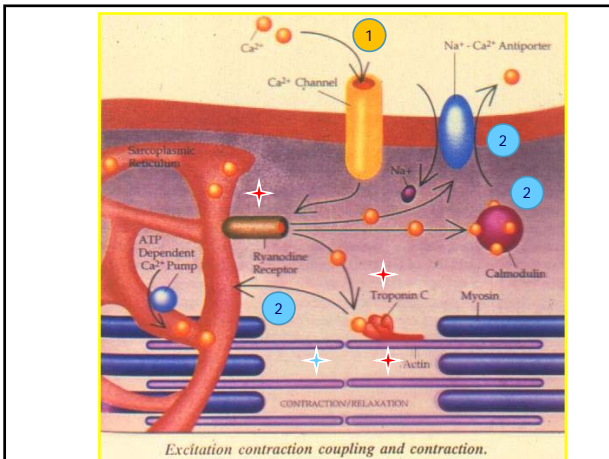


Cardiac Properties (2)

PHYSIOLOGY DEPARTMENT
CAIRO UNIVERSITY

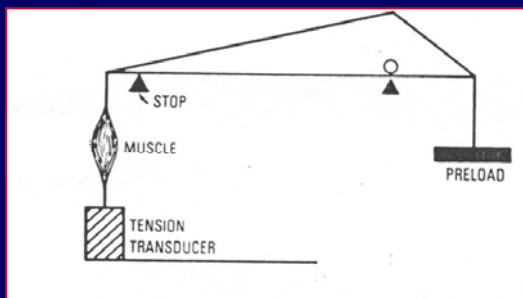
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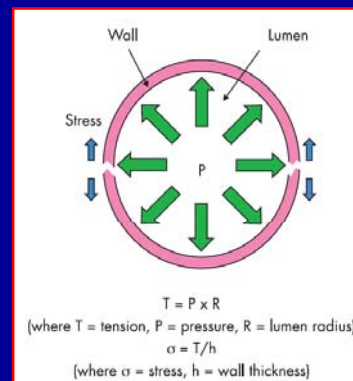


32- Regarding the conduction speeds in cardiac tissue.

