Chapter 9

Endocrine System
Pituitary Gland - Pituitarism

- Any disorder of the pituitary gland and its functions
Pituitary Gland - Panhypopituitarism

- Total pituitary impairment that brings about a progressive and general loss of hormonal activity.
- Pituitary hormones control function of the adrenal and thyroid glands, the testes and ovaries.
Thyroid - Exophthalmos

- Abnormal protrusion of eyeball.
Thyroid - Graves’ Disease

- Hyperthyroidism (toxic goiter)
- Involves overactivity of the thyroid with hypersecretion of thyroxine (thyroid hormone).
- Characterized by exophthalmos.
Thyroid - Myxedema

- Advanced hypothyroidism in adults.

- This disorder affects body fluids. It causes edema and increased blood volume, thereby increasing blood pressure.
Radioactive Iodine Uptake

- Radioactive iodine is injected to determine thyroid function. The thyroid’s ability to take up iodine from the blood is monitored.
Pancreas - Insulinoma

- Tumor of the Islet of Langerhans cells of the pancreas

- The insulinoma secretes insulin, leading to low blood sugar (hypoglycemia).
Pancreas - Diabetes Mellitus

- **Type 1 diabetes**: Abrupt onset in children and young adults due to failure of pancreas’ islet cells to produce insulin.

- **Type 2 diabetes**: Gradual onset usually seen in patients over age 40. Insulin is produced, but the body’s cells become insulin-resistant.
Morbid Obesity

- Body mass index (BMI) of 40 or greater, which is generally 100 lb or more over ideal body weight.
Adrenal Gland – Addison’s Disease

- Results from a deficiency in the secretion of hormones from the adrenal cortex (adrenocortical hormones).
Adrenal Gland – Cushing Syndrome

- Hypersecretion by the adrenal cortex causes excessive production of glucocorticoids.

- Can be caused by an adrenal tumor
Adrenal Gland – Pheochromocytoma

- Chromaffin cell tumor, usually located in the adrenal medulla.

- Image: MRI scan of upper abdomen with a right adrenal mass.

*Figure 2 – MRI showing large adrenal mass - hypersignal in T2.*
Hormone Replacement Therapy

- Use of synthetic hormones to compensate for hormone deficiencies.
Endocrine System - Summary

**HYPOTHALAMUS**
- Production of ADH, oxytocin, and regulatory hormones

**PITUITARY GLAND**
- Anterior lobe: ACTH, TSH, GH, FRL, FSH, LH, and MSH
- Posterior lobe: Release of oxytocin and ADH

**THYROID GLAND**
- Thyroxine (T₄)
- Triiodothyronine (T₃)
- Calcitonin (CT)

**PARATHYROID GLANDS**
- (on posterior surface of thyroid gland)
- Parathyroid hormone (PTH)

**PINEAL GLAND**
- Melatonin

**HEART**
- Natriuretic peptides: ANP and BNP

**KIDNEY**
- Renin
- Erythropoietin (EPO)
- Calcitriol

**ADIPOSE TISSUE**
- Leptin
- Resistin

**DIGESTIVE TRACT**
- Numerous hormones

**ADRENAL GLANDS**
- Each adrenal gland is subdivided into:
  - Adrenal medulla: Epinephrine (E), Norepinephrine (NE)
  - Adrenal cortex: Cortisol, corticosterone, aldosterone, androgens

**PANCREATIC ISLETS**
- Insulin, glucagon

**GONADS**
- Testes (male):
  - Androgens (especially testosterone), inhibin
- Ovaries (female):
  - Estrogens, progestins, inhibin

**THYMUS**
- (Undergoes atrophy during adulthood)
- Thymosins

**Ovary**
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Chapter 9

Nervous System
Paralysis

- Loss of muscle function, loss of sensation, or both.
- May be caused by trauma (spinal cord injury) or disease (e.g. stroke).
Paraplegia

- Paralysis of the lower portion of the body and both legs.
- Sensory and motor control are lost below the level of injury.
Quadriplegia

- Paralysis of all four extremities and usually the trunk.

- Loss of function can extend to bladder, bowel, and sexual response.
Palsy

- Partial or complete loss of motor function; paralysis.
Cerebral Palsy

- Cerebral palsy: bilateral, symmetrical, nonprogressive motor dysfunction.

- Usually caused by damage to the brain during gestation or from birth trauma.
Bell Palsy

- Facial paralysis caused by damage to 7th cranial nerve.
- It may be unilateral, bilateral, transient, or permanent.
Transient Ischemic Attack

- **Temporary interference** in the blood supply to the brain.

- Lasts from a few minutes to a few hours.
Cerebrovascular Accident

- (CVA) Brain tissue damage usually caused by formation of a clot or blood leaking from a ruptured blood vessel.
- The resulting functional deficit depends on the area of the brain affected. Also called stroke, brain attack.
Seizure

- Convulsion or other clinically detectable event caused by a sudden discharge of electrical activity in the brain.

- Can be classified as partial or generalized and is a symptom of epilepsy.
Epilepsy

- Disorder affecting the central nervous system, characterized by recurrent seizures.
Epilepsy

- Epileptic seizures can sometimes be triggered by flashing lights.
Huntington Chorea

- Hereditary nervous disorder caused by the progressive loss of brain cells, leading to bizarre, involuntary, dancelike movements.
Parkinson Disease

- A progressive, degenerative neurological disorder affecting the portion of the brain responsible for controlling movement.

- Shaking movements (tremor) often interfere with voluntary movement. This is the most common symptom of Parkinson’s Disease.
Parkinson Disease

VIDEO

http://tinyurl.com/27kzzvl

Michael J. Fox and Muhammad Ali have Parkinson Disease.
Multiple Sclerosis

- A progressive degenerative, autoimmune disease of the CNS characterized by a loss of myelin throughout the spinal cord and brain.

- This produces weakness and other muscular symptoms.
Sciatica

- Severe pain in the leg along the course of the sciatic nerve.
- The sciatic nerve travels from the hip to the foot.
Alzheimer Disease

- A chronic organic mental disorder. A form of presenile dementia caused by atrophy of brain tissue.
- Onset is usually between ages of 40-60.
Nervous System

Developmental Abnormalities
Hydrocephalus

- Cranial enlargement caused by accumulation of fluid within the ventricles of the brain.
Spina Bifida

- Congenital defect - incomplete closure of the spinal canal.
- The spinal cord and meninges may or may not protrude.
- Usually occurs in the lumbosacral area.
- Prevented by the mother’s taking folic acid during pregnancy.
Spina Bifida Occulta

- Most common and least severe form of this defect without protrusion of the spinal cord or meninges.
Spina Bifida Cystica

- More severe form which involves protrusion of the meninges (meningocele), spinal cord (myelocele) or both (meningomyelocele).

Figure 3. Meningocele
Neuroblastoma

- A malignant tumor composed principally of cell resembling neuroblasts (nerve-forming cells).

- Occurs chiefly in infants and children.
Nervous System

Infectious Diseases
Shingles

- Eruption of painful, inflammatory vesicles on the trunk of the body along a peripheral nerve.

- Caused by herpes zoster (Chickenpox) virus.
Poliomyelitis

- Inflammation of the gray matter of the spinal cord caused by a virus, commonly resulting in spinal and muscle deformity and paralysis.
Poliomyelitis

- 1950s – Paralyzed children lived in iron lungs which breathed for them.

- Development of polio vaccines made this a thing of the past.
Nervous System

Diagnosis and “Treatment”
Cerebrospinal Fluid Analysis

- Cerebrospinal fluid taken by a lumbar puncture is evaluated for presence of blood, bacteria, malignant cells, white blood cells, glucose, and protein.
Magnetic Resonance Imaging

- MRI of the brain which produces cross sectional images is particularly effective for detecting brainstem and spinal cord abnormalities.
Positron Emission Tomography

- PET scans detect brain metabolism and are helpful in diagnosing brain tumors, epilepsy, stroke, and Alzheimer’s disease.
Craniotomy

- Surgical procedure to create an opening in the skull to relieve intracranial pressure, to control bleeding, or to perform other surgical procedures on the brain.
Thalamotomy

- Partial destruction of the thalamus to treat psychosis or intractable pain.

- Drug therapy has replaced this procedure and it is now rarely performed, if ever.