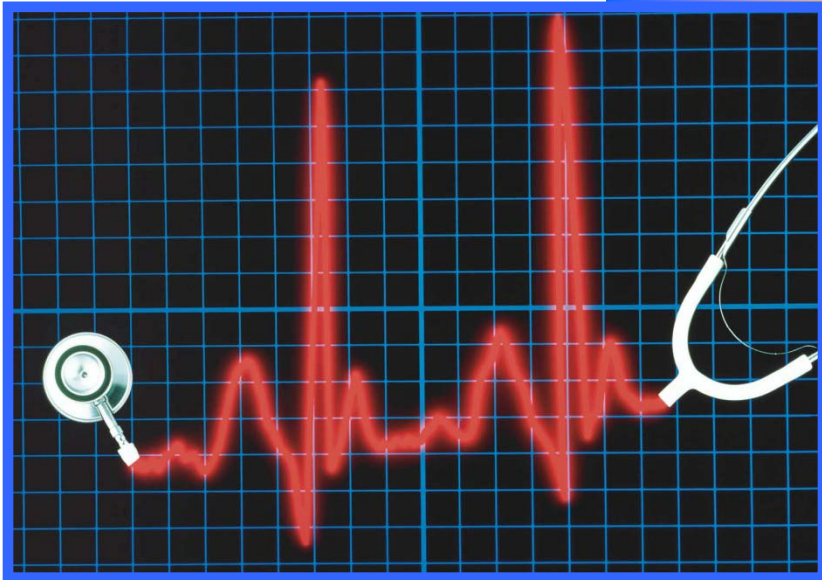




Cardiac Emergencies

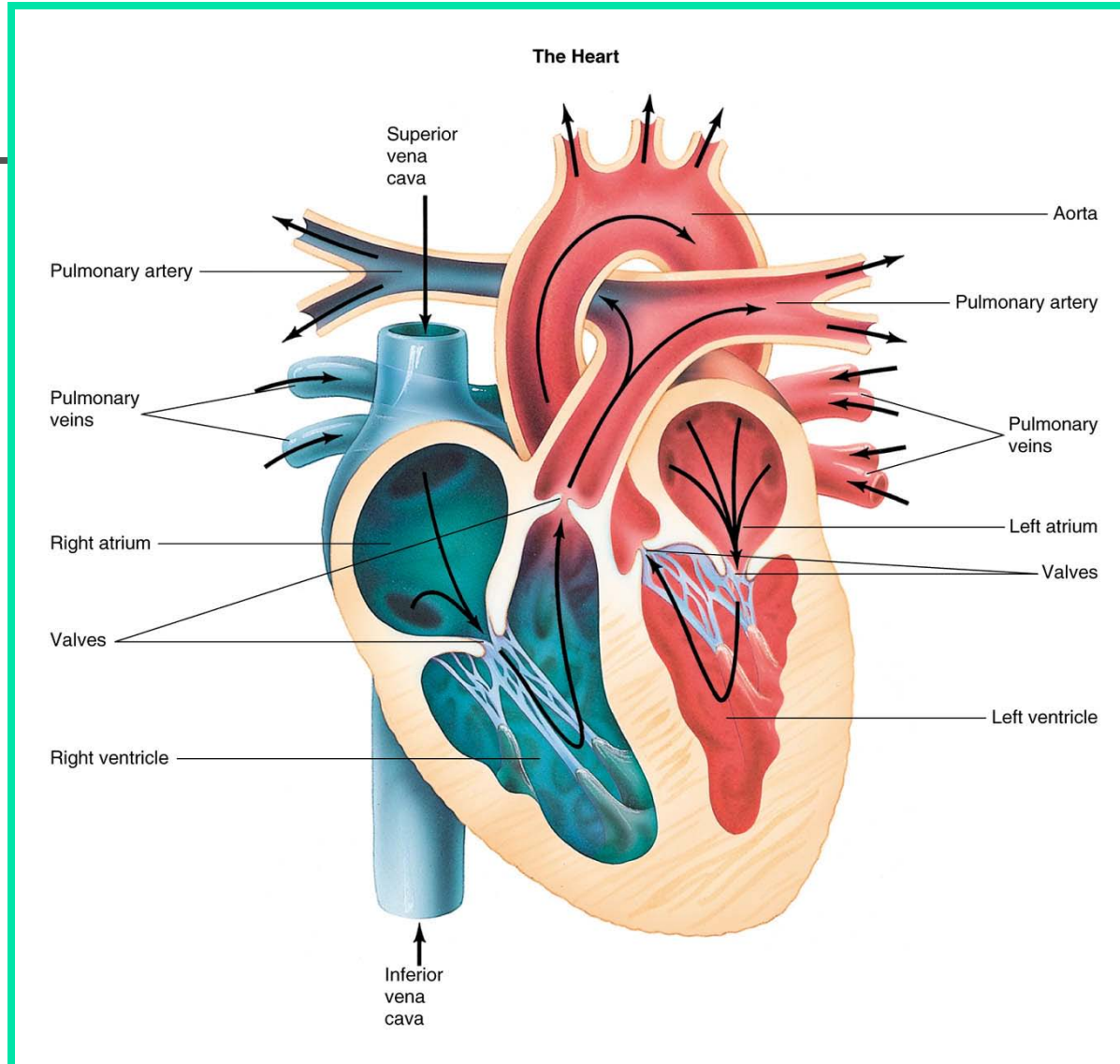




Session Overview

- Review of circulatory system anatomy & physiology.
- Cardiac output.
- Cardiac emergencies.
 - AMI, Angina, CHF, Aneurysm, Valvular problems, Cardiac Arrest,...
- Cardiac medications.
- Review of CPR & AED.