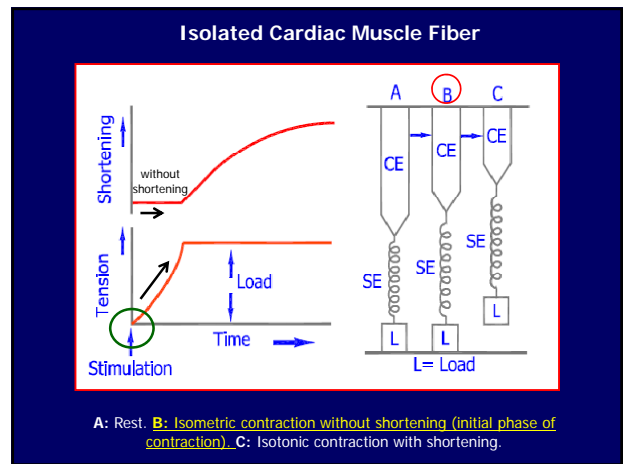
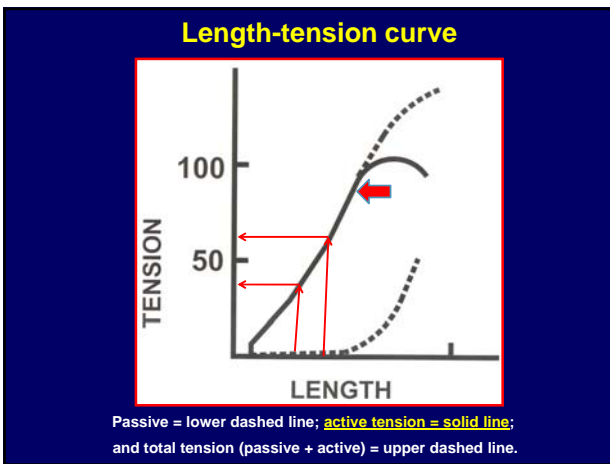
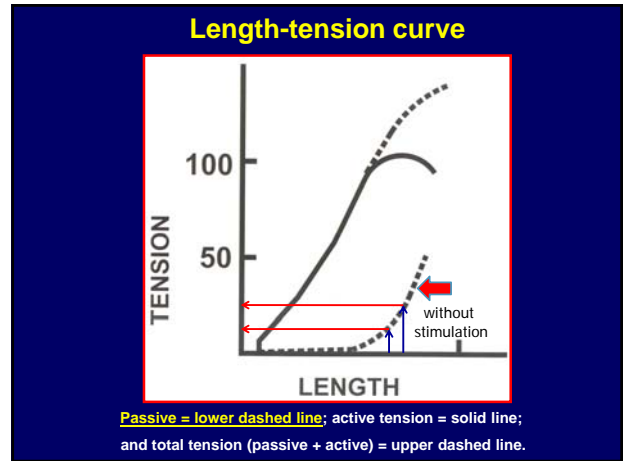
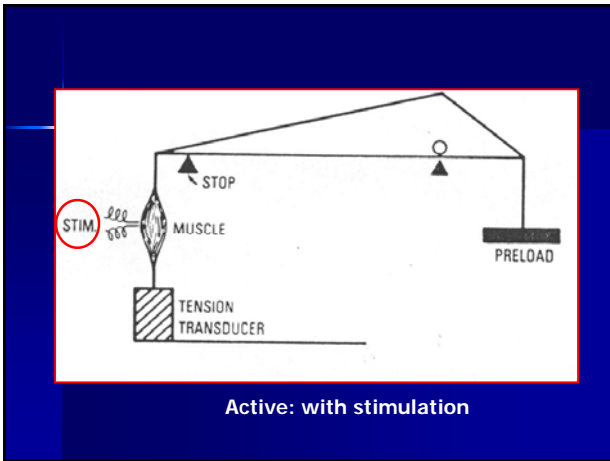
- a- Is determined only by the speed of upstroke of the action potential.
- b- The Purkinje system has the highest speed of conduction (1 m/sec).
- c- The AV node has the slowest speed of conduction (0.05 m/sec)
- d- Sympathetic stimulation and digitalis shorten the AV nodal delay while vagal stimulation lengthens it.



