PTA201: Circulatory System Structure and Function

Components include: Heart, arterial system, venous system, lymphatic system

Heart: 4 chambers, see diagram

Arterial System: vasodilatation/constriction component via smooth muscle. Carries oxygenated blood to the body from the heart.
- Arteries, Large! Aorta
- Arterioles, Circular bands of smooth muscle allow for changes in blood pressure.
- Capillaries, very small only single RBC wide!

Venous System: valvular system. Carries de-oxygenated blood back to the heart from the body.
- Veins
- Venule
- Capillary

Lymphatic System: Drains interstitial space.
- Relies mainly on muscle action to move fluid back to the heart.
- Also has valvular system, like that in veins.

Blood Pressure: Measured using a Sphygmomanometer! Normal 120/80 mm Hg
- Auscultation, using stethoscope
- Systolic BP
- Diastolic BP
- Pre-capillary sphincter, regulates capillary blood flow

Hypertension:
- Systolic: greater than 140 mm Hg
- Diastolic: greater than 90 mm Hg
Hypotension:
- Systolic: less than 100-110 mm Hg
- Diastolic: less than 70 mm hg

**Orthostatic Hypotension:** An excessive fall in BP on assuming an erect posture. The condition is not a disease, but a manifestation of abnormalities of normal BP regulation.
- Decrease in Venous return + Decrease in Cardiac Output = reduction in BP

**Normal control of BP:**
1. Increase in Vasomotor tone
2. Increase HR
3. Increase myocardial contractility / CO
- Impairments of the above-mentioned BP modulators, results in decreased tissue perfusion to the brain.

**Etiology: Orthostatic Hypotension**

**Drugs:**
- Anti-hypertensive drugs
- Diuretics
- Recreational drugs
- Alcohol

**Reductions in intervascular volume:**
- Hemorrhage
- Vomiting
- Diuretics
- Excessive sweating
- Addisons disease: prevents the absorption of water

**Neuropathic Disorders:**
- Diabetes
- Pernicious anemia
- Uremia
- Parkinson’s Disease
- Guilian Barre Syndrome: autonomic changes = vasomotor dysfunction
- Loss of autonomic regulation of cardiovascular system
Prolonged Bedrest
• Adaptation of baroreceptors (change in set point)
• Decreased ability of vessels and heart to accommodate

Common Signs & Symptoms:
• Faintness
• Dizziness
• Decreased BP
• Weak, rapid pulse
• Pale clammy skin
• Vision changes, blurry
• Generalized seizures

Treatment: Orthostatic Hypotension
1. Treat underlying cause
2. Mechanical Reduction in venous pooling (ace wraps, pressure stockings)
3. Tilt Table