

Pharmacology

Drugs that Affect the
Endocrine System

Topics

- Pituitary Drugs
- Parathyroid/Thyroid Drugs
- Adrenal Drugs
- Pancreatic Drugs
- Reproductive Drugs
- Sexual Behavior Drugs

Functions

- Regulation
- Control

Glands

Exocrine

- Secrete enzymes
- Close to organs

Endocrine

- Secrete hormones
- Transport via bloodstream
- Require receptors

Nervous

Wired

Neurotransmitters

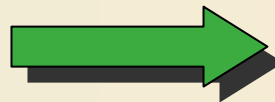
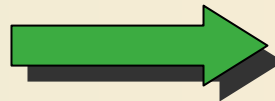
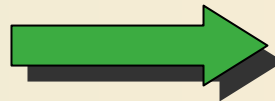
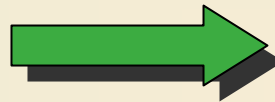
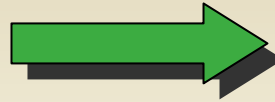
Short Distance

Closeness

Rapid Onset

Short Duration

Rapid Response



Endocrine

Wireless

Hormones

Long Distance

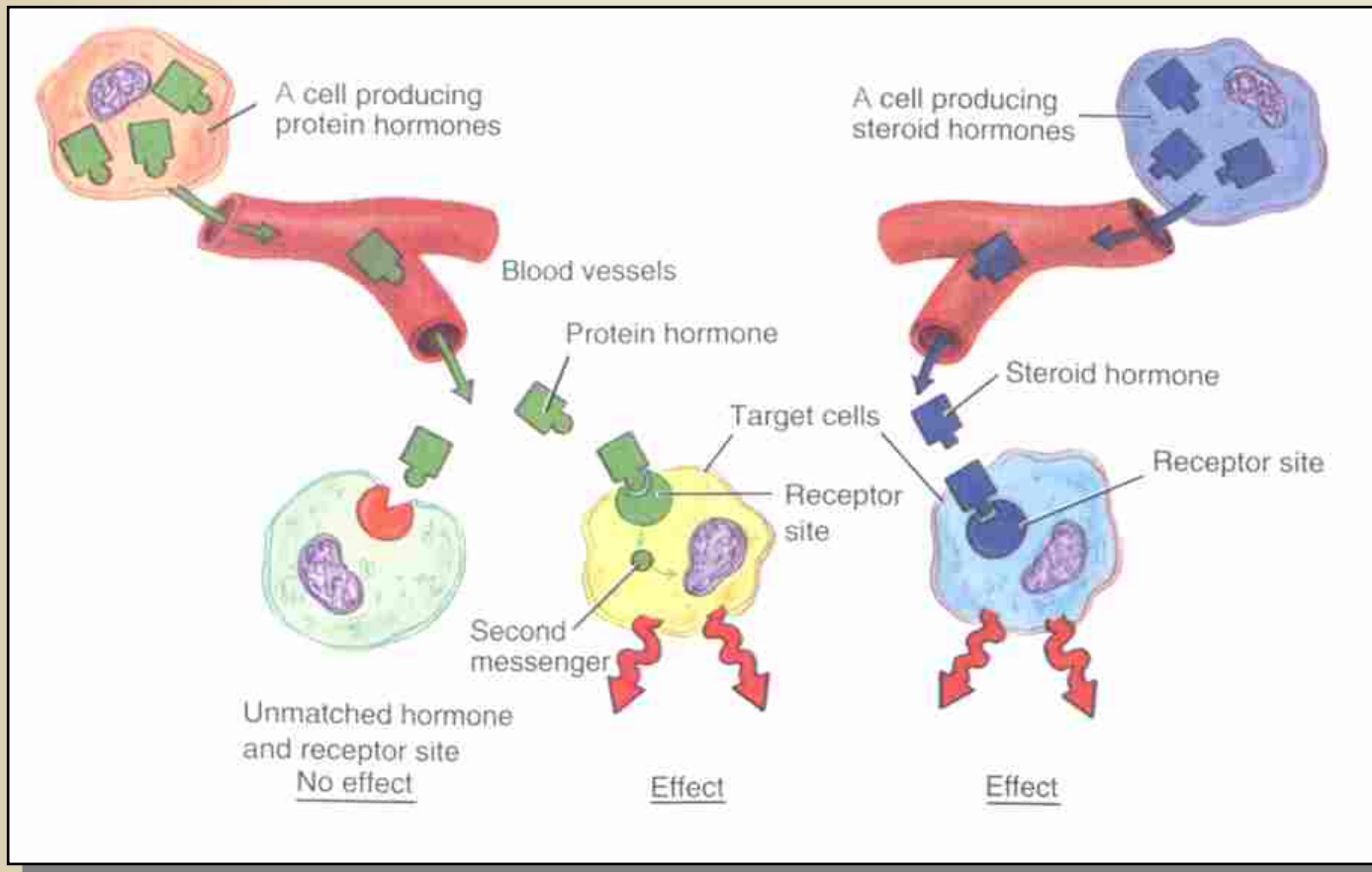
Receptor Specificity

Delayed Onset

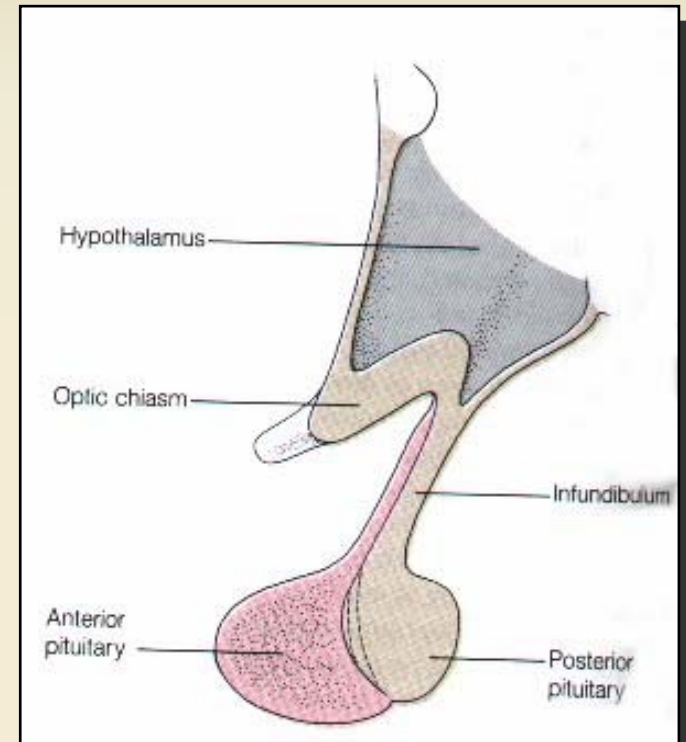
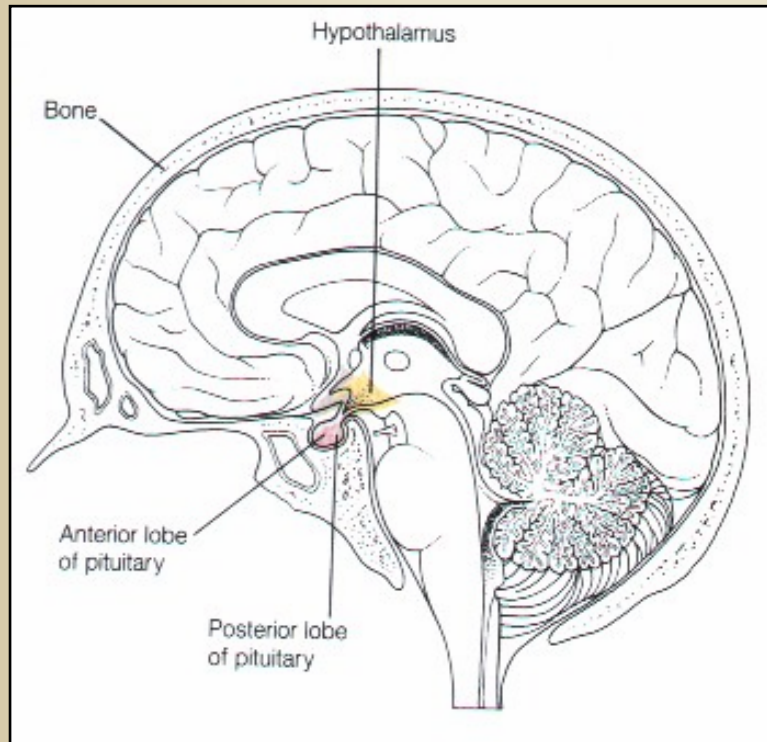
Prolonged Duration

Regulation

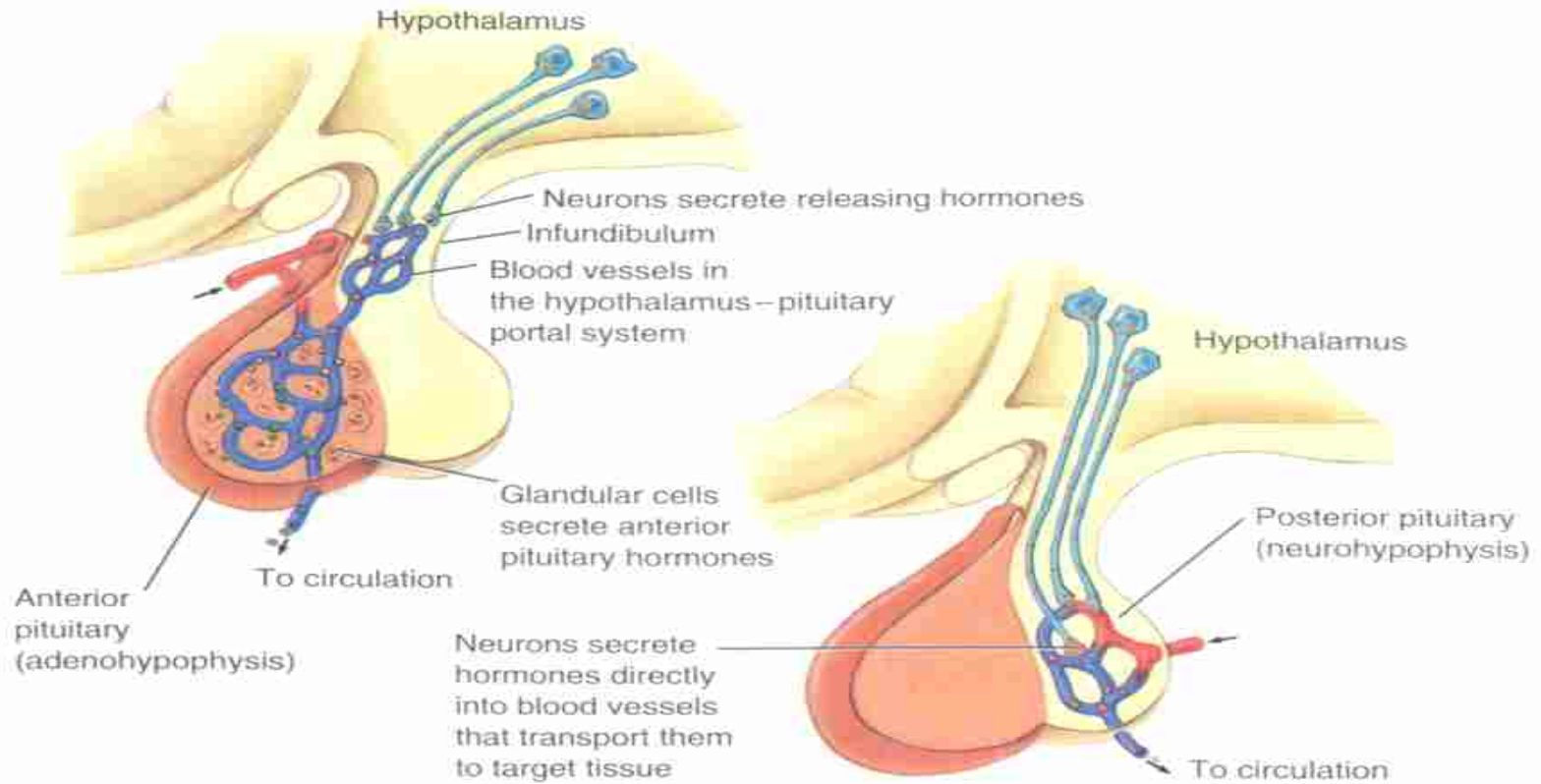
Mechanism of Action



Hypothalamus



Hypothalamic Control Pituitary



Posterior Pituitary

	Target	Actions
Oxytocin	Uterus Mammary	↑ Contraction ↑ Milk let-down
ADH	Kidneys	↑ Water reabsorption