The Heart



The 4 Chambers of the Heart



Right Atrium

Receives blood from venous system; pumps to right ventricle

Left Atrium

Receives oxygenated blood from lungs; pumps to left ventricle

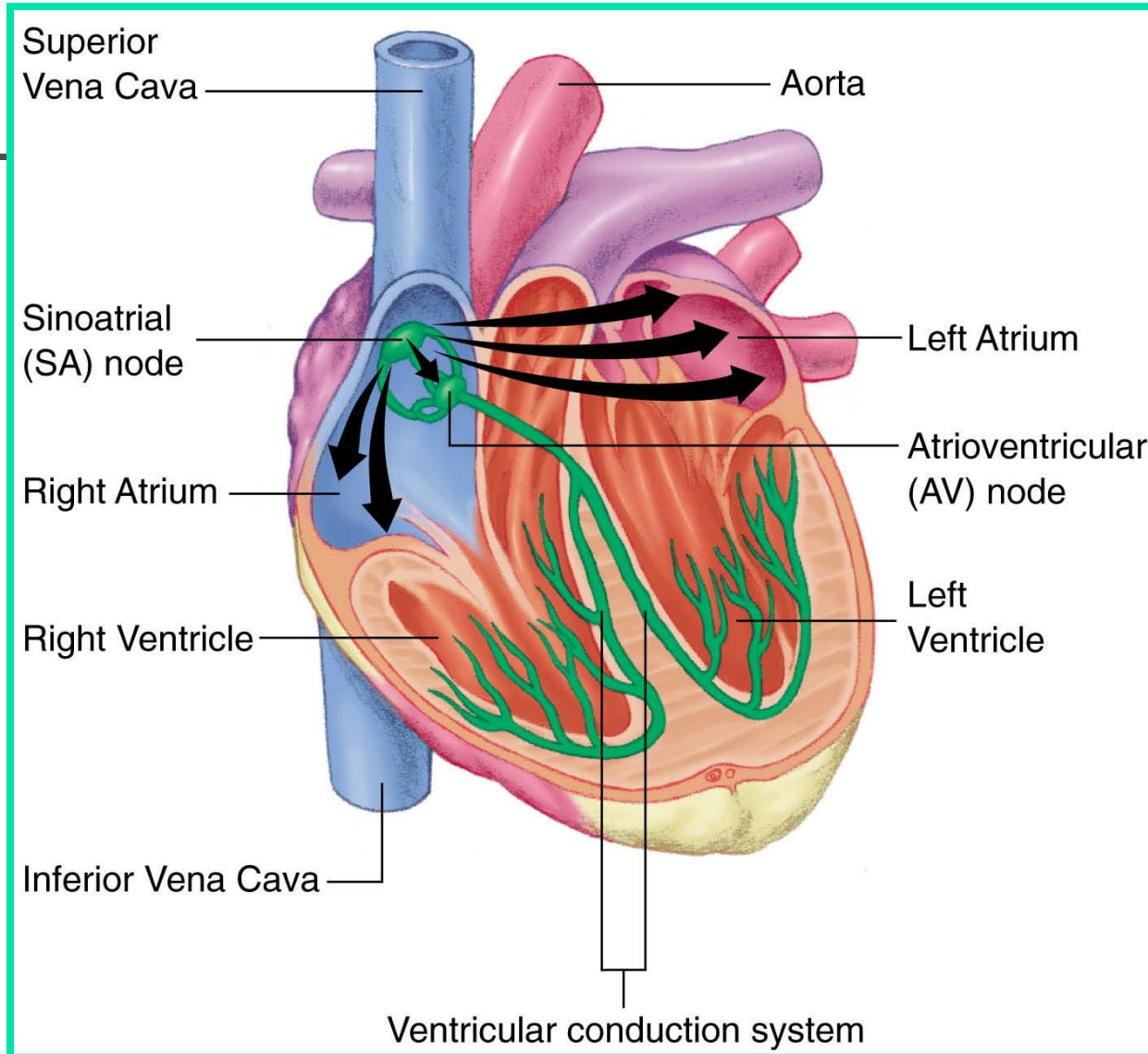
Right Ventricle

Pumps blood low in oxygen content to the lungs

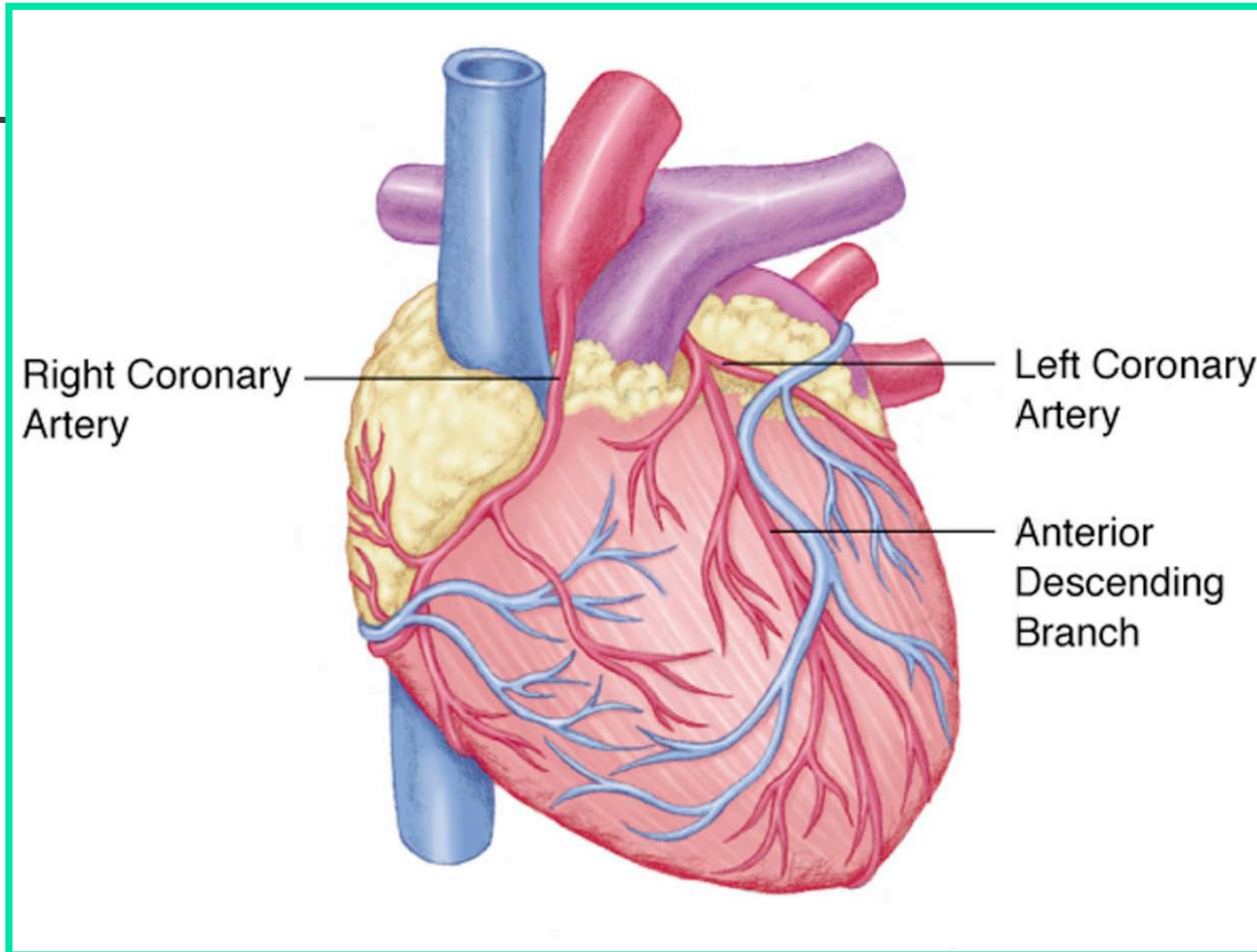
