

## Homework Assignment – Module 4

1. [20 points] From the statements below regarding smooth muscle choose the most correct statement AND briefly explain why each of the incorrect statements is incorrect.
  - A. Phosphorylation of ATP bound to myosin light chains depends on the binding of  $\text{Ca}^{2+}$  to calmodulin; this binding is potentiated by myosin light chain kinase.
  - B. The formation of crossbridges that can continue to cycle requires that myosin phosphatase be activated by an elevated intracellular concentration of  $\text{Ca}^{2+}$ .
  - C. The velocity of unloaded shortening ( $V_0$ ) is proportional to the percentage of crossbridges with phosphorylated light chains.
  - D. In response to a sustained (in time) stimulation most crossbridges become, and remain, phosphorylated.
  
2. [20 points] From the statements below regarding  $\text{Ca}^{2+}$  handling in smooth muscle choose the one that is most correct AND briefly explain why each of the incorrect statements are incorrect.
  - A.  $\text{Ca}^{2+}$  is released from the sarcoplasmic reticulum in response to an action potential coupled from the sarcolemma to the sarcoplasmic reticulum by the caveoli.
  - B. In response to a ligand binding to a receptor on the sarcolemma an ATP-powered pump drives extracellular  $\text{Ca}^{2+}$  across the sarcolemma and into the myofilament space.
  - C. An increase in the concentration of intracellular  $\text{Ca}^{2+}$  reduces the activity of myosin light chain kinase.
  - D. To enable relaxation,  $\text{Ca}^{2+}$  can be removed from the myofilament space by re-accumulation into the sarcoplasmic reticulum and by extrusion across the sarcolemma; both of these require energy.
  
3. [20 points] Indicate which of the following statements regarding smooth muscle is **not** correct AND briefly explain why it is incorrect.
  - A. Activator  $\text{Ca}^{2+}$  (for contraction) can enter the myofilament space across the sarcolemma in response to a stimulus that does not alter the sarcolemma's membrane potential.
  - B. Crossbridges in the "latch" state go through (finish, if they are attached) their cycle more slowly than crossbridges that are phosphorylated.
  - C. Single-unit smooth muscle is more densely innervated than is multi-unit smooth muscle.
  - D.  $\text{Ca}^{2+}$  in the myofilament space can be extruded across the sarcolemma *via* a secondary active transport mechanism.