Anterior Pituitary

	Target	Action
GH	Most tissue	↑ Growth
TSH	Thyroid	↑ TH secretion
ACTH	Adrenal Cortex	↑ Cortisol secretion

Anterior Pituitary

	Target	Action
FSH	Ovaries Testes	Follicles Estrogen Sperm
LH	Ovaries Testes	Ovulation Progesterone Testosterone

Anterior Pituitary

Target

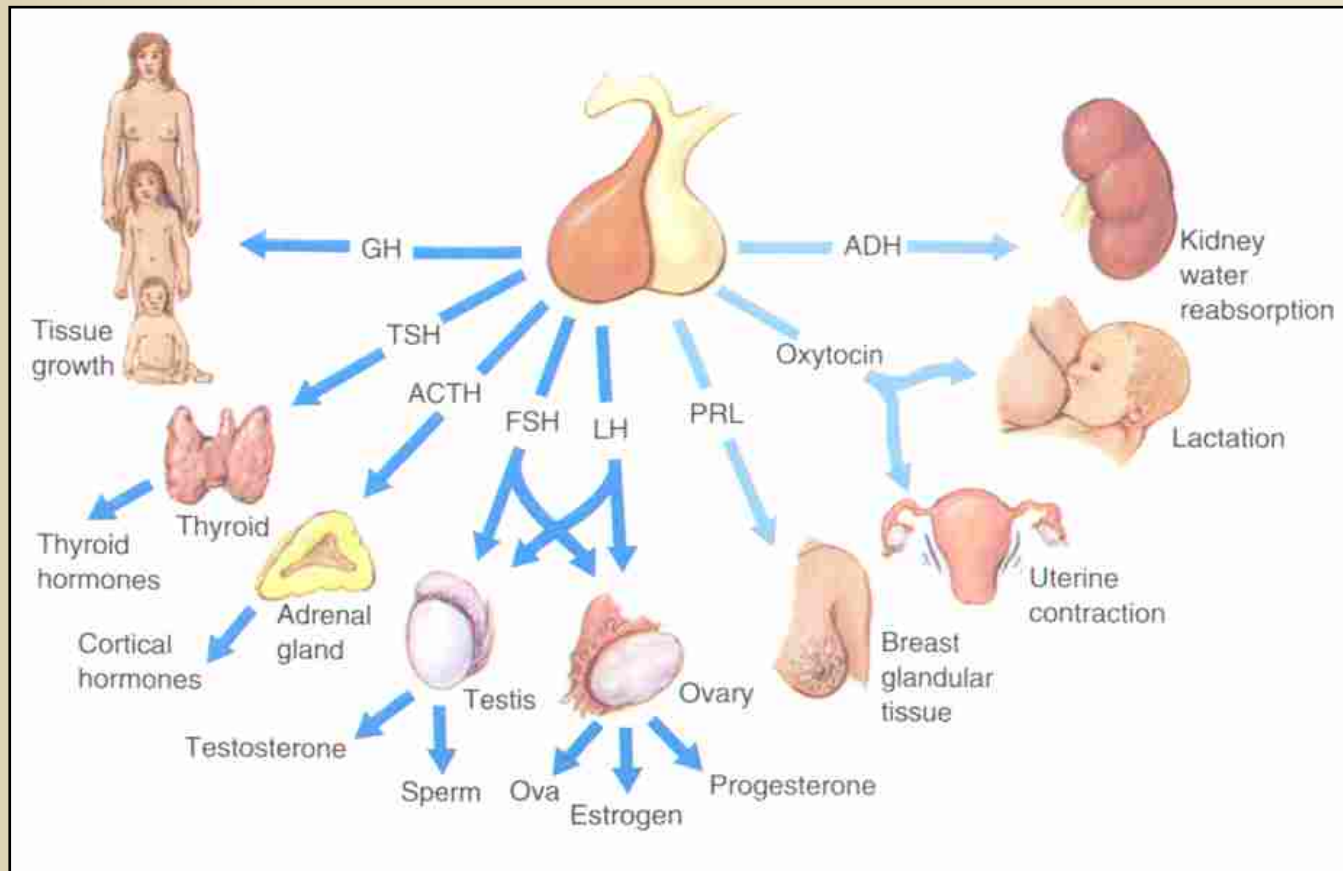
Action

Prolactin

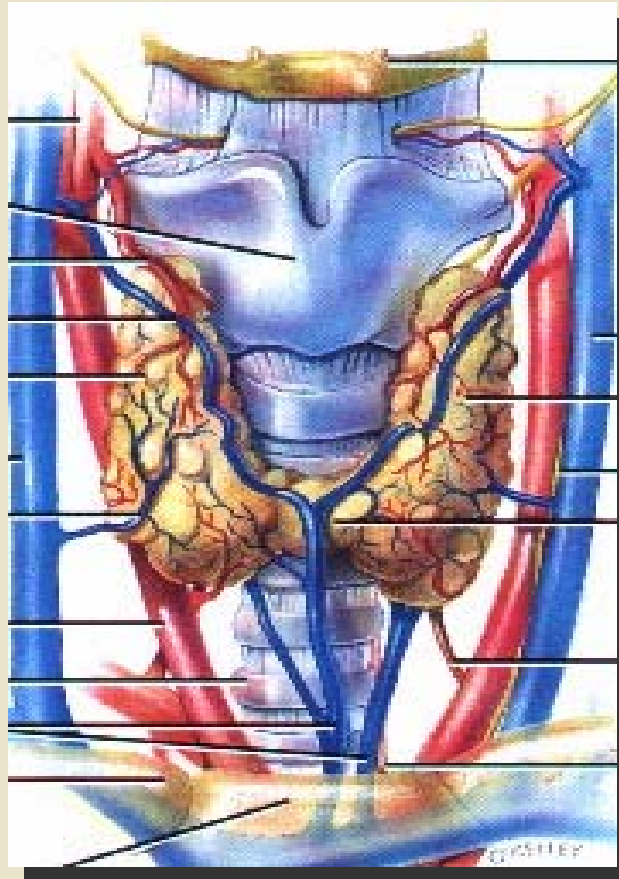
Mammary
Gland

Milk
production

Pituitary Hormones



Thyroid



Thyroid

	Target	Action
Thyroxine Triiodothyronine	Most cells	↑ BMR
Calcitonin	Mostly bone	↓ Calcium

