

# ADRENAL CORTEX

rvsd 2/24/94, rvsd 2/23/95, 2/27/96, 2/27/97, 2/26/98, 24 Feb 00, 28Feb05, 3 March 08, 2Mar09, 8Mar10  
 Marieb p 559-, Martini's 4<sup>th</sup>: 614-618, Martini's 6<sup>th</sup>: 627-630, 7<sup>th</sup>: 613-616, 8<sup>th</sup>:

Also known as suprarenal glands, about level of 12<sup>th</sup> rib, upon kidneys, retroperitoneal.

**Medulla** derived from neural crest cells, **cortex** from mesodermal cells

**CORTEX:** (p 628) Produces more than 2 dozen corticosteroids, stress response hormones made from cholesterol (or acetate if low on cholesterol) lipid rich organ = yellow  
 alter transcription in nucleus which affects enzyme levels, which alters metabolism  
 Three layers of cortex:

<b>zona glomerulosa</b>	<b>mineral corticoids</b>
<b>zona fasciculata</b>	<b>glucocorticoids</b>
<b>zona reticulata</b>	<b>androgens</b>

**MINERALCORTICOIDS:** regulates electrolyte balance: (p 636, 743)

**Aldosterone** most imp (95% of total), reg Na<sup>+</sup> bal, conserve Na<sup>+</sup>, excrete K<sup>+</sup>

Mech: **stim Na<sup>+</sup> resorption in kidney distal convoluted tubules**, therefore water is retained, ADH potentiates the effect stimulates salt taste buds, increasing consumption of salt release is stimulated by high K<sup>+</sup>, low Na<sup>+</sup>, low blood vol, hypotension

**REGULATION, EFFECTS OF ALDOSTERONE:** (p. 636, 743, 982)

<b>renin</b>	<b>juxtaglomerular complex</b> in kidney: release due to hypotension, low Na <sup>+</sup>
<b>angiotensinogen</b>	(synthesized by liver) cleaved, activated by <b>renin</b> , becomes <b>angiotensin</b>
<b>angiotensin I</b>	converted to angiotensin II in lung capillaries (angiotensin converting enzyme = ACE. Note ACE inhibitors)
<b>angiotensin II</b>	1) stimulates adrenal cortex to release aldosterone 2) increases secretion of <b>ADH</b> by Posterior Pituitary 3) Increases thirst 4) stimulates cardiac output, constricts arterioles: <b>elevates BP.</b>
<b>aldosterone</b>	stimulates Na <sup>+</sup> retention in the kidney (activates Na <sup>+</sup> /K <sup>+</sup> pump)
<b>excess aldosterone</b>	leads to hypokalemia, cardiac arrhythmia, weak contractions

**GLUCOCORTICOIDS** **response to stress, raises blood glucose** by:

1. decrease cellular uptake of blood glucose
2. decrease amino acid incorporation into muscle
3. gluconeogenesis (break down protein to AA, deaminate, fabricate glucose)
4. mobilization of fatty acids from hips and thighs to abdomen and jowls (camel hump)
5. Inhibit inflammation, immune response

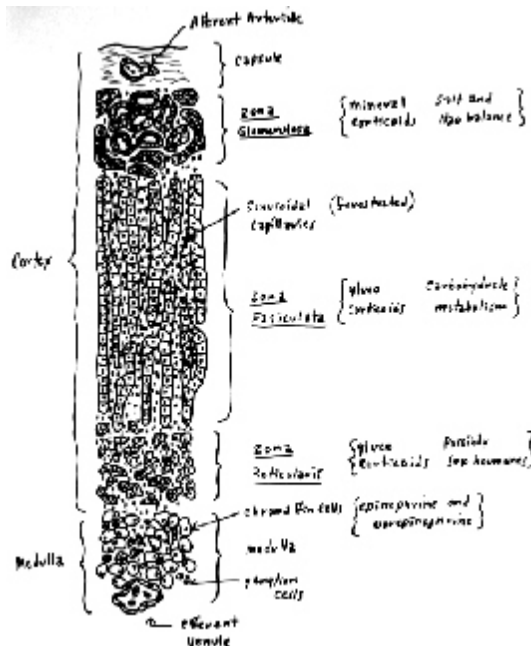
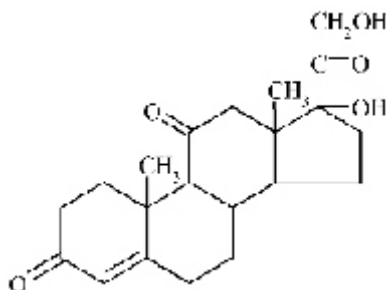
**ANDROGENS** (anabolic steroids) (only 7 % of corticosteroids secreted) fenestrated blood vessels  
 excess ACTH, high BP, xs blood salt, edema, loss of sexual function  
 some converted to estrogens in the blood stream (normal amounts do not affect sex characteristics)

**Cortisone (prednisone) side-effects:**

(NOTE THAT THESE ARE A SUMMARY OF ALL THE ABOVE)

- ↑ blood glucose (steroid diabetes)
- ↓ wound healing, peptic ulcers
- ↑ susceptibility to infections
- muscle wasting, osteoporosis
- negative nitrogen balance
- redistribution of fat
- ↓ ACTH, atrophy of adrenal cortex
- hirsutism
- retention of water, Na<sup>+</sup>
- hypertension, congestive heart failure
- ↑ intraocular pressure glaucoma
- convulsions (fr hypokalemia)
- suppress growth in children

Cortisone:



**Renin-angiotensin system:**

