

Slow twitch fibers are better adapted for sustained aerobic activity. They are also called red muscle because they contain myoglobin, have many mitochondria, and are well supplied with blood vessels. Fast twitch fibers can generate maximum tension quickly, but they also fatigue quickly. They are called glycolytic or white muscle because they have few mitochondria, little or no myoglobin, and fewer blood vessels.

2. Why is it difficult to start and finish a pull up? What is the optimal length for generating maximum muscle tension?

When a muscle is stretched and the sarcomeres are lengthened, there is less overlap between the actin and myosin filaments. As a result, fewer cross bridges can form and less force can be produced. If the sarcomeres are stretched too much, actin and myosin do not overlap and no force can be produced. Titin molecules create enough elastic recoil to pull the actin and myosin filaments back into an overlapping arrangement. When the muscle is fully contracted, the actin and myosin filaments overlap so much that the myosin bundles are pressed up against the Z lines. Because they have no place to go, additional shortening is difficult.

What are the three main systems by which ATP is supplied to muscles?

The **immediate system** that uses preformed ATP and creatine phosphate. The **glycolytic system** that metabolizes carbohydrates to lactate and pyruvate. And the **oxidative system** that metabolizes carbohydrates or fats all the way to H<sub>2</sub>O and CO<sub>2</sub>.

4. What is the difference between membranous and cartilage bone?

Membranous bone forms on a scaffold of connective tissue membrane. Cartilage bone forms first as a cartilaginous structure resembling the future mature bone, then gradually hardens, or ossifies, to become bone.

5. What is the difference between cancellous and compact bone?

Compact bone is solid and hard. Cancellous bone has numerous internal cavities that make it appear spongy (although it is rigid).