Left Ventricle

Pumps oxygenated blood through the aorta to the body

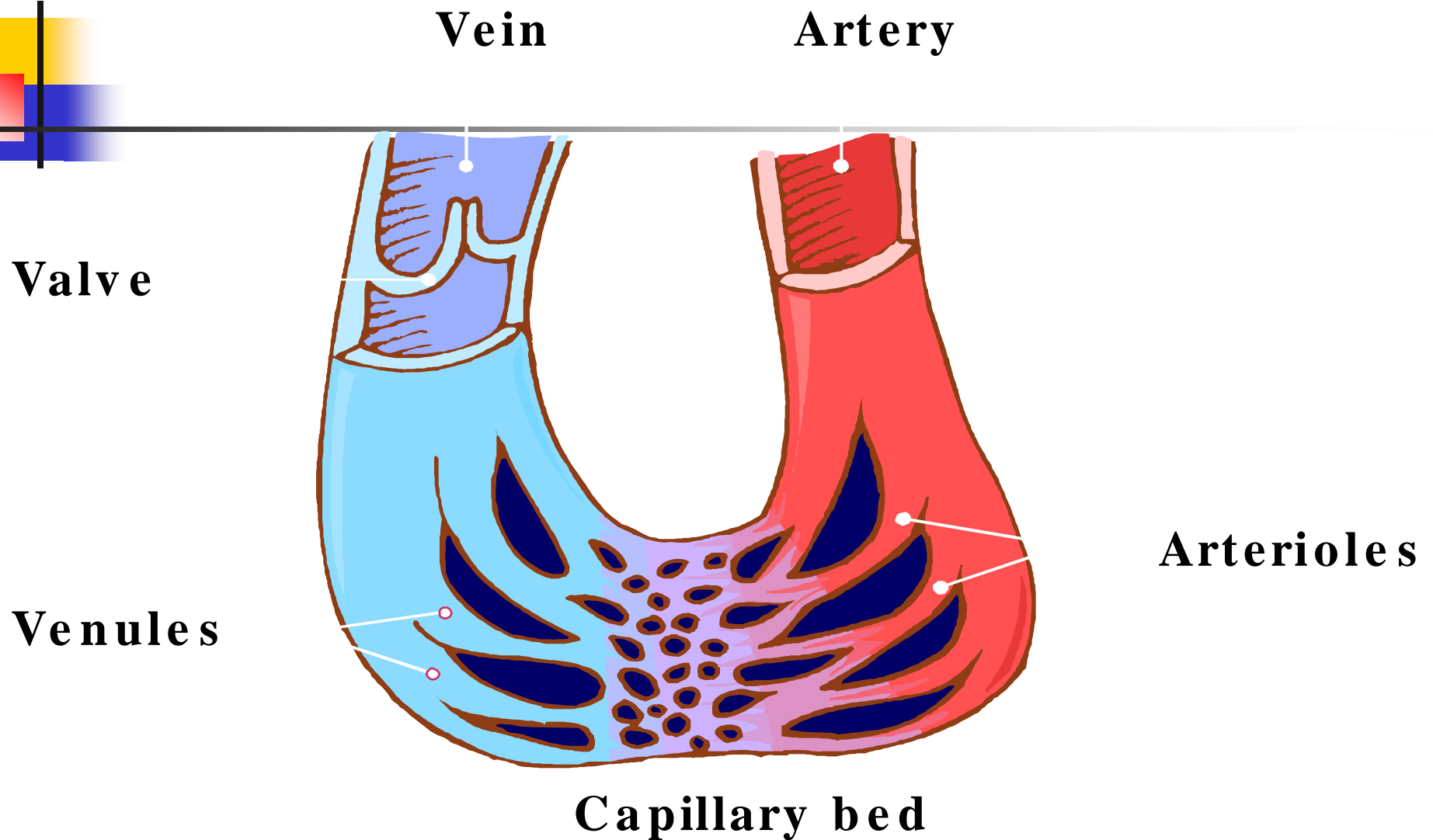
Cardiac Electrical Conduction System



The Coronary Arteries



Vessels of Circulation



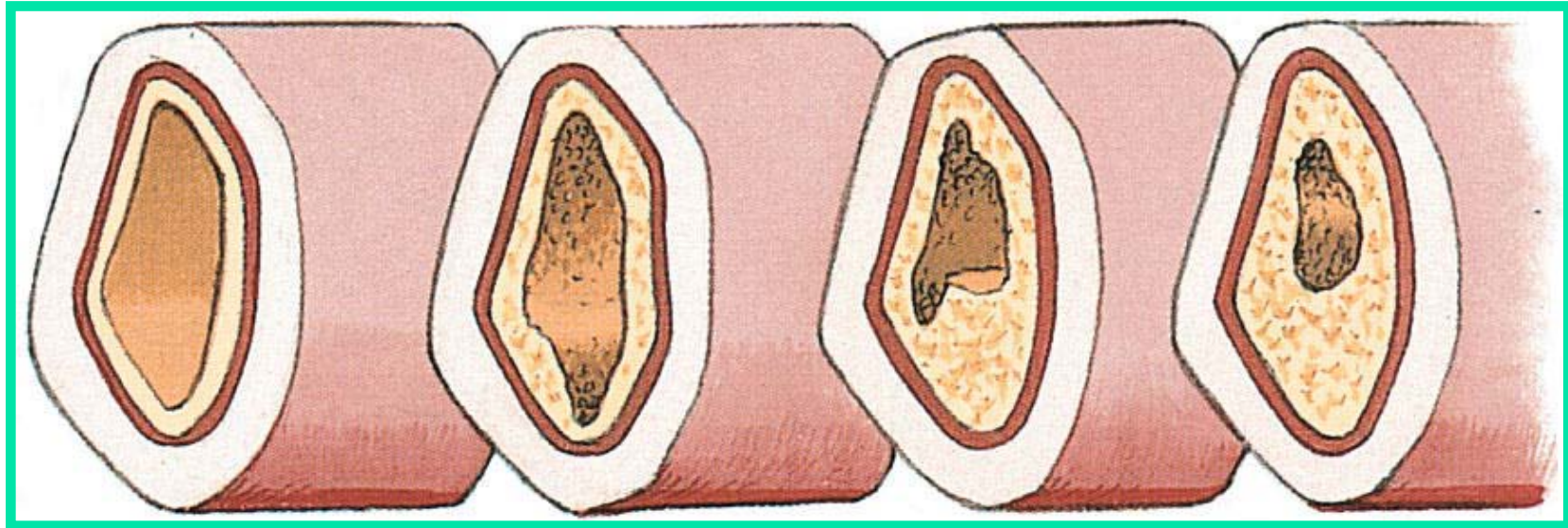


Cardiac Compromise

Any kind of problem with the heart.

Acute Coronary Syndrome (ACS)

Causes of Cardiovascular Compromise - Atherosclerosis





Suspect Cardiac Compromise:

- Chest discomfort, chest pressure, or numerous other descriptions for chest pain or abnormality.
- SOB.
- Diaphoresis associated with any of the above.
- Nausea and or vomiting associated with any of the above.
- Weakness associated with any of the above or if elderly or diabetic.