Passive: without stimulation

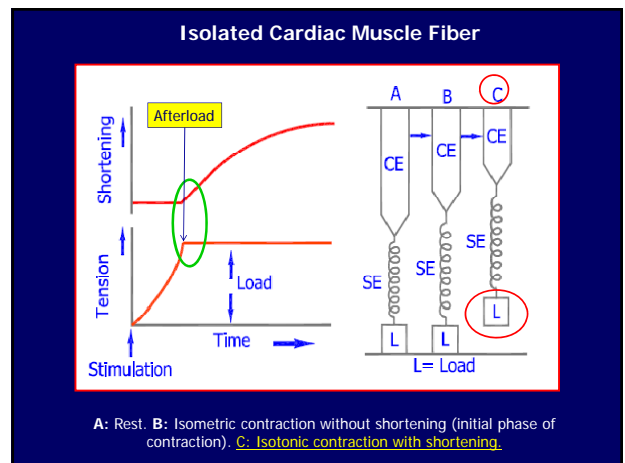


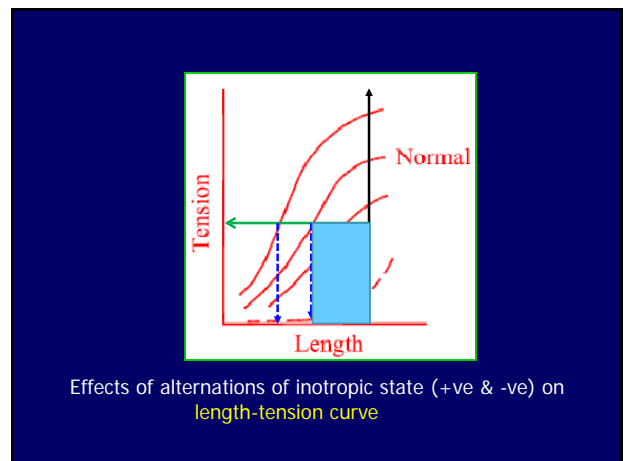
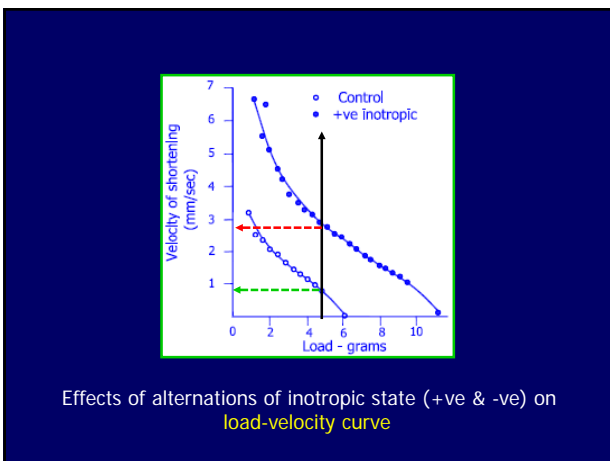
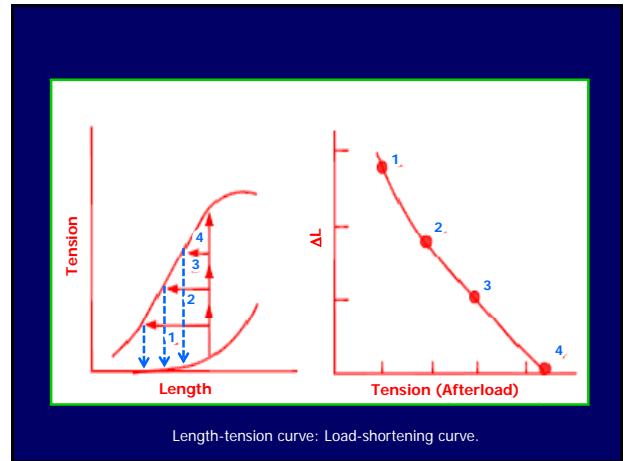
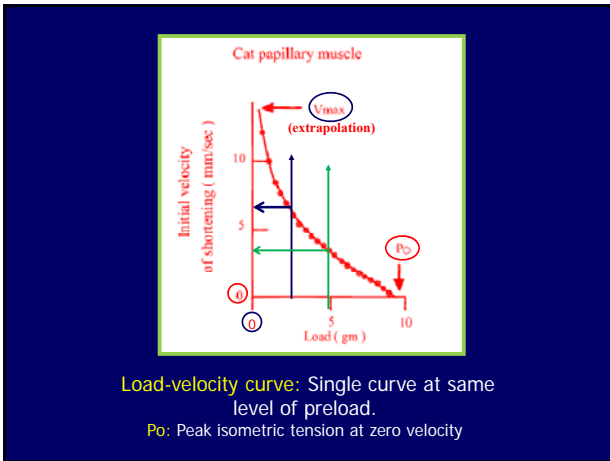
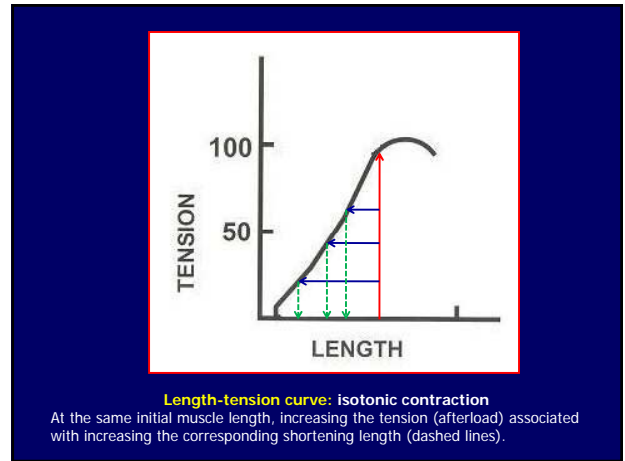
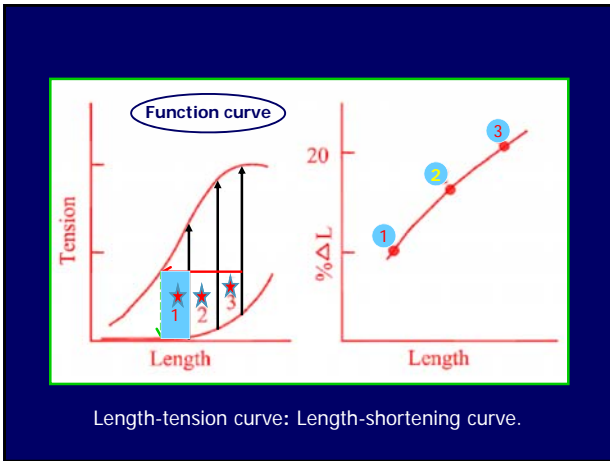
Wall stress and tension in a thin walled tube or chamber (Laplace's law)



Isotonic contraction with shortening

- The isometric-length-tension curve also provides a frame-work for isotonic contractions

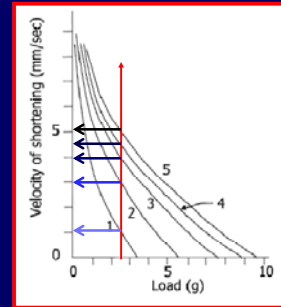




33- Regarding the excitation-contraction coupling in cardiac muscle:

- a- Cardiac cells directly trigger Ryanodine (Ry) channel Ca^{2+} release.
- b- Is an example of Ca induced Ca release (CICR) as all excitable muscles.
- c- Is blocked by dihydropyridine (DHP).
- d- Calcium is mainly reuptaked by mitochondria.

At any level of afterload, the muscle is faster and can shorten more at higher preload



Load-velocity curve: Multiple curves with increasing levels of preload (from left to right).

35- In length-tension curve of the cardiac muscle all the following are correct Except:

- a- Increasing preloads is associated with increasing in extent of shortening.
- b- Increasing afterloads is associated with decreasing in extent of shortening.
- c- At the same level of preload and afterload, -ve inotropic stimulus shifts the curve upwards and to the left.
- d- More shortening occurs with +ve inotropic stimulus.

34- All the following are the mechanisms lower intracellular Ca^{2+} and produce relaxation EXCEPT:

- a- Sarcoplasmic reticulum ATP-dependent Ca^{2+} reuptake.
- b- Na^{+} - Ca^{2+} exchanger.
- c- Calmodulin.
- d- Inhibition of Na-K pump.

37- Regarding the afterload in the whole intact heart :

- a- Is the resistance against which blood is expelled.
- b- It equals the end systolic pressure
- c- Approximately equals the aortic pressure.
- d. All of the above.

36- In the whole intact heart all the following are correct EXCEPT:

- a- The length of the muscle fiber is proportionate to the end-diastolic volume.
- b- The tension developed is proportionate to the pressure developed in the ventricle..
- c- The preload is the degree to which the myocardium is stretched before it contracts
- d. The afterload equals the end diastolic pressure.

39- Regarding Starling's law of the heart:

- a- An increase in resting length of the cardiac muscle enhances the force of its subsequent contraction, within limits.
- b- The increase in length of the sarcomere enhances the extent of overlapping between the actin and myosin filaments.
- c- The increase in length of the sarcomere increases the affinity of the regulatory protein (Troponin C) to Ca^{2+} .
- d- All of the above.

38- The performance of cardiac muscle is affected by:

- a- Mechanical determinants (preload and contractility).
- b- Heart rate.
- c- Contractility that depends on preload and afterload
- d- All of the above

THANK YOU