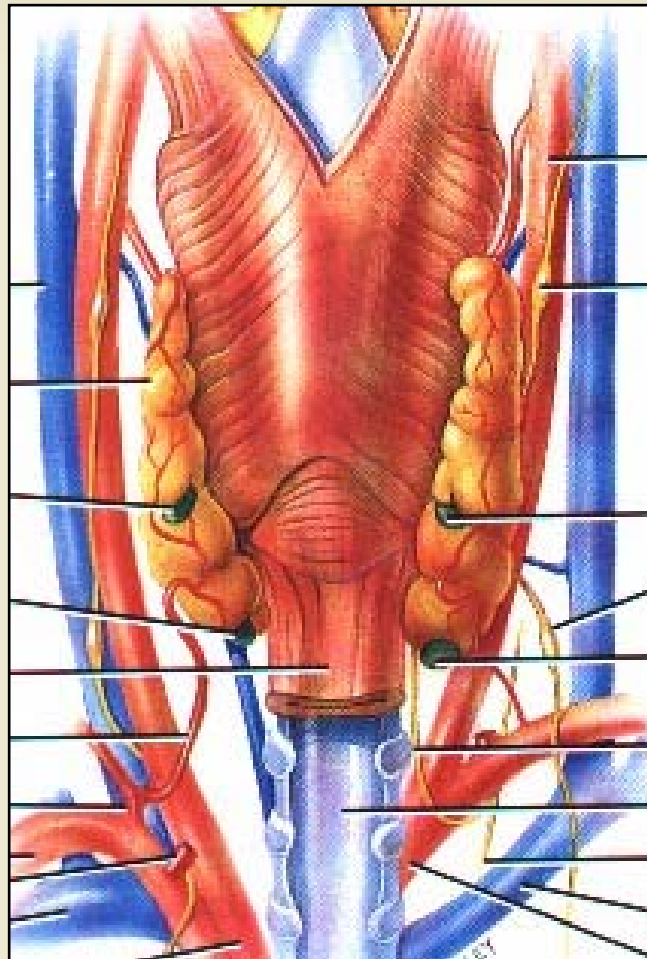
Hypothyroidism



Hyperthyroidism



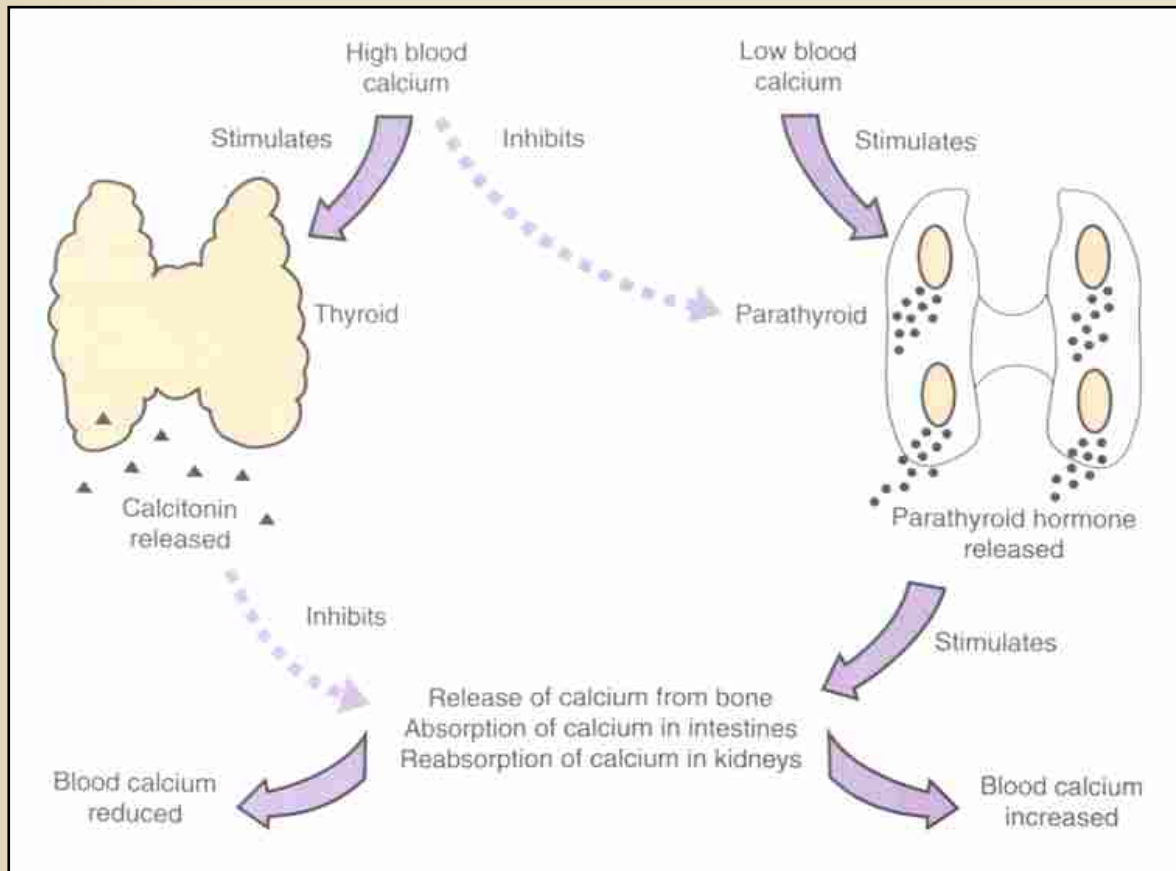
Parathyroid



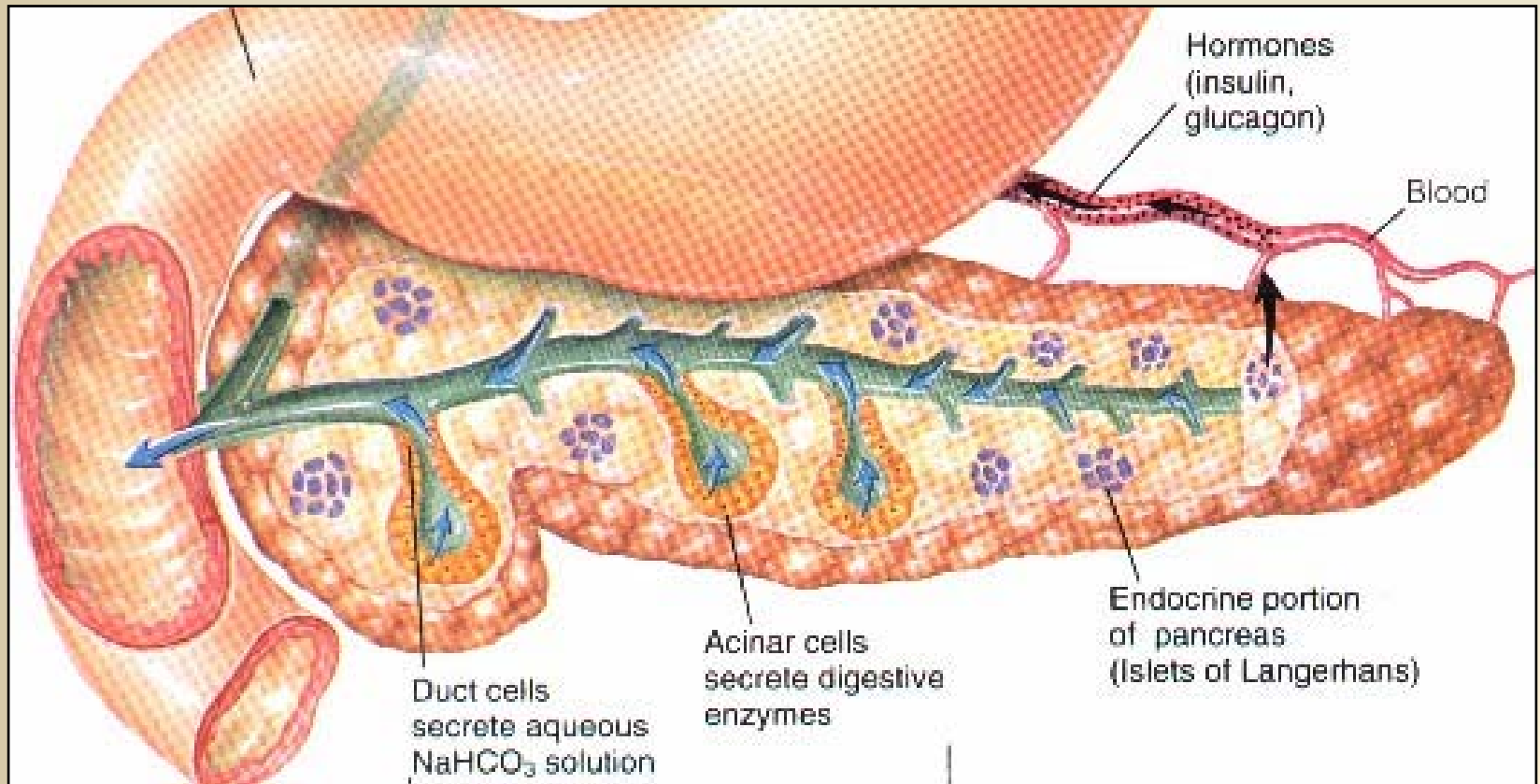
