Cardiac myocytes are short branched striated muscle cells. They are connected with gap junctions. Gap junctions transmit electrical activity between cells. So, cardiac myocytes act as a single functional unit (syncitium).
1. Nodal fibers

2. Conducting fibers

3. Contractile fibers
Properties of Cardiac Muscle

1. Rhythmicity
2. Excitability
3. Conductivity
4. Contractility
Rhythmicity

- **Rhythmicity** means the ability of the heart to beat regularly without external stimulation.
- It is *myogenic* in origin *not neurogenic*
- The nodal fibres and conducting system are *self-excitable*.
- Sinoatrial node (SAN) → 110 b/min
- Atrioventricular node (AVN) → 90
  - Bundle of His (A-V bundle) → 45
  - Purkinje fibres → 35
  - Ventricular fibres → 25

The cells of SAN; (posterior wall of right atrium) is the primary pacemaker of the heart
II- Conductivity

- The ability to conduct impulse from one cell to another---facilitated by the presence of **gap junctions** that transmit electrical currents
- From SAN $\rightarrow$ atrial muscle & atrioventricular node (AVN)
- From AVN *(slowest) $\rightarrow$ atrioventricular (AV) bundle (bundle of His) $\rightarrow$ left & right bundles $\rightarrow$ purkinje fibres *(fastest)*
Excitability

• The heart muscle responds to stimuli which may be mechanical, electrical or chemical

Refractory Period

• The refractory period of the myocardial fibers is of much longer duration than that of skeletal muscle fibers and lasts approximately as long as the cardiac contraction-------- so no continuous contraction without relaxation (tetanus) can occur in heart.
The cardiac muscle contracts either maximally or not at all (under constant conditions).
The Atria contract as one unit & the ventricles contract as one unit.
This is significant for efficient pumping of the blood.
2- Staircase or Treppe Phenomenon

- Rapidly Repeated stimulation of the cardiac muscle produce gradual increase in the strength of contraction.
- The earlier contractions produce better conditions (heat, less viscosity between muscle fiber, more Ca) for the following contraction.
3- Starling Law

- Within limits, the greater the initial length of cardiac muscle fibre (stretch), the greater the force of contraction.
- The initial length is determined by the volume of blood filling ventricles at end of diastole (end-diastolic volume; EDV).
A) Sympathetic supply:
1. ↑es all cardiac properties
2. ↑es the coronary blood flow.

B) Parasympathetic supply:
1. ↓es all cardiac properties except the ventricles (not supplied by vagus nerve)
2. ↓es the coronary blood flow.