Skeletal, cardiac and smooth muscle

• How are these muscle types similar and dissimilar

Smooth Muscle- Review

• Like skeletal: basic molecules
• Differ: size, time course, excitation contraction coupling
• No rigid sarcomere, allows for much greater change in fiber length, while still maintaining ability to contract

Smooth muscle tone

• Skeletal tone = asynchronous firing of motor units
• Smooth muscle tone = graded contraction depends on level of calcium and # of cross bridges formed

Examples of tone in smooth muscle

• Basic electrical rhythm of small intestine
• What happens to tone when you add acetylcholine?
• What happens to tone when you add epinephrine?
• Why does tone change in just the opposite way in walls of arteriole?
Cardiac muscle

• Structure:
  – sarcomeres (striated),
  – Troponin/tropomyosin
  – T-tubule
  – SR (not very elaborate) and significant calcium must come from extracellular fluid
  – Branching fibers, intercalated discs
    • desmosomes (why?)
    • Gap junctions (why?)

Metabolism of cardiac muscle

• Oxidative or glycolytic?
• Would you expect high mitochondrial density?
• Would you expect high capillary density?

Myogenic heart

• Pacemaker potential - spontaneous depolarization
• What is effect of NE or Epi?
• What is effect of Ach?
• Action potential in most of heart cells
  – Long plateau phase due to calcium influx
  – Two roles for calcium
• What is significance of long action potential?

Heart contracts as a unit

• 2 atria contract
• Then 2 ventricles contract
• Pacemaker cells (about 1% of total) drive this

How to increase cardiac strength of contraction

• Recruitment?
• Higher frequency of stimulation?
• More favorable overlap of thick and thin filaments due to stretch?
  – Starling Law of the Heart
• Increased sympathetic stimulation (increased calcium)
• Calcium channel blockers