Parathyroid

	Target	Action
Parathyroid (PTH)	Bone Kidney GI Tract	↑ Calcium

Calcium Regulation



Pancreas



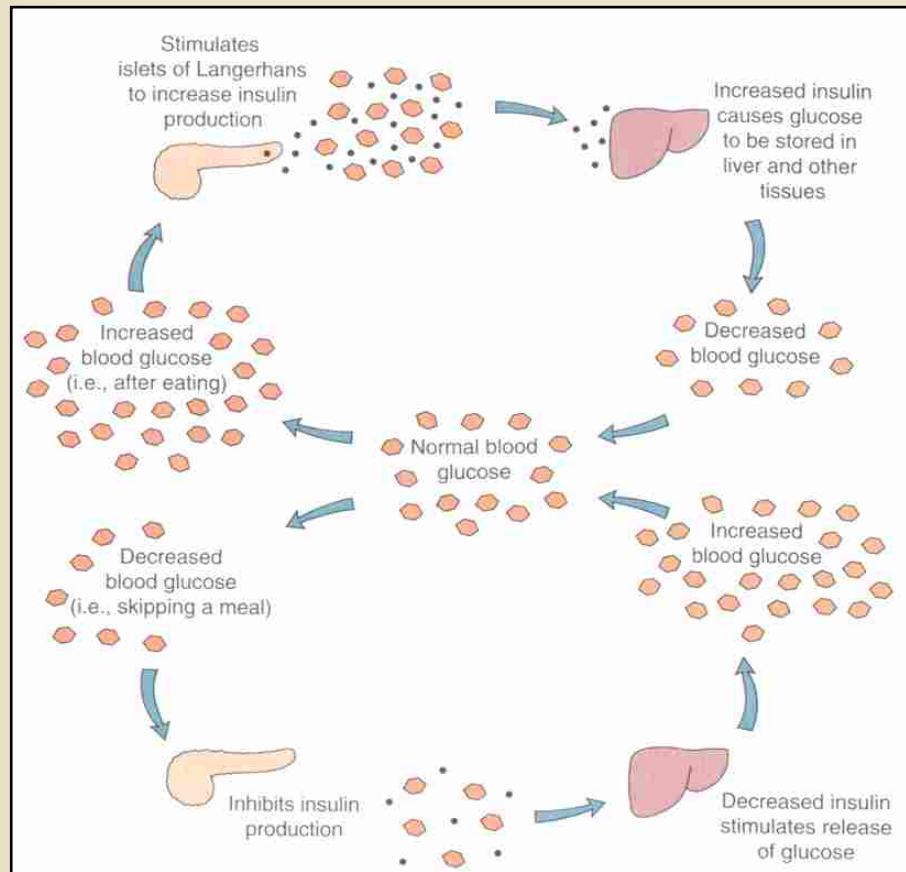
Pancreas

- Alpha cells: glucagon
