SMOOTH MUSCLE
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ABSTRACT
Smooth muscle has always been a topic of second choice for most medical teachers. It is always dominated by skeletal muscle, which is a top favourite. This article would serve as a refresher on smooth muscle physiology for medical teachers who teach in medical and dental colleges. Smooth muscles are spindle shaped, lack striations and have single nucleus. They contain Actin and Myosin and contract by sliding filament mechanism.

KEYWORDS
Smooth Muscle, Single Unit, Multi-Unit, Smooth Muscle.


Types of Smooth Muscle
There are two types of smooth muscles: Single unit and Multiunit.

Single Unit
Consists of a group of muscle fibres, which are interconnected to each other by gap junctions. These contract as a group. Eg. Muscles of the hollow visera. These are stimulated mainly by circulating hormones or neurotransmitters.

Multiunit
This consists of a group of muscle fibres, in which each fibre can contract independent of the other. They are controlled mainly by nerves. Eg. Iris of the eye. Blood vessels have both single unit and multiunit smooth muscle in their walls.¹,²

Structure
It consists of actin, myosin, intermediate filaments, Calmodulin and dense bodies.

Contraction of Smooth Muscle
Contraction of smooth muscle is initiated by a Ca²⁺. In response to specific stimuli in smooth muscle, the intracellular concentration of Ca²⁺ increases and this activator Ca²⁺ combines with calmodulin. This complex activates Myosin Light Chain (MLC) kinase to phosphorylate the light chain of myosin (Fig. 1). Cytosolic Ca²⁺ is increased through Ca²⁺ release from intracellular stores (sarcoplasmic reticulum) as well as entry from the extracellular space through Ca²⁺ channels (receptor-operated Ca²⁺ channels).

Smooth Muscle Relaxation
Once the stimulus stops or the inhibitors of smooth muscle (e.g. atrial natriuretic factor is a vasodilator) start acting, muscle relaxation starts. Regardless of the process, relaxation requires a decreased intracellular Ca²⁺ concentration and increased MLC phosphatase activity (Fig. 2).³,⁴,⁵,⁶,⁷,⁸,⁹,¹⁰,¹¹ The sarcoplasmic reticulum and the plasma membrane contain Ca,
Mg-ATPases that remove Ca\(^{2+}\) from the cytosol. Na\(^+/Ca\(^{2+}\) exchangers are also located on the plasma membrane and aid in decreasing intracellular Ca\(^{2+}\). During relaxation, receptor- and voltage-operated Ca\(^{2+}\) channels in the plasma membrane close resulting in a reduced Ca\(^{2+}\) entry into the cell.\(^{11}\)

Sarcoplasmic reticular Ca\(^{2+}\)-binding proteins also contribute to decreased intracellular Ca\(^{2+}\) levels. Recent studies have identified calsequestrin and calreticulin as sarcoplasmic reticular Ca\(^{2+}\)-binding proteins in smooth muscle.\(^{11}\)

Figure 2. Relaxation of Smooth Muscle

REFERENCES