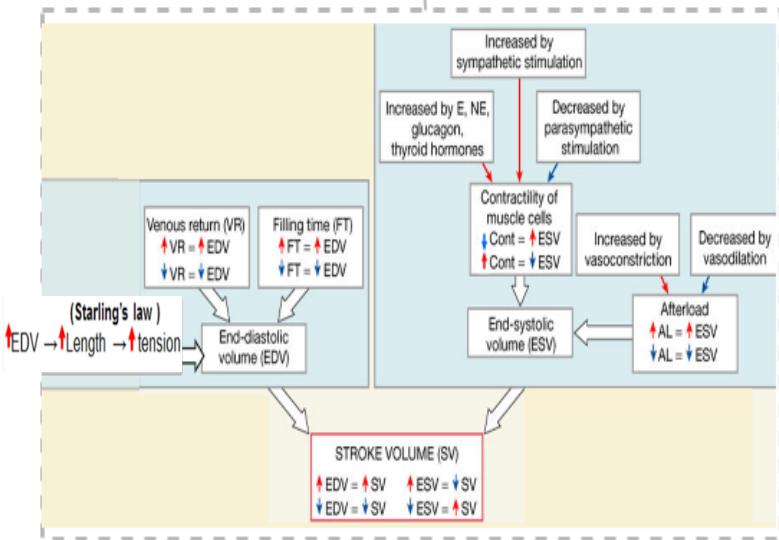
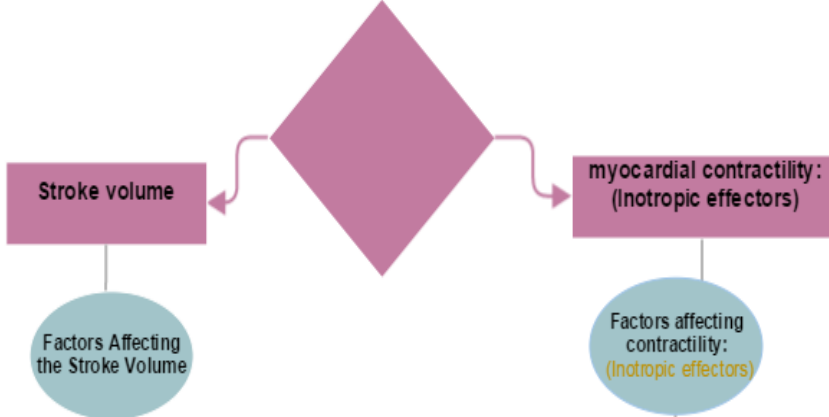


## Regulation Of Stroke Volume , Contractility & Heart Failure

stroke volume / end diastolic volume  
= 70 mL / 130 mL = 0.54

Fraction of end-diastolic volume ejected during a heart beat.

Ejection Fraction



<b>End-Diastolic Volume</b> (Starling's law of the heart) (Length-tension relationship)	(Within Limit) ↑length → ↑power of contraction	(Overstretching the fiber) ↑length → ↓power of contraction
<b>Cardiac innervation</b>	Sympathetic NS → ↑force of cont	Parasympathetic NS → ↓ atrial cont <b>NO effect on Ventricular cont</b>
<b>Oxygen supply</b>	Hypoxia → ↓c contractility	
<b>K&amp;Ca concentration in ECF</b>	↑ Ca <sup>2+</sup> → ↑c cont	↑ K <sup>+</sup> → ↓c cont
<b>Physical factors</b>	Warming → ↑c cont	Cooling → ↓c cont
<b>Hormonal &amp; chemical factors (drugs)</b>	<b>Positive inotropics:</b> (Adrenaline, noradrenaline, alkalosis, digitalis, Ca <sup>2+</sup> and caffien)	<b>Negative inotropics:</b> (Acetylcholine, acidosis, ether, chloroform, some bacterial toxins (e.g. diphtheria toxins), K <sup>+</sup> , ...)
<b>Mechanical factors</b>		

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# Heart Failure

## Definition

It is the pathophysiological process in which the heart as a pump is unable to meet the metabolic requirements of the tissue for oxygen and substrates despite the venous return to heart is either normal or increased

## Types

Left Side HF

Usually affected first

Right Side HF

#Usually occurs as a result of left heart failure.  
#Occasionally isolated right HF (COR PULMONALE) can occur due to lung disease

Systolic HF

Diastolic HF

## Causes

### 1- Impaired cardiac function

- Coronary heart disease
- Cardiomyopathies (muscle disease)
- Rheumatic fever
- Endocarditis

### 2- Increased cardiac workload

- Hypertension
- Valvular disorders
- Anemias
- Congenital heart defects

### 3- Acute non-cardiac conditions

- Volume overload (Renal impairment)
- Hyperthyroidism, Fever, Infection

## Signs and Symptoms

Lack of appetite/ Nausea  
Tiredness, fatigue

Seen in Left HF

- Orthopnea
- Pulmonary Edema
- Persistent Cough or Wheezing
- Paroxysmal nocturnal Dyspnea

Seen in RHF

- Hepatomegaly
- Peripheral Edema
- Elevated Jugular Vein

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