- Beta cells: insulin

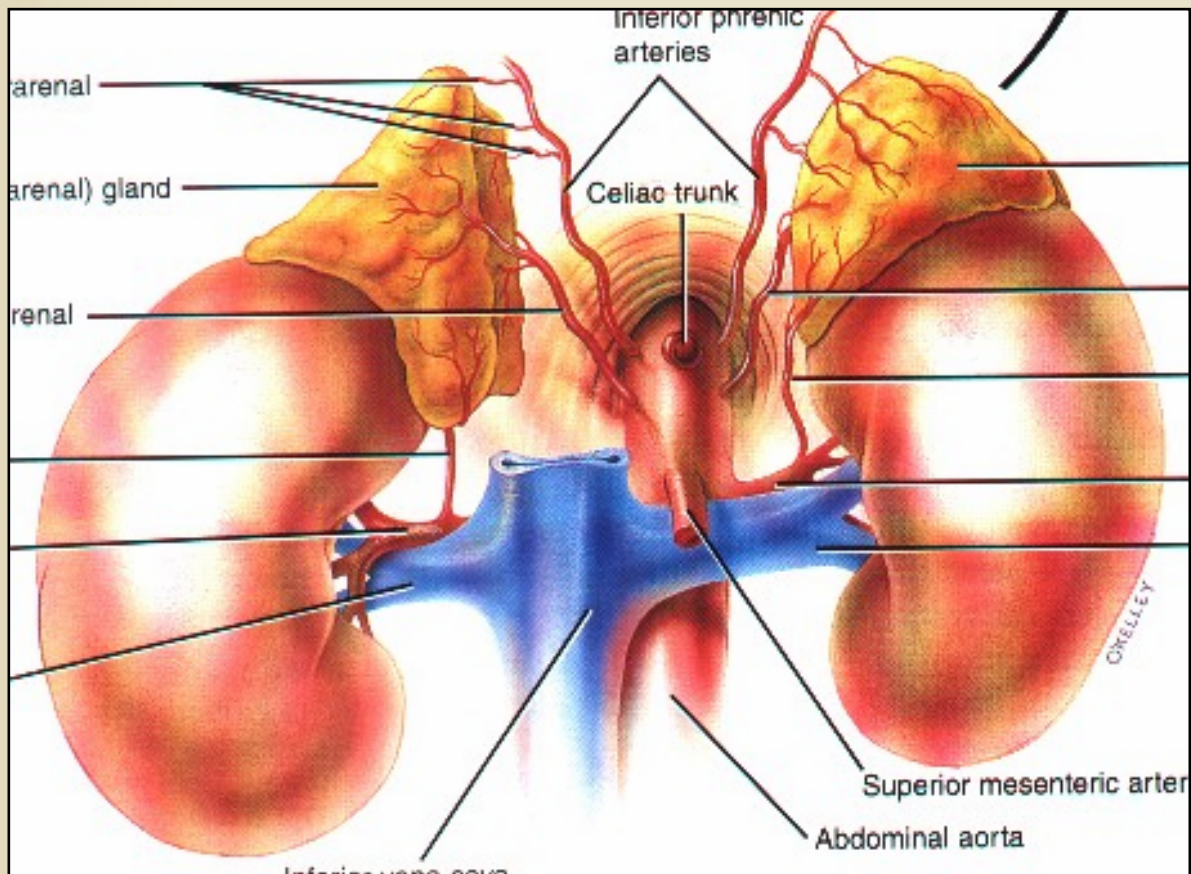
Pancreas

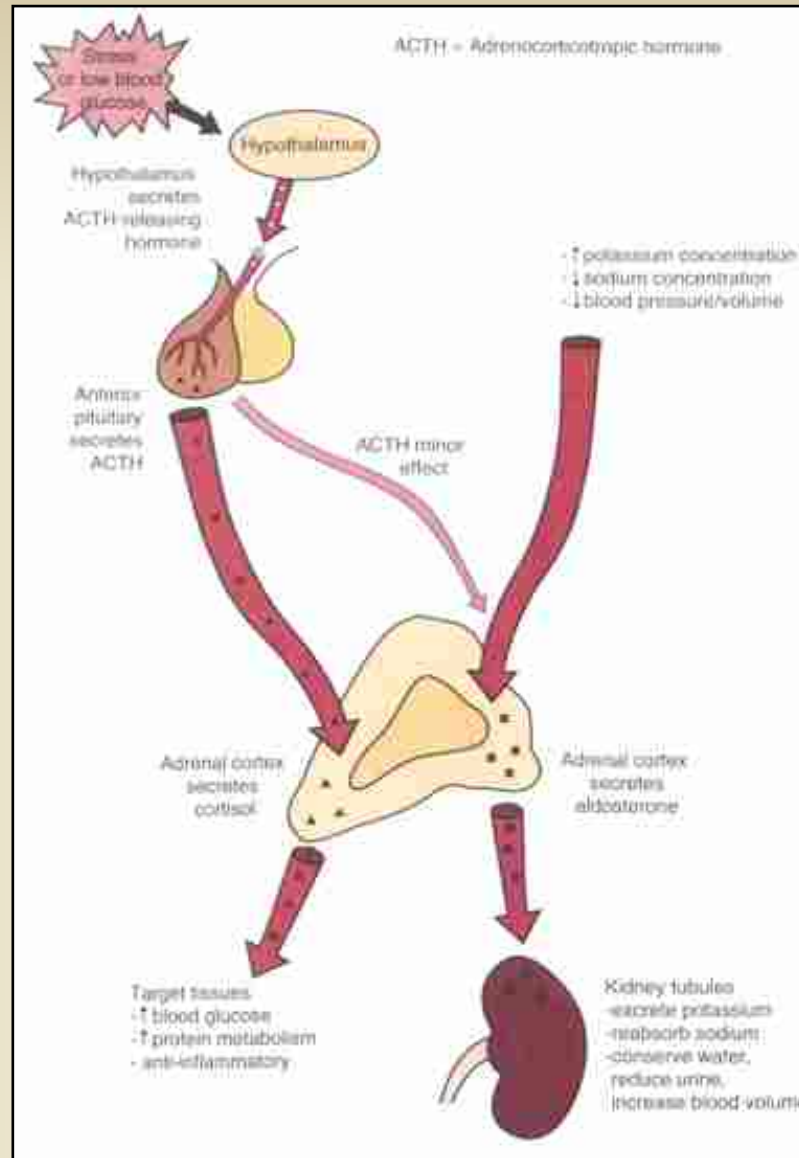
	Target	Action
Glucagon	Liver	↑ Glucose
Insulin	General	↓ Glucose

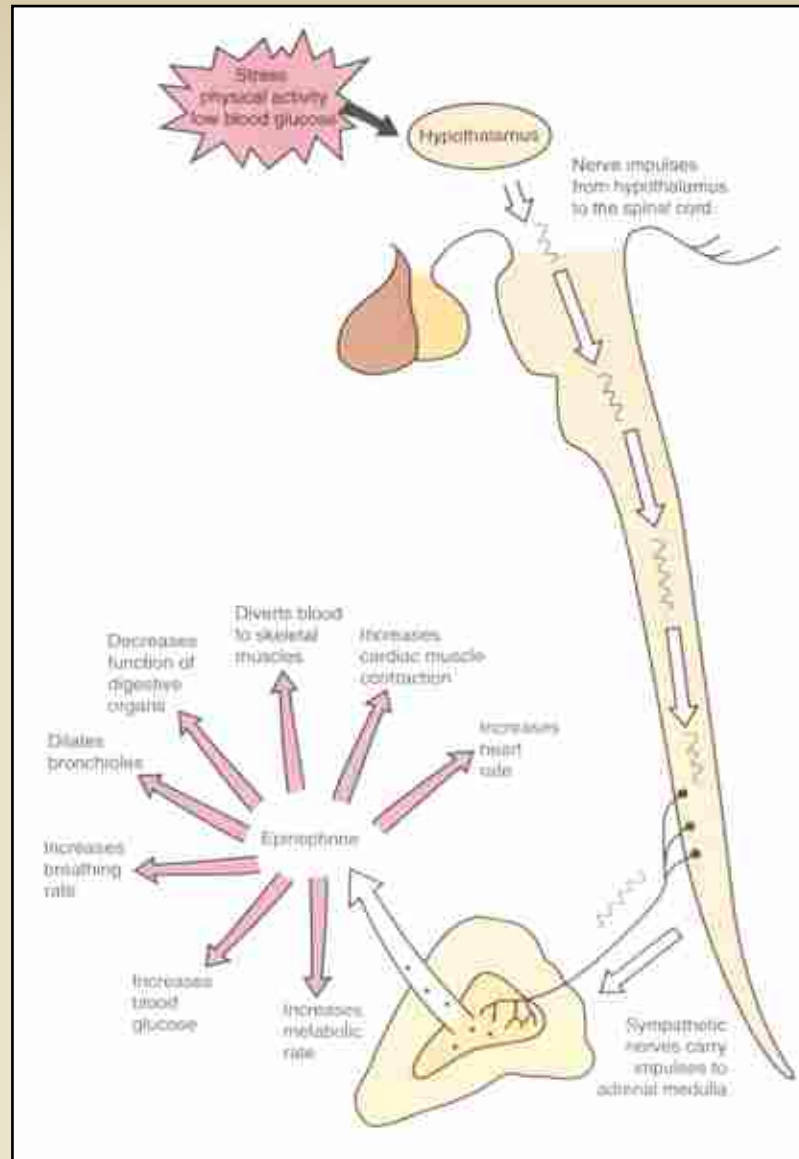
Glucose Regulation



Adrenal







Adrenal Medulla

	Target	Action
Norepi Epi	Heart Blood vessels Liver	Prolongs SNS Effects

Adrenal Cortex

	Target	Action
Aldosterone	Kidney	↑ Na reabsorption ↑ Water retention
Cortisol	Most Tissue	↑ Glucose ↓ inflammation

Anterior Pituitary Drugs

Inadequate Growth Hormone

- Dwarfism
- somatrem (Protropin[®])
- homatropin
(Humatrope[®])

Excessive Growth Hormone

- Acromegaly
- Gigantism
- Surgical removal 1^o
- octreotide
(Sandostatin[®])

Posterior Pituitary Drugs

- Oxytocin
- ADH
 - Diabetes insipidus
 - Nocturnal enuresis
- vasopressin (Pitressin[®])
- desmopressin (Stimate[®])
- lypressin (Diapid[®])

Parathyroid Diseases

- Hypoparathyroidism
 - Inadequate calcium levels
 - TX: increased dietary calcium
- Hyperparathyroidism
 - Excessive calcium levels
 - TX: surgical removal

Thyroid Disease

- Hypothyroidism
 - Hormone replacement
 - levothyroxine (Synthroid®)
- Hyperthyroidism
 - Thyrotoxicosis
 - Surgical removal
 - propylthiouracil (PTU)

Adrenal Cortex

ACTH Hypersecretion

Cushing's Disease

- Surgical removal
- Inhibit adrenal secretion
 - ketoconazol (Nizoral[®])
- Symptomatic tx:
 - Antihypertensives

ACTH Hyposecretion

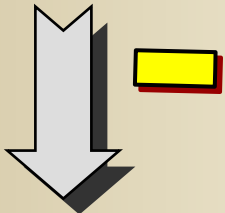
Addison's Disease

- Replacement therapy
- Cortisone (Cortistan[®])
- Hydrocortisone (SoluCortef[®])
- Fludrocortisone (Florinef Acetate[®])

