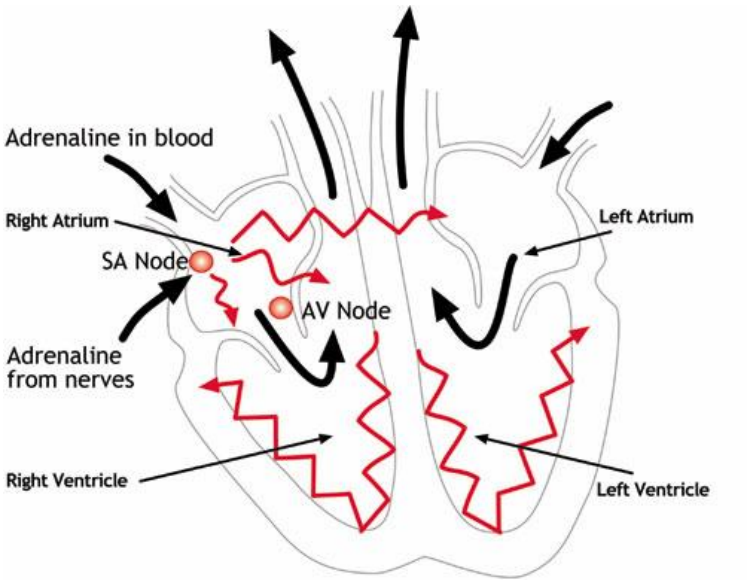
Control of the Heartbeat (Cardiac Cycle)



- Cardiac muscle is striated and branched with intercalated discs. (allows nerve impulses to spread rapidly and heart muscle to contract rapidly and together
  - Coronary arteries directly from the aorta supply the heart muscle with oxygen and glucose
  - The heart beats on its own (myogenic) and is under involuntary control
  - Originates in the sinoatrial node (SAN) located in the right atrium. → **PACEMAKER**
  - Sends a nerve impulse that causes contraction of the atria (atricular systole)
  - This impulse spreads to the atrioventricular node (AVN), then to the Bundle of HIS down to the apex of the heart (into the ventricles) and to the perkinji fibres.
  - This causes contraction of the ventricles. (ventricular systole)
  - Nerves and hormones can slow down or speed up the heart beat (eg. Adrenalin)
    - An increased CO_2 level (decreased pH) is sensed by medulla in the brain (therefore a greater need for oxygen). An impulse is sent via the sympathetic nerve to the SAN
    - When blood pH returns to normal (after exercise), the vegus nerve slows the heart rate

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Artificial Pacemakers

- An artificial pacemaker is a device that uses electrical impulses to regulate the beating of the heart.
- Used in patients with a problem of electrical conduction (too slow, too fast or heart failure)
- Pacemakers are battery powered and may be internal or external. It is often fitted below the collarbone and is connected to the heart via a vein.

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Defibrillation

- If a person goes into cardiac arrest (their heart stops beating properly), their heart can be set back to a normal rhythm using a defibrillator
- The defibrillator delivers an electronic shock that (hopefully) causes it to being beating normally again.
- It is connected using electrodes which are placed on the patients chest.

➢ The Cardiac Cycle & Blood Pressure

Cardiac Cycle – the sequence of actions of a heart beat.

One cardiac cycle involves:
Diastole – relaxation or resting of heart chambers.
Systole – contraction of heart chambers

Atricular Diastole
- Atria fill with blood.
- Pressure forces the AV valves open

Atricular Systole
- Atria contract
- Blood is pushed into the ventricles

Ventricular Systole
- Contraction of the ventricles.
- A-V valves close (bicuspid & tricuspid), causing a “lub” sound.
- Pressure is increased and forces blood out of the ventricles, opening the semilunar valves.

Ventricular Diastole
- Relaxation of the ventricles
- Semilunar valves close causing a “dub” sound.
- Pressure drops, AV valves open, ventricles fill with blood.

Heart beat sounds: “lub-dub-lub-dub”

Blood Pressure – the pressure exerted on the walls of the arteries.

Systolic	Normal Adult = 120	mmHg
Diastolic	80	

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