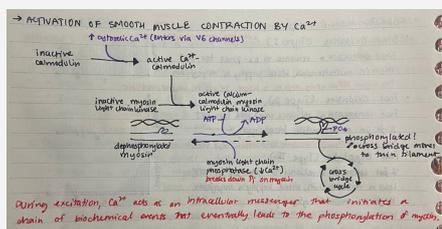


Smooth Muscle Features

Location: Walls of hollow organs and tubes, structures that change in volume. (ex-intestines).

- Non-striated.
- Uninuclear.
- Spindle-shaped cells (dia = 2-10 μm , l = 50-400 μm).
- Divide lifelong.
- Thick filaments = myosin.
- Thin filaments = actin, anchored to the plasma membrane or dense bodies.
- Filaments are not organized into myofibrils, no sarcomeres.
- No troponin, calmodulin instead!
- Tropomyosin present.
- Contract by sliding-filament mechanism.
- No T-tubules.
- Sarcoplasmic reticulum present.

Activation of Smooth Muscle Contraction by Ca^{2+}



Single Unit Smooth Muscle

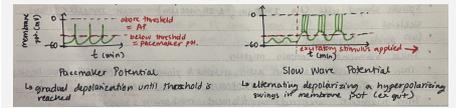
Cells respond to stimuli as a single unit due to connections via gap junctions = functional syncytium.

- Capable of generating pacemaker activity.
- Spontaneous AP from pacemaker SMC can propagate to non-pacemaker SMC due to gap junctions.
- Experience pacemaker potential and slow-wave potential.
- Ex- GI tract walls, reproductive tract walls, urinary tract walls, walls of small blood vessels.

Multi Unit Smooth Muscle

- SMCs that are activated by neuronal input.
- Cells respond to stimuli independently and contain few gap junctions.
- Ex- Walls of large blood vessels, large airways to lungs, muscles of the eye that adjust the lens, iris of the eye, base of hair follicles.

Pacemaker vs. Slow-Wave Potential



Excitation/Contraction Coupling in SMCs

- Self or neuron excitation leads to Ca^{2+} entry from the extracellular space via VG channels.
- Ca^{2+} entry triggers internal release of Ca^{2+} from SR.
- Ca^{2+} binds to calmodulin in cytosol.
- Ca^{2+} -calmodulin complex activates light chain myosin kinase (phosphorylates light chain of myosin).
- Phosphorylated myosin light chain binds to actin = activated cross-bridges.
- Removal of Ca^{2+} desphosphorylates myosin, dissociating it from actin.
- Gap junctions allow rapid spread of excitation between connected cells.
- Contraction strength is directly proportional to cytosolic $[\text{Ca}^{2+}]$.