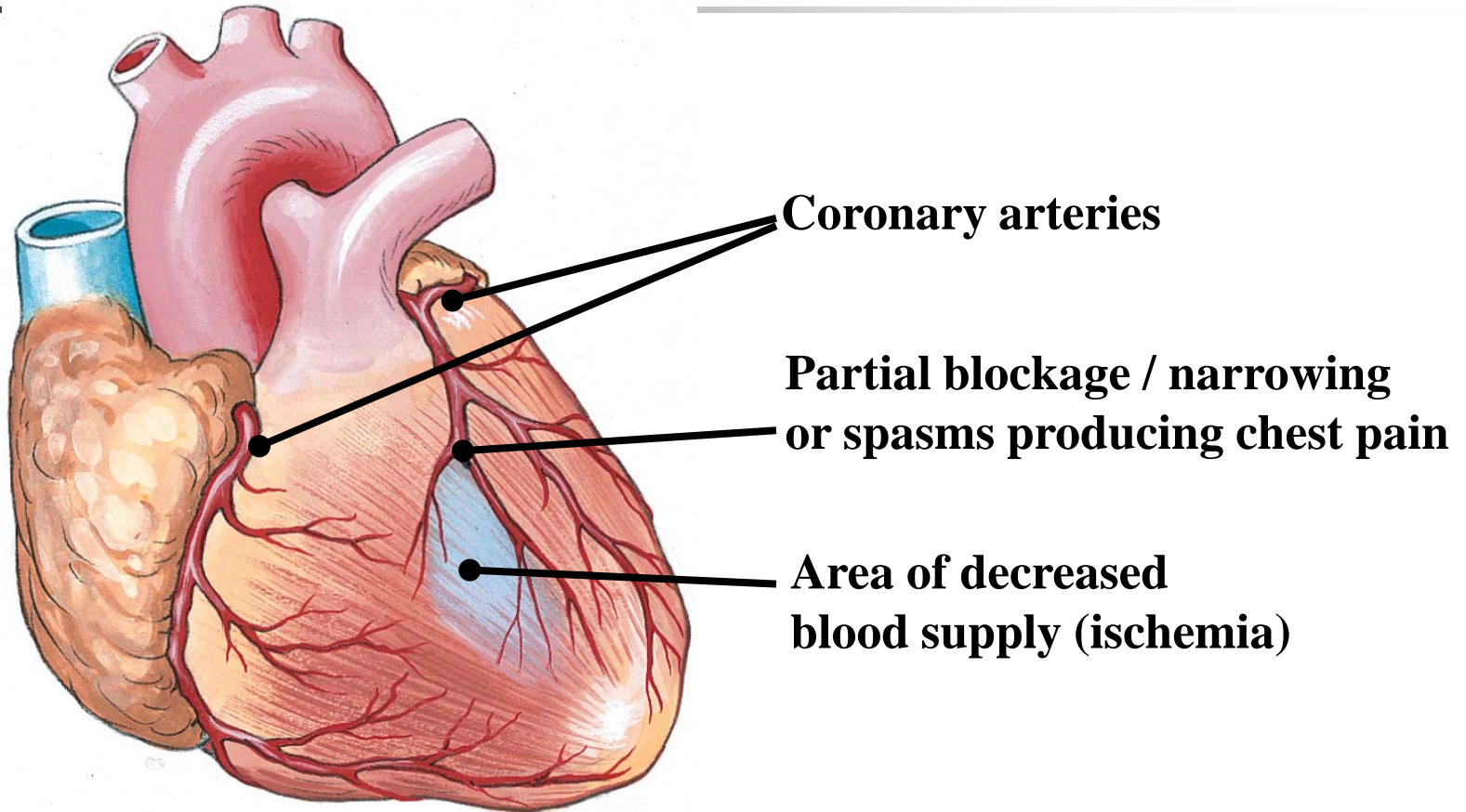


Suspect Cardiac Compromise:

- C/O palpitations, rapid, slow, fluttering or other descriptions of abnormal heart beating.
- Anxiety or sense of impending doom with any of the other symptoms previously mentioned.

Causes of Cardiac Compromise:

Angina Pectoris





Signs & Symptoms of Angina

- Chest discomfort – pressure, tightness, heaviness, pain...
- SOB.
- Anxiety.
- Diaphoresis.
- Usually brief in duration.
- **SOMETIMES UNABLE TO DISTINGUISH BETWEEN AMI AND ANGINA!!!**

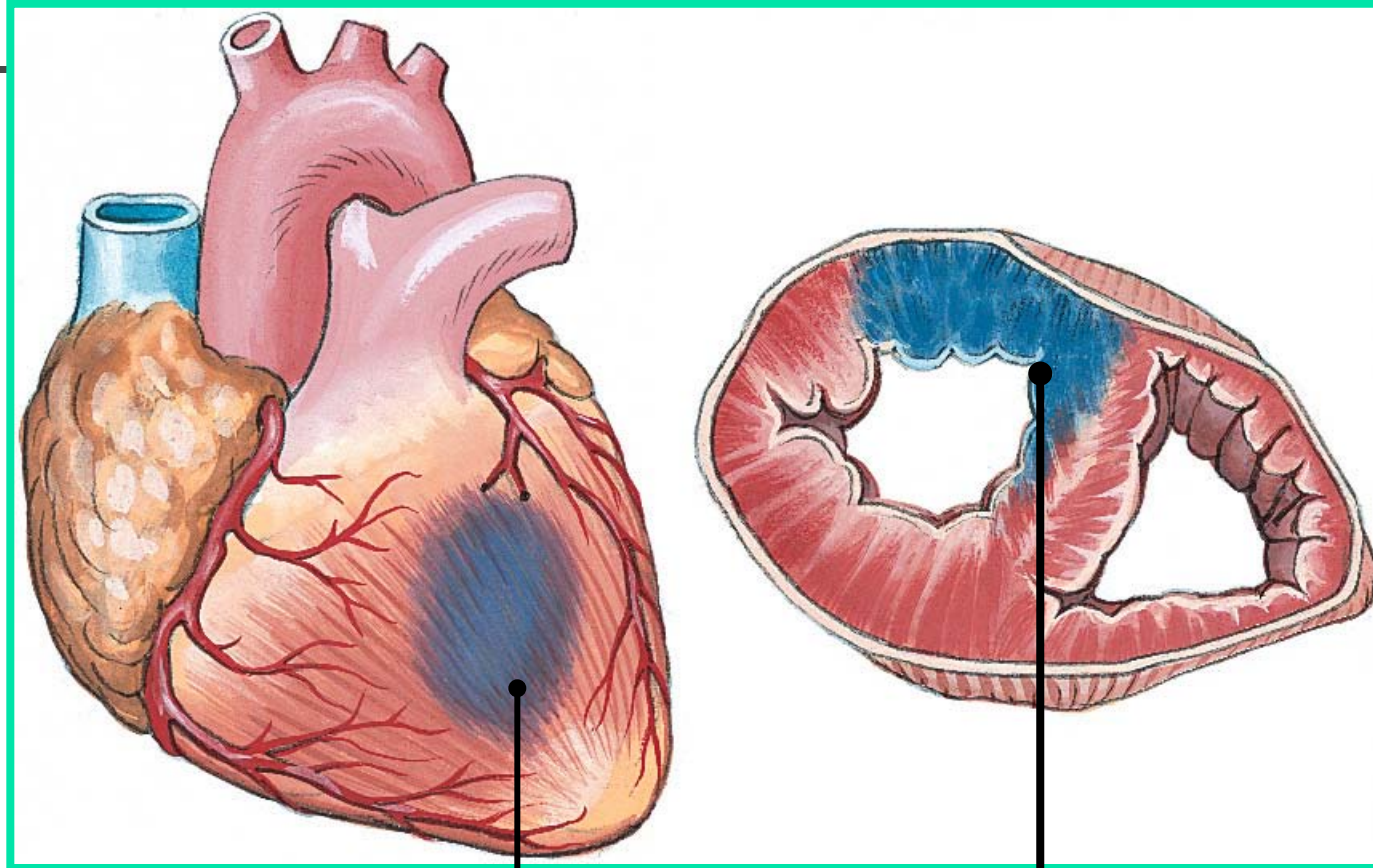


Treatment of Angina

- Crisis intervention
- Rest
- Oxygen
- Nitroglycerin (will discuss NTG later)
 - Tablets
 - Oral spray
- Request ALS
- Typically resolves with above interventions.

