Assessment of Cardiovascular Function

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Coronary Arteries

- Aortic arch
- Left main coronary artery
- Circumflex coronary artery
- Right coronary artery
- Left anterior descending coronary artery
- Posterior descending coronary artery
Cardiac Conduction System

For creating and transporting the electrical impulse or action potential

SA node (60-100)
- The pacemaker of heart
- Atrial muscle

Internodal conducting fibers

AV node (slow, 40-60)

Purkinje fiber conducting system, 30-40
- Ventricular muscle
- Electrical cell

Ability to transmit an electrical impulse from one cell to another
Cardiac Action Potential

- Potassium exits the intracellular space
- Rate of repolarization slows, calcium ions enter intracellular space
- Triggers mechanical activity
- Return of cell to resting state
- Before next depolarization
- Antiarrhythmic medication: blocking the influx of channel
The Normal EKG

- **Right Arm**
- **Left Leg**

- **“Lead II”**

- **Atrial muscle depolarization**
- **Ventricular muscle depolarization**
- **Ventricular muscle repolarization**

- 0.12-0.2 s
- approx. 0.44 s

- **P**
- **Q**
- **R**
- **S**
- **T**
To Calculate Heart Rate:
Count the number of “R” waves in 6 seconds.
(6 large blocks X’s 10 = 1 min rate)
CARDIAC ELECTROPHYSIOLOGY

P-WAVE
Produced as impulse from SA node and causes atrial contraction

QRS COMPLEX
Conduction of impulse through the bundle of HIS to Perkinje fibers causing contraction of ventricles

S-T SEGMENT
The heart's resting period

P-R INTERVAL
Time between atrial depolarization and the start of ventricular conduction (Depolarization)

T-WAVE
Ventricular repolarization

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Great Vessel and Heart Chamber Pressures

Systole: contraction of myocardium, results in ejection of blood from the cardiac chamber

Diastole: allows for filling of the chamber
BLOOD FLOW THROUGH THE CARDIAC VALVES

- Tricuspid
- Pulmonic
- Mitral
- Aortic

Tissue Paper My Assets

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AUSCULATING HEART VALVE SOUNDS

Aortic  Pulmonic

APE

Tricuspid  To  Man

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Preload
Volume of blood in ventricles at end of diastole (end diastolic pressure)

Increased in:
- Hypervolemia
- Regurgitation of cardiac valves
- Heart Failure

Afterload
Resistance left ventricle must overcome to circulate blood

Increased in:
- Hypertension
- Vasoconstriction

↑ Afterload = ↑ Cardiac workload
CARDIAC OUTPUT

CO = HR \times Stroke Volume

Cardiac Output
Heart Rate
Stroke Volume
DO₂ v.s. VO₂

Oxygen supply (DO₂)

\[ DO₂ = \text{Cardiac output} \times \text{Arterial oxygen content} \]

\[ \text{Cardiac output} = SV \times HR \]

\[ \text{Arterial oxygen content} = \frac{\text{PaO₂}}{100} \times 1.35 \]

\[ \text{PaO₂} = \text{Oxygen saturation} \times \text{Partial pressure of oxygen} \]

\[ \text{Preload} = \text{LVEDP} \]

\[ \text{Afterload} = \text{SVR} \]

\[ \text{Contractility} = \text{EF} \]

Oxygen demand (VO₂)

\[ VO₂ = \text{Amount of oxygen used by the body} \]
Pressoreceptor
(aorta & carotid arteries)
Vasomotor center
(medulla of brain)
SNS activation

Heart Coronary arteries Blood vessels (skin. GI, renal) Blood vessels (ske. muscle) Lungs Pupils Sweat

↓ CO ↓ BP  ↓

↓ HR Constriction Dilate Constrict Dilate Dilate
↑ Rate & Depth

↓ blood flow
↓ CO₂, Resp. alkalosis

↓ clammy skin
↓ sweat
**Renal & endocrine system**

- **SNS activation** → **Adrenal Medulla**
  - **Anterior pituitary gland**
    - **ACTH** → **Gulcocorticoid** (Cortisol)
      - **Renin release from renal cells** → **Angiotensinogen (Liver) → Angiotensin I** → **Angiotensin II**
    - **Osmolality** → **Antidiuretic hormone, ADH** (Posterior pituitary gland)
      - **H₂O retention**
    - **Na⁺; K⁺** → **Osmolality** → **Osmoreceptors** (hypothalamus)
  - **Aldosterone** → **Vasoconstriction** → **BP**
  - **β 1: heart** → **↑HR, force of contraction, speed of conduction**
  - **α 1: peripheral vascular** → **vasoconstriction**
Terms such as discomfort, heaviness, pressure, indigestion, aching choking, strangling, tingling, squeezing, constricting, or vise-like

Assessing Chest Pain

Table 26-2, pp. 791-792
HEART MURMURS

Types...
- Systolic
  - Crescendo
  - Decrescendo

- Diastolic → Indicates Pathologic Disease

Causes...(S.P.A.M.S.)
- Stenosis of a Valve
- Partial Obstruction
- Aortic Regurgitation
- Mitral Regurgitation
- Septal Defect

{ Innocent murmurs occur in children or with pregnancy and are noted during systole. }
**LDL/HDL**

*Want **LOW** (↓130mg/dl)*
or it will lower you into the ground.

*Want **HIGH** (↑45mg/dl)*
for client to feel healthy.
Phlebostatic Level

Transducer must be placed at a standard reference point.

Catheter placement is confirmed by a chest X-ray and the site is inspected daily for signs of infection.

Figure 26-10, pp. 817
Assess L ventricular function, diagnosing the etiology of shock, evaluating the patient’s response to medical interventions.

**Pulmonary Artery Catheter**

- CO
- Inflated 0.8~1.5 c.c.
- PAP
- PCWP
- IV solution are infused

Figure 26-11, pp. 818