

BIO 131 PAL

Week 7 – Problem Set 1

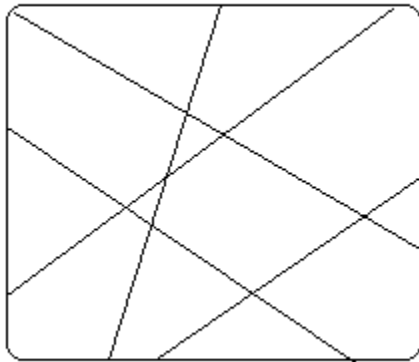
SKELETAL, SMOOTH, AND CARDIAC MUSCLE

1. Single unit smooth and cardiac muscle have gap junctions that connect individual muscle cells. Gap junctions are little "tunnels" that form between cells and allow ions to pass from one cell to another.

A. Why might gap junctions improve action potential conduction?

B. Why might gap junctions be important in smooth muscle? What about their role in cardiac muscle?

2. Smooth muscle has its actin and myosin arranged in a non-linear fashion. In the diagram below, each line represents an actin/myosin combo in a relaxed state. Draw your prediction of what this cell would look like when it's contracted.



A. What ion is responsible for initiating contraction in smooth muscle? Where does it bind?

B. What is the role of calmodulin in smooth muscle contraction?

C. Given the way smooth muscle contracts, explain how it might cause "squeezing" when it is arranged as a tube (as it is in a blood vessel or intestine)

3. Fill in the following table comparing the action potentials of cardiac and skeletal muscles:
 Contractile myocardium = the cardiac muscle cells that actually contract
 Autorhythmic myocardium = the cardiac cells that generate spontaneous membrane pot.

	Skeletal Muscle	Contractile myocardium	Autorhythmic myocardium
Nervous control			
Membrane potential	stable at -70 mV		
Rising phase of action potential			
Repolarization phase	rapid; caused by K ⁺ efflux		
Duration of action potential			
Refractory period			

5. Differentiate between temporal summation in a neuron vs. a skeletal muscle fiber.