Causes of Cardiac Compromise:

Acute Myocardial Infarction



**Area of Infarct –
tissue death**



Signs & Symptoms of AMI

- Often similar to Angina.
- More often described as “pain” or “stabbing” vs pressure or heaviness.
- Persistent.
- Altered VS’s.
- N&V possible.
- Radiation to L arm, shoulder, neck, lower jaw...
- Others as discussed in CPR program.

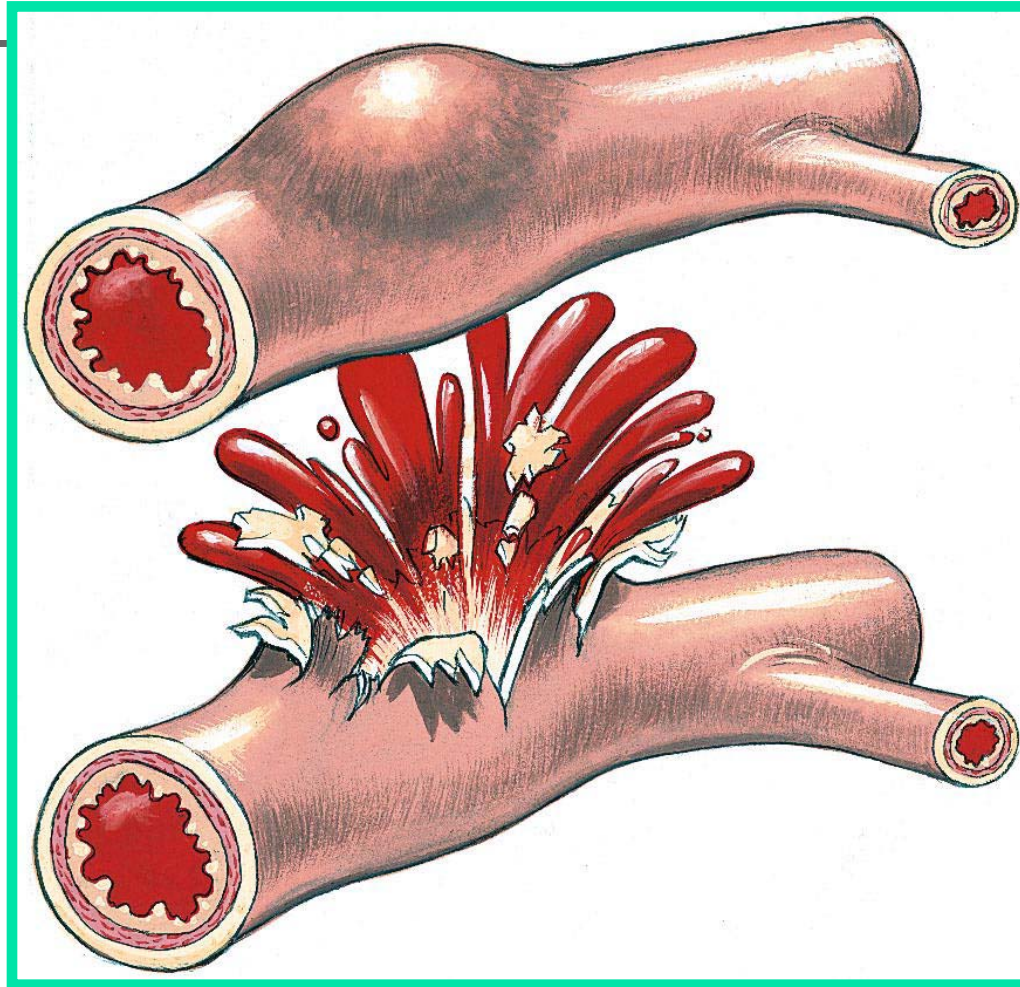


Treatment of AMI

- Same as Angina.
- At risk for “sudden death” requiring CPR and AED.

Causes of Cardiovascular Compromise:

Aneurysms





Signs & Symptoms

- Sharp, tearing, stabbing “pain” in chest and or abdomen.
- Often caused by long standing, poorly controlled hypertension.
- Other causes such as genetics or heredity of genetic conditions – Marfan’s Syndrome.
- Typically involves the aorta – a high pressure vessel.
- May involve other arteries as well.



Causes of Cardiac Compromise:

Congestive Heart Failure

- Two types of CHF:
 - Left heart failure (LHF).
 - Right heart failure (RHF).



Left Heart Failure (LHF)

- Causes:
 - Leading cause - AMI
 - Age
 - Valvular problems
 - Disease / infection



S&S's of LHF

- Dyspnea / SOB.
- Rapid pulse, possibly elevated BP.
- Tachypnea.
- **VERY** anxious.
- Fluid in lungs (wet breath sounds).
 - Rales.
 - Rhonchi.
 - Sometimes wheezing may be heard as well.



Managing LHF

- Crisis intervention.
- Semi or high fowlers position to ease respiratory efforts.
- Oxygen by NRM.
- Have patient dangle legs off of the side of the cot.
- ALS.



Right Heart Failure (RHF)

- Most often caused by LHF.
- Sometimes caused by pulmonary disease or valve problems.
- Seen with liver failure at times.
- RHF and LHF are frequently seen together.



