* Each of 3 types of muscle have it's own properity and these properity may be shared in more than one type of muscle.

Striation present → Skeletal + Cardiac.

location vary according to their function and structure → Skeletal muscle present in all over the body and it is responsible for local motion

Cardiac muscle → specifically responsible for development pressure and pushing of cytoplasm into B.V. if we cut nerve fiber it will get paralysis in skeletal muscle so it called operated (only)

Skeletal muscles are called neurogenic → so they do their function following a stimulus in their nerve supply. while both the smooth muscle and cardiac muscles are called myogenic which means that they have in net properity of contraction without their n. supply these depending on the unstable R.M.P presents of pacemaker and so that they have the ability to develop there A.p and followed by contraction

Bulk (skeletal) → very large in nember very large in the size

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* Contraction of ventricle in same time While contraction of atriam is separeted.

* The skeletal muscle are surrounded by membrane and this membrane isolate each muscle Fiber from adjacent one, While smooth muscle and cardiac have another Property that is (Elect + Mech). Connection which means that specially in the certien types of smooth muscle which is called as unitery smooth.m they are Mech+ele connected so that if we excitation of single smooth m.F it will spread all over the orgen

Cardiac muscle → each C.M separabed by it's own membrane but there is an interconnection between adjacent m.F through the intercalated disk and each m.F contain one single nuclus like that of the smooth muscle

properties of cardiac muscle.

* Branching and inter digitating → and these is very important to make the cardiac.M as a meshwork in order to develop a high pressure within ventricle and through the pushing the blood through the big blood vessel and each single cell has complete separated around by it's own membrane bub this membrane is connected with adjacent Muscle through the intercalated disk which is presenting the electrical and mechanical inberconnected between adjacent muscle.

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Fiber

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The receive they nerve supply which is an autonomic nerve supply (parasympathetic and sympathetic) and both this two nerve fiber are responsible for just regulation the activity of the nerve fiber which means that can increase the rate of contraction or decrease it and (increase + decrease) force of contraction through the stimulation

CM has the same (endoplasmic reticulum / Sacroplasmic) where in Skeletal muscle but not well develop. and poor developed in smooth muscle

If we do excitation of one CM and there is interance of Na^+ inside this CM it can pass from this cell to adjacent one and produce excitation.

All or none law (rule).

present in (CM), (Unitary smooth) muscle because a Gap junction through which electrical stimulus can be transmited from one cell to another So they are also following all or none law rule

(Single nerve Fiber) when we do stimulus it is produce action potential if the stimulus more than the threshold

T- tubules → it is important because the T- tubules if it present the release of Ca^{+2} and Ca^{+2} will produce the excitation contraction coupled So that if it present at Z- line it means that once there is released of Ca^{+2} it will produce Z excitation and contraction of Z adjacent Sacromere and this will produce more affetion of CM.

One of the property that well developed in CM and less developed in Skeletal muscle is Starling law → means that if we do stretching of the muscle it will produce increase force of contraction Why this is happen? because → Stretched CM due to separet actin away from myosin and this means that doing excitation or stimulation of the CM there will be more distance of slit for actin to slit between myosin.

Heart failure occures when there is excessive Stimulation of blood within the ventricle doing excessive stretching of CM and so that it will produce more in the contraction.

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*Cardiac muscle changes it's force of contraction according to blood flow in the ventricle as their increase in blood flow they move stretching more force of contraction within normal heart but in abnormal heart (heart failure) the flow of blood will produce more stretching and it will produce failure in contraction

Starling law is well develop in CM rather than the skeletal muscle because: → resting length of CM in sacromere is less than that in the skeletal muscle but in skeletal muscle the 2-2 line is about 2.4 µm and can be stretch up to 3 micron while in CM the 2-2 line is about 1.8 micron and can be stretched to 3 micron so more stretching and more availablity between actin and myosin and more force of contraction. The other thing that make a starling law more effective in CM is attach in CM there is no Bone so the increase of stretching is no limitation.

Other properties in CM ~> electrical properties

Action potential in CM vary → have prolonged duration (very long durations + plateau which means there is a prolonged period of which the R.M.P is still

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* Cardiac action potential

* It is formed of 4 phases

* Starting with R.M.p which is there is excitation the CM there will be rapid influx of Na^+ inside CM and this is presenting State 0 in A.p of CM

After that there will be slit repolarization that is Stage 1 and at this Stage there will be efflux of K^+

After this there will be opening of Ca^{+2} channel which produce influx Ca^{+2} inside the CM So keep the membrane potential toward positive value and these means that there is no R.M.p and this means also that there is reflecting period

After that there is Stage 3 in which there will Efflux of K^+ and activation of Na^+-K^+ pump that push the Na out and this will produce re-polarization of CM.

* Dukation of A.P

If we increase the rate of heart therabe of Contraction of CM and the duration of A.p will be decrease

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During rest in CM or Skeletal muscle there is resting membrane potential at which is prevention of enterance of Na^+ and prevention of enterance of Ca^{+2} but the K^+ can pass nearly 3 Freely across the membrane through the K^+ channel (leakage K^+ channel)

Depolarization ⇝ there are opening the Na^+ or Ca^{+2} channal so that ($Ca^{+2} + Na^+$) will pass inside the cell and this will produce depolarization at this stage K^+ are closed and this will produce development of an A.p in the muscle

Comparison between Cardiac + skeletal muscle A.p

The duration is very short about 1 msec at the beginning and to end in Skeletal.M and is CM about 150 - 250 and even it may increase more than 200 - 300 if there is very low heart rate

Types of CM

The pace maker cell differ from the CM in that there is not responsible mainly for contraction they are responsible for initation of an A.p while the CM although it can action potenial in an abnormal condition when there is decrease in the excitation through the pacemaker or through the conductive syst

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but the pacemaker cell are at side which git different CM through the normal contraction of ventricale +atrim

The arrangement of CM exitation occur by starting of A.P in pacemaker cell which present in SA node and the impulse travel through the atrim and change the AV septum which contain only fiberous tissue can't transmitte electrical activity to the ventricle

- A.V node excitated following the stimulation of the S.A node.

Through perkenji fibers pass to different CM and contracte will occur.

→ Pace makers have unstable R.M.P due to increase in the Ca^{+2} + decrase in the Efflux of K^+

→ CM contraction can be increase by stimulation of sympathetic N.S or by catecholamine (adrenaline and nor adrenaline) this called (+ inotropic effect)

This increase in force of contraction doesn't need much increase in the O_2 supply so it depend on innate properity of CM by increase availablity

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