

Skeletal Muscle System LAB Report

Introduction

The skeletal muscles is composed of intricate tissues that have a detailed structure and that voluntary contract. An early anatomist in 1584, known as Andreas Vesalius, contributed drawings of skeletal muscle to the world of anatomy. Skeletal muscles are ultimately made up of myofibrils that contain thick and thin protein filaments called myosin and actin. A.F. Huxley and Niedergerke in 1954, are accredited as founders of the sliding filament theory which is essentially the basic mechanism for contraction in the skeletal muscle. in 1984, Ritchie and Woods researched Muscle fatigue, which can also be known as a motor deficit, is the gradual exercised- induced decrease in the force of the muscles it performs contractions. Below are three labs that deliv deeper into the complex structure of the skeletal muscle and its purpose.

Part 1: Skeletal Muscle Structure:

