4 Hormones of the Adrenal Glands**

<b>Hormone</b>	<b>Control</b>	<b>Action</b>	<b>Disorders</b>
<b>Adrenal Medulla</b>			
Epinephrine and norepinephrine	Sympathetic division of the autonomic nervous system	Prepares body to meet emergencies; increases heart rate, cardiac output, blood pressure, and metabolic rate; increases blood sugar by converting glycogen to glucose; dilates respiratory passages	Hypersecretion causes prolonged responses. Hyposecretion causes no major disorders.
<b>Adrenal Cortex</b>			
Aldosterone	Blood electrolyte levels	Increases blood levels of sodium and water; decreases blood levels of potassium	Hypersecretion inhibits neural and muscular activity, and also causes edema.
Cortisol	ACTH from anterior pituitary	Promotes normal metabolism; provides resistance to stress and inhibits inflammation; promotes formation of glucose from non-carbohydrate sources	Hyposecretion causes Addison's disease. Hypersecretion causes Cushing's syndrome.
Adrenal sex hormones		Effects are insignificant in normal adult males; contribute to the sex drive in females.	Hypersecretion as a result of tumors causes masculinization in females.

# Disorders

## 1- Cushing's syndrome :

Results from hypersecretion by the adrenal cortex. It may be caused by an adrenal tumor or by excessive production of ACTH by the anterior pituitary gland. This syndrome is characterized by:

- 1- high blood pressure,
- 2-an abnormally high blood glucose level,
- 3-protein loss,
- 4-osteoporosis,
- 5-fat accumulation on the trunk,
- 6-fatigue,
- 7-edema,
- 8-decreased immunity.
- 9- A person with this condition tends to have a full, round face(moon face).



**Fig. 17-31** Cushing's syndrome. The rounded facial features ("moon facies") of this patient are due to the abnormal deposition of fat, which is induced by excess corticosteroid hormone. (Courtesy of Dr. George Blozis.)

# Disorders

## 2- Addison's disease:

Results from a severe hyPOSECRETION by the adrenal cortex. It is characterized by :

- 1-low blood pressure,
- 2-low blood glucose and sodium levels,
- 3-an increase in the blood potassium level,
- 4-dehydration,
- 5-muscle weakness,
- 6-increased skin pigmentation.

**Without treatment to control blood electrolytes, death may occur in a few days.**



**Fig. 17-32** Addison's disease. Diffuse pigmentation of the floor of the mouth and ventral tongue in a patient with Addison's disease. (Courtesy of Dr. George Blozis.)



**Fig. 31.6 Addison's disease.** A close-up shows the characteristic distribution of pigment rather patchily along the attached gingivae. It is a brownish-black in colour.



**Fig. 31.7** Addison's disease. Deep pigmentation of the buccal mucosa.

## Laboratory tests

- 1- Basal plasma ACTH & cortisol.**
- 2- 24 hour urine excretion of 17- hydroxycorticosteroids (17-OHCS).**
- 3- Normal cortisol concentration in blood.**
- 4-HPA axis stimulating tests (ACTH &CRH).**

## MEDICAL MANAGMENT

***Patient with Addisons disease*** is treated by replacement of clinically significant hormones that are lacking. Normal range are hydrocorticoid replacement is accomplished with 12.5-50 mg daily. So patient treated by:

- Cortisol 30 mg daily, or Prednisone 7.5 mg daily.**
- Fludrocortisone 0.05-0.1 mg daily to replace mineralocorticoid.**
- Patients are also encouraged to ingest adequate sodium.**

# Signs and symptoms of adrenal crisis

1. weak pulse,
2. hypotension,
3. Hypoglycemia
4. dyspnea,
5. myalgia,
6. arthralgia
7. fever are present.

**Patient with adrenal crisis** (acute adrenal insufficiency)

requires immediate treatment- including injection of a **glucocorticoid and fluid and electrolyte replacement and hypertonic glucose**. In addition, resolution of the condition that precipitated the crisis is required.

# Causes of Adrenal Insufficiency

## ➤ **Primary Adrenal Insufficiency**

The primary medical needs of the Addisonian patient are

- (1) adrenal disease (e.g., elimination of the infectious agent or malignant disease),
- (2) hormonal replacement therapy.

## ➤ **Secondary Adrenal Insufficiency** may result from:

1. destructive hypothalamic-pituitary disorders
2. long-term steroid use.

# Cortisone and Surgery

**adults secrete :**

- ✓ **75 to 150 mg a day in response to major surgery**
- ✓ **50 mg a day during minor procedures.**
- ✓ **Cortisol secretion in the first 24 hours after surgery rarely exceeds 200 mg**

## When supplemental steroids needed?

**The newer recommendations, as described by Salem and colleagues base the need for glucocorticoid replacement on three factors:**

- (1) the duration and severity of surgery and level of pain control,**
- (2) the amount of cortisol produced during the physiologic response to surgical stress,**
- (3) The patient who takes daily steroids.**

# DENAL MANAGEMENT

1- Routine dental procedures and extraction or surgery)

## **1. Patient past history of systemic corticosteroid use**

- A. Evaluate the patient.**
- B. Determine whether systemic corticosteroid was taken within the past 2 weeks and the reason for discontinuing usage.**
- C. Determine type, dose, and duration of systemic corticosteroid used.**
- D. no additional supplementation required; be sure to obtain good local anesthesia and good postoperative pain control and monitor blood pressure during treatment.**

# DENTAL MANAGEMENT

## 2- Routine dental procedures (**EXCLUDING** extraction and surgery)

### **2. Patient currently taking systemic corticosteroids**

- a. Evaluate the patient.
- b. Determine dose and duration of systemic corticosteroid used.
- c. Identify signs and symptoms of possible adrenal insufficiency.
- d. For diagnostic and minimally invasive procedures, have patient take the usual daily dose, and perform oral procedure in the morning, shortly after the corticosteroid is taken.
- e. Stress reduction measures should be implemented, blood pressure recorded during the procedure.

# DENAL MANAGEMENT

3- For dental extractions and surgery, extensive procedures, or extreme patient anxiety:

## **2. Patient currently taking systemic corticosteroids**

- a. Evaluate the patient.
- b. Determine dose and duration of systemic corticosteroid used.
- c. Identify signs and symptoms of possible adrenal insufficiency.
- d. For diagnostic and minimally invasive procedures, have patient take the double daily dose, and perform oral procedure in the morning, shortly after the corticosteroid is taken.
- e. Stress reduction measures should be implemented, blood pressure recorded during the procedure. Additional steroid given postoperative if severe pain is suspected postoperative.

# How you deal with adrenal crisis in dental clinic

- **Monitoring of blood pressure throughout the procedure is critical for recognition of the development of an adrenal crisis.**
- **During surgery, blood pressure should be evaluated at 5-minute intervals and before the patient leaves the office.**
- **A systolic blood pressure below 100 mm Hg or a diastolic pressure at or below 60 mm Hg represents hypotension. The diagnosis of hypotension dictates that the clinician must take corrective action.**
- **This would include proper patient positioning (i.e., head lower than feet), fluid replacement,**
- **evaluation for signs of adrenal dysfunction versus hypoglycemia.**
- **Immediate treatment during an adrenal crisis consists of the administration of 100 mg of hydrocortisone or 4 mg dexamethasone IV and immediate transportation to a medical facility.**

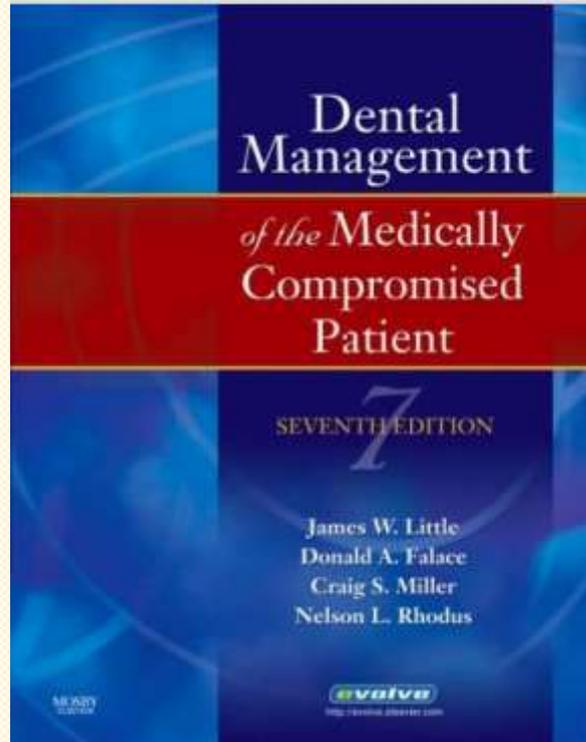
## Steroid supplementation protocol for major surgical procedure

- **Discontinue drugs that decrease cortisol levels (e.g., ketoconazole) at least 24 hours before surgery with the consent of the patient's physician.**
- **Have patient take usual morning dose (or the parenteral equivalent as a preoperative dose), and provide supplemental hydrocortisone preoperatively and intraoperatively to achieve 100 mg within first hour of surgery. Give hydrocortisone 25 mg every 8 hours subsequent to surgery for 24 to 48 hours. Perform in hospital environment.**
- **Provide adequate operative and postoperative analgesia.**

## Steroid supplementation protocol for major surgical procedure

- **Use barbiturates with caution and knowledge of the potential for adverse effects on plasma cortisol levels.**
- **Monitor blood pressure (BP) and blood loss throughout the procedure. If BP drops to below 100/60 mm Hg and the patient is unresponsive to fluid replacement and vasopressive measures, administer supplemental steroids.**
- **Communicate with the patient at the end of the appointment and within 4 hours postoperatively to determine whether Signs and symptoms of adrenal crisis dictate transport to a hospital for emergency care.**
- **Surgery should be scheduled in the morning when cortisol levels are highest. Nitrous oxide–oxygen inhalation and benzodiazepine sedation are helpful in minimizing stress and reducing cortisol demand..**

# References



THANK YOU