



Bleeding and Shock

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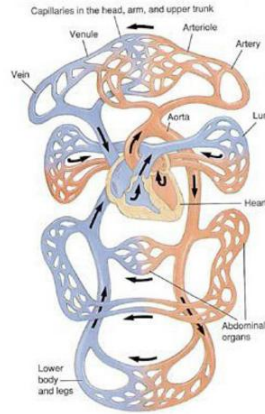
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Circulatory System

- Composed of heart, blood vessels and blood
- **A closed system**
- Pumps oxygenated blood and nutrients **to** body tissues
- Delivers waste products to waste organs
- Supply and Demand

Circulatory System



Arteries

- Carry blood **away** from the heart
- **Usually** carries oxygenated blood
- Has thick muscular walls
 - *Can change its diameter*
 - *To selectively distribute 5 – 6 liters of blood to parts of the body that really require about 9 liters*
- Under relatively high pressure
- Eventually, become Arterioles



Veins

- Carry blood **to** the heart
- **Usually** carries deoxygenated blood, CO₂ and other waste products
- Large veins (e.g. in legs) can hold large volumes of blood
- Contains **one way valves**
 - To prevent backflow
- Under very small pressure
- Eventually become Venules

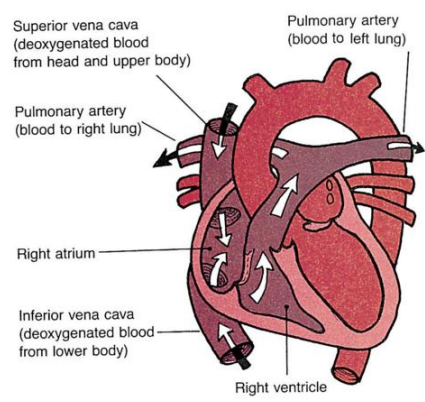


Capillaries

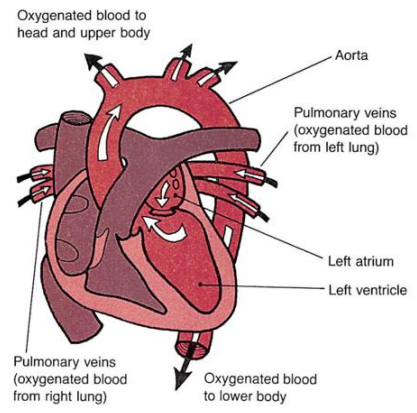
- Where gas, nutrient and waste exchange occurs
- **One cell thick**
 - **To facilitate the diffusion of gasses, nutrients and waste products**



Cardiac Circulation -- 1



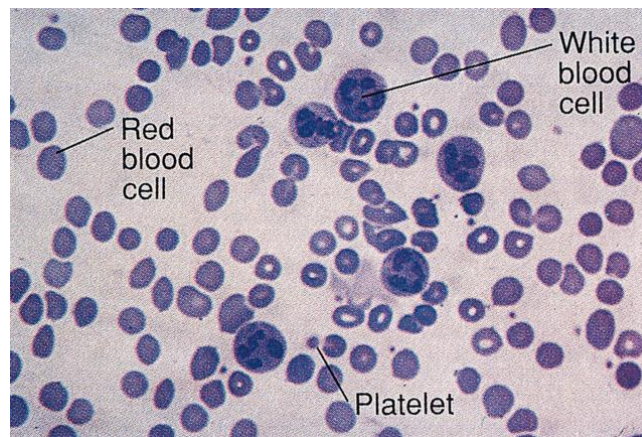
Cardiac Circulation -- 2



Blood

- **Approximately 5-6 liters in the adult body**
- Composed of:
 - Red Blood Cells
 - Erythrocytes
 - Carry Oxygen "on" Hemoglobin
 - White Blood Cells
 - Leukocytes
 - Fight Infection
 - Platelets
 - Assist in clotting
 - Plasma
 - Mostly Water

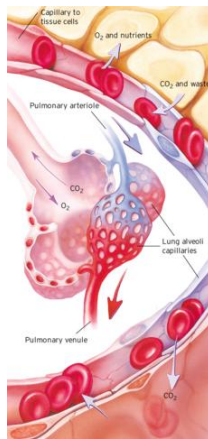
Blood Cells



Functions of Blood

- Transportation of gasses
 - Oxygen
 - Carbon Dioxide
 - Other gasses in small amounts
- Nutrition
 - Transport nutrients to the tissues

Gasses & Nutrients





Functions of Blood -- 2

- Excretion
 - Transport waste to waste eliminating organs
- Protection
 - White Blood Cells fight infection
- Regulation of bodily functions



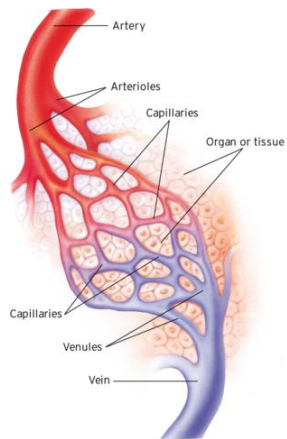
Regulation of Bodily Functions

- Hormones
 - From one place in the body to another
 - E.g. Adrenalin in a “flight/fright” situation
- Chemicals
 - E.g. Medications
- Temperature
 - E.g. On a hot day, blood vessels dilate near the skins surface → Allows the blood to cools and circulate cooler blood to the rest of the body

Important Terms!

- Perfusion
 - Adequate delivery of O₂ and nutrients to body tissues
- **Shock/Hypoperfusion**
 - **Inadequate tissue perfusion**
- Hemorrhage
 - Bleeding of any kind from any place in the body

Perfusion





Causes of "Shock"

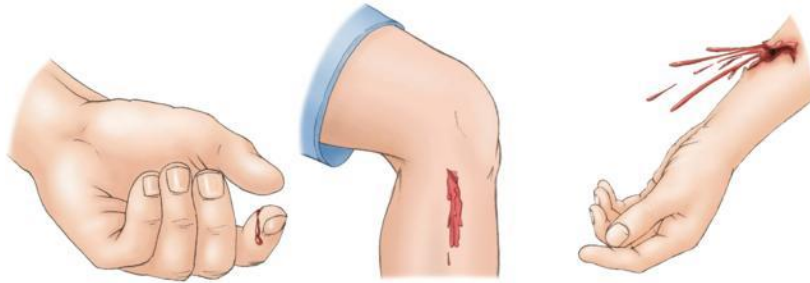
- **Key principle: When the circulatory system fails, it fails in one or a combination of the following:**
 - The pump
 - A heart problem
 - Cardiogenic shock
 - Leaks
 - Hemorrhage
 - Pipes
 - Blood vessels that become too wide
 - Sepsis
 - Anaphylaxis



Types of Hemorrhages

- Arterial
 - Pulsating bright red flow
- Venous
 - Steady dark red flow
- Capillary
 - Slow and oozing

Types of Bleeds



External Bleeding

- **Determine severity based on age and estimated blood loss**
- One liter in an adult considered serious
- Weight dependent in children
- **“Relatively” easy to control**

External Bleeding -- Treatment

Other Techniques

- Tourniquet
 - **Never release in the field**
 - **Mark the time applied on forehead**
 - E.g. "TK/9:00PM"
- If it involves a fracture, apply a "splint"
- MAST/PASG

Tourniquet – Bad technique!





MAST/PASG – not used

- **Medical AntiShock Trousers**
- **Pneumatic AntiShock Garment**
- **Indications:**
 - **Shock with Systolic BP < 50**
 - **Pelvic injury with S/S of shock**
- **Contraindications:**
 - **Absolute Contraindication**
 - **Patient in Acute Pulmonary Edema**
 - **Relative Contraindications**
 - Pregnancy (inflate legs only)
 - Impaled object
 - Open Chest Wound
- **NEVER DEFLATE IN THE FIELD!**



Internal Bleeding

- **Not outwardly visible**
 - **BIG PROBLEM!**
- **Severity**
 - **Varies**
 - **Large blood losses in short time periods**
 - **Can occur with fractures of large bones**
 - **E.g. Pelvis, femur**
- ***YOU CAN'T FIX IT!***



Internal Bleeding -- Causes

- Blunt trauma
 - Especially to abdominal organs
- Gunshot wounds
- Stab wounds
- Impaled objects
- Medical causes
 - E.g. "GI bleeds"



Recognition of internal bleeds

- Often, it's only recognized by signs & symptoms
- Mechanism of Injury ("MOI")
 - Bruising/pain/swelling over affected areas
 - Body orifice bleeding
 - Tender/rigid/distended abdomen
 - Coffee grounds or BRB "emesis"
 - BRB per rectum
 - S/S of shock



Types of shock

- Hypovolemic
 - Hemorrhagic
 - Metabolic
- Cardiogenic
- Neurogenic (“Spinal shock”)
- Septic
- Psychogenic
 - The “simple” faint
- “Syncope”



A Question

***How important is it to “diagnose”
the type of shock?***



Hypovolemic

- Blood losses (hemorrhagic)
- Fluid losses (metabolic)
 - Vomiting
 - Diarrhea
 - Sweating



Cardiogenic Shock

- Caused by the heart's inability to pump sufficiently to meet body needs
- Often follows a "large" MI
 - Within hours or days
- **Poor outcomes – despite the best treatment**



Neurogenic Shock

- Caused by an injured spinal cord
- Body loses the ability to “constrict” blood vessels
 - Allows BP to drop
- Loss of “communication” with nerves controlling skin condition
- **Hallmark: Warm, dry skin in a patient with S/S of shock**



Septic Shock

- Caused by a generalized body infection
- Usually, follows some “local” infection
 - E.g. pneumonia, UTI in elderly
- Body loses the ability to “constrict” blood vessels
 - Allows BP to drop



Severity of shock

If undetected and/or untreated, can QUICKLY lead to organ failure and death!



Stages of Shock

- Compensated
 - HR and RR are elevated
 - Trying to maintain perfusion
 - **Normal BP is maintained**
 - Cool, pale and clammy skin
 - **Body is fighting to “compensate”**



Stages of Shock

- Decompensated
 - **The hallmark: Falling BP**
 - Body can not maintain perfusion
 - **Body is losing the fight**



Stages of Shock

- Irreversible
 - Cell damage and organ death is occurring
 - Body has **lost** the fight
 - Death almost a certainty



S/S of Shock

- Altered Mental Status (“AMS”)
 - Agitation (an “early sign”)
 - Lethargy → Unconsciousness
- Cool, pale, sweaty (“**diaphoretic**”) skin
- **Tachycardia**
 - An early sign
 - Body tries to maintain cardiac output



More S/S of Shock

- **Tachypnea**
 - Early sign
 - Body tries to maintain O₂ saturation
- Poor/delayed “capillary refill”
- **Hypotension**
 - ***A LATE SIGN!***
 - ***DO NOT RELY ON IT AS AN INDICATOR OF SHOCK!***



Treatment Priorities

- **Rapid transport!**
- **“Golden Hour”**
 - From incident to operating room
 - *Patient needs a “date with a surgeon”!*
- Platinum ten minutes
 - On scene time
 - Additional stabilization and treatment during transport to the hospital



Shock -- Treatments

- ABC's
 - Close attention to airway maintenance *especially in patients losing consciousness and in facial/oral trauma patients*
- High concentration O₂
- “Shock position” (Trendelenberg)
- (PASG/MAST if indicated)



Shock -- Treatments

- **Rapid transport!**
- Splint and further assessment and treatment enroute
- Prevent the loss of body heat
 - **Shock patients lose control of temperature**
- **Consider ALS**
 - **Call for ALS ASAP!**



Shock -- Treatments

- Reassure patient!
 - "PFA"
 - More than just being nice!
 - Medical reasons
- **Continuous reassessment**
 - **Patients can rapidly deteriorate**
 - **Be prepared to treat**