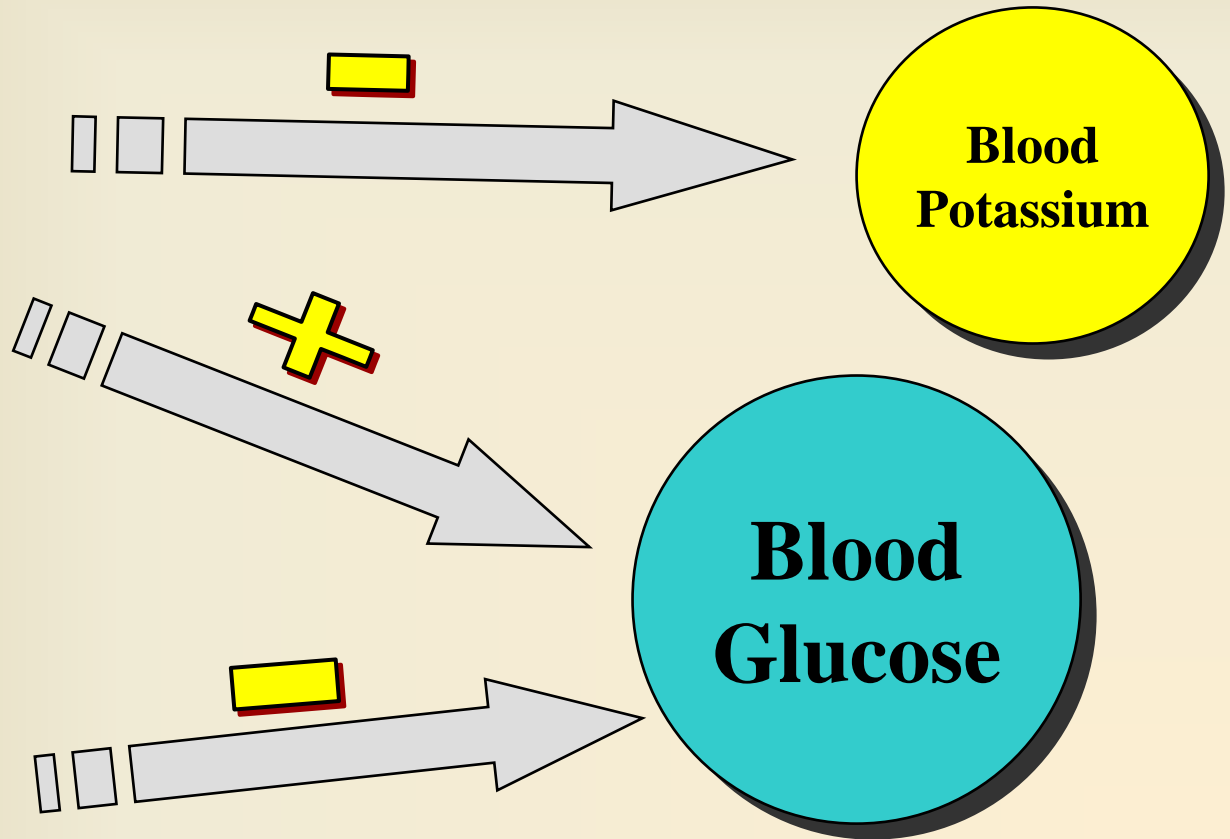
Pancreas

Insulin

Beta Blockers



Glucagon



Insulin Preparations

- Regular Insulin
 - Natural insulin
- Modified Insulin
 - Increased duration of action
 - NPH (neutral protamin Hagedorn)
 - Natural plus protamin
 - Lente
 - Attached to zinc to prolong absorption

Oral Hypoglycemic Agents

Sulfonylureas

↑↑ insulin secretion

tolbutamide (Orinase[®])

chlorpropamide (Diabinese[®])

glipizide (Glucotrol[®])

glyburide (Micronase[®])

Alpha-glucosidase inhibitors

- Delay carbohydrate metabolism

acarbose (Precose[®])

miglitol (Glyset[®])

Biguanides

metformin (Glucophage[®])

↓ Glucose synthesis

↑ Glucose uptake

Thiazolidinediones

↑↑ Insulin effectiveness

troglitazone (Rezulin[®])

Hyperglycemic Agents

- Glucagon
 - ↑ gluconeogenesis
- D₅₀W

- diazoxide
(Proglycem®)
 - Inhibits insulin release

Estrogens & Progestins

- Estrogens used for post-menopausal hormone replacement therapy.
 - estradiol (Estrace[®])
 - conjugated estrogens (Premarin[®])
 - estropipate (Ogen[®])

- Progestin
 - Diminish side effects of estrogen therapy
 - Nausea, fluid retention, breast tenderness
 - medroxyprogesterone acetate (Provera[®])
 - norethindrone acetate (Aygestin[®])

Oral Contraceptives

- Combination of estrogen and progestin
 - Loestrin[®], Levora[®], Nordette[®], Ovocon[®], Norinyl[®] plus many others
- Minipill: progestin only
 - Micronor[®], Nor-Q.D.[®], Orvette[®]
- Prime side effect: ↑↑ risk of thromboembolism

Uterine Stimulants & Relaxants

- Stimulants (*Oxytocics*)
- ↑↑ uterine contraction
- Indication:
 - Induce labor
 - Postpartum hemorrhage
- oxytocin (Pitocin[®])
- ergonovine (Ergotrate[®])

- Relaxants (*tocolytics*)
- Relax uterine smooth muscle
- Beta₂ agonists
 - terbutaline (Brethine[®])
 - ritodrine (Yuptopar[®])

Infertility Agents

- Promote maturation of ovarian follicles
- clomiphene (Clomid[®])
- urofollitropin (Metrodin[®])

Male Reproductive Agents

- Testosterone Replacement
 - methyltestosterone (Metandren[®])
 - fluoxymesterone (Halotestin[®])
- Benign Prostatic Hypertrophy
 - Surgery
 - finasteride (Proscar[®])

Sexual Behavior

- Most are side effects from other medications
 - Antihypertensives & psychoactive drugs
- sildenafil (Viagra[®])

Thank You!

- To Temple College EMS Professions for permission to use their materials