S&S of RHF

- Elevated VS's.
- JVD.
- Swollen extremities – especially the feet, ankles & legs.
 - If in bed sacral edema may be present.
- “Pitting” edema of tissues.
- Engorged liver.
- Fluid in abdominal cavity (ascites).



Managing RHF

- Crisis intervention.
- Position of comfort.
- Oxygen.
- ALS.

Perform initial assessment, introductions and crisis intervention.



Perform focused history and physical exam; take baseline vital signs.

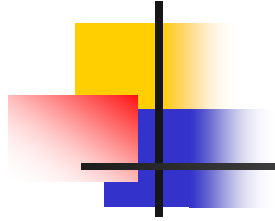


Place patient in position of comfort; give high-concentration O₂ by NRM.



**If patient meets nitroglycerin criteria,
consult medical direction.**





Nitroglycerin



Nitroglycerin

- Mechanism of action:
 - Dilates blood vessels – mostly peripheral.
 - Reduces the resistance against which the heart must pump.
- Side effects:
 - Headache due to dilation of cerebral vessels (expected).
 - **Hypotension**. If significant must be managed immediately.
 - Supine with feet elevated.
 - I.V. fluids. (ALS)
 - “Bitter” taste under the tongue.
 - VS’s must be obtained immediately before and within several minutes after administration. Every few minutes thereafter.



Medication Administration

- Patients must meet criteria based upon Maryland EMS Protocols for any meds you are allowed to administer.
- **ALWAYS ASSURE THE SIX (6) RIGHTS:**
 - Assure right **patient**.
 - Assure right **medication**.
 - Assure right **dose**.
 - Assure right **expiration** date.
 - Assure right **route**.
 - Assure right **condition** to be treated.
- ALWAYS OBTAIN VS'S JUST BEFORE ADMINISTERING ANY MEDICATION & EVERY FEW MINUTES THEREAFTER.

To administer NTG: Remove oxygen mask & ask patient to open mouth & lift tongue.



**Place nitroglycerin tablet or spray
under tongue. Wear gloves.**

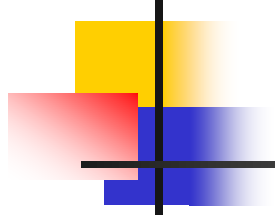


**Have patient close mouth (not swallow or chew).
Replace mask. Reassess patient, document findings.**





Review NTG Protocols.



Some patients with cardiac compromise go into cardiac arrest. You must be prepared. Unfortunately this is not uncommon.



One-Rescuer CPR

You may need to be able to do this while your partner is preparing equipment such as the AED, oxygen and airway adjuncts – and calling for assistance.



Two-Rescuer CPR: Critical Skill for EMT-B

You must be able to:

- **Conduct a patient assessment.**
- **Use an automated external defibrillator.**
- **Request ALS backup when appropriate.**
- **Use BVM with supplemental oxygen.**
- **Lift and move patients.**



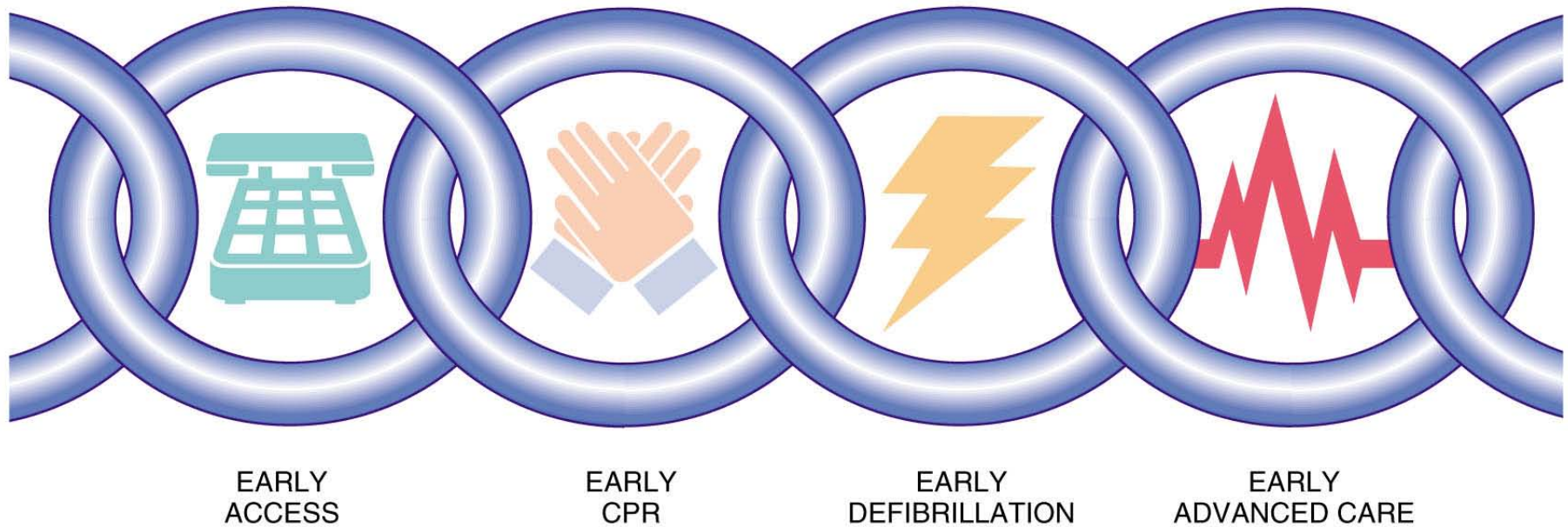
Two Rescuer CPR: Critical Skill for EMT-B

You must also be able to:

- **Suction the airway.**
- **Use airway adjuncts.**
- **Employ BSI precautions.**
- **Interview family / bystanders.**

American Heart Association's Chain of Survival

Chain of Survival





Two Types of AED's:

- **Semi-automatic / shock advisory (our kind).**
 - **Computer in AED analyzes the rhythm & advises the EMT to deliver the shock.**

- **Fully automatic.**
 - **The operator turns on power, attaches the patient and the AED does the rest.**



Analysis of Cardiac Rhythm

**AED's are extremely accurate
in distinguishing between shockable
and non-shockable rhythms.**

ONLY shockable rhythms:

Ventricular Fibrillation (V Fib).

Ventricular Tachycardia (V Tach).



AED Safety Considerations

An AED must be applied ONLY to patients who are unresponsive, apneic, and pulseless.



Safety Considerations

No one should do CPR or touch the patient when the AED is analyzing the rhythm or delivering a shock.

Keep oxygen away during shocks.

Exercise BSI. Briefly question bystanders about pre-arrest events.



Perform initial assessment.





Note

Do not delay defibrillation to perform CPR when the event is witnessed.

Defibrillation is the priority!

Set up AED as partner starts (or resumes) CPR.



**Turn on power and, if appropriate,
begin verbal report.**



**Attach one pad to right upper chest.
Place one pad over lower left ribs.**



Say "Clear!" Ensure no one is touching patient. Press analyze button.



If AED advises shock, say “I’m Clear, You’re Clear, We’re All Clear“. Ensure no one touching patient, press shock button. Immediately resume CPR.



Check carotid pulse.



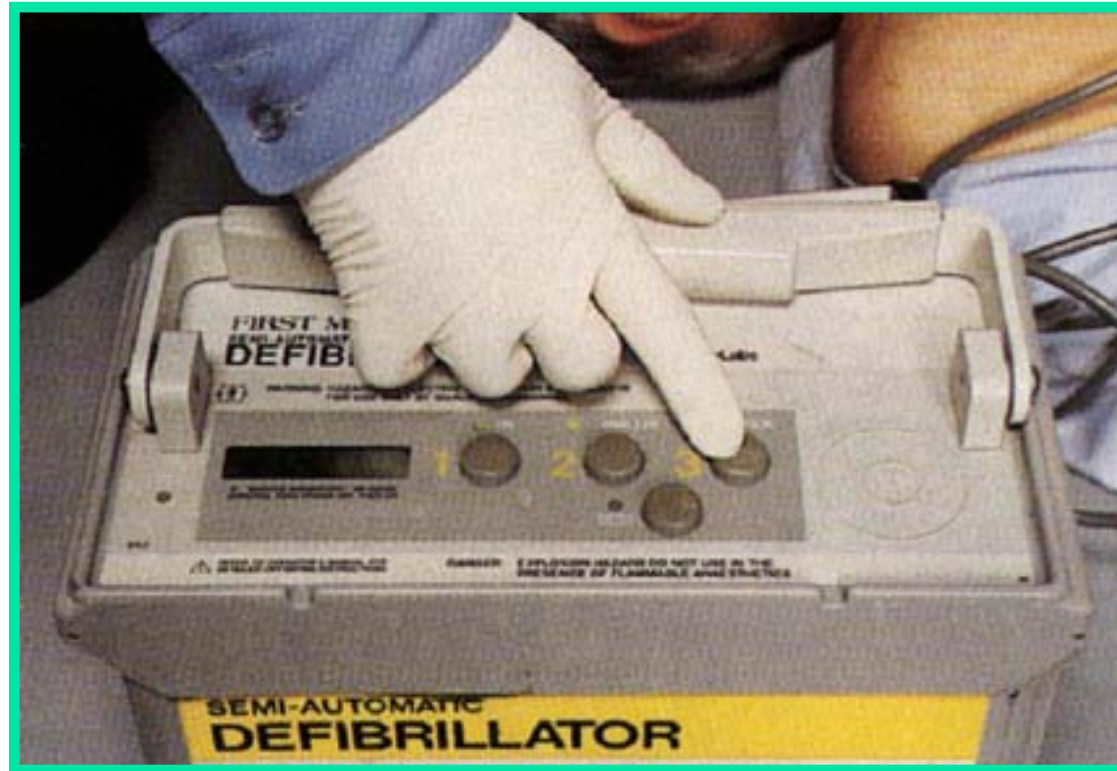
Continue CPR for two minutes. Check effectiveness of CPR by evaluating pulse.



Direct use of airway adjunct & ventilation with high-concentration oxygen.



After two minutes of CPR, clear patient and repeat sequence of three analyses, CPR and single shocks.



Check carotid pulse. If present, assess adequacy of breathing. **Wear facial protection.**





Standard Operating Procedures

- **One EMT-B operates AED while CPR is done by a partner.**

- **Don't delay defibrillation.**



Standard Operating Procedures

ALWAYS look from the patients head to toe
before delivering shocks.



Post-Resuscitation Care

- **Maintain airway.**
- **Transfer to ambulance.**
- **Continue to monitor the patient very closely.**
- **Coordinate rendezvous with ALS if available.**



Post-Resuscitation Care

- **Leave AED attached to patient.**

- **Perform focused assessment and begin the ongoing assessment enroute.**



Additional Safety Considerations

➤ **Water**

- **Conducts electricity well.**

➤ **Metal**

- **Ensure no one touching any metal in contact with patient.**



Additional Safety Considerations

➤ Medication Patch

- If patch visible on chest, remove it *with gloved hands* before delivering shock.

*** NTG is combustible and explosive.**



Closing Comments

- Cardiac events will account for the majority of the significant calls you will handle in the pre-hospital setting.
- You must become comfortable and very proficient managing these patients.
- Cardiac care changes frequently. Subscribe to trade journals and other periodicals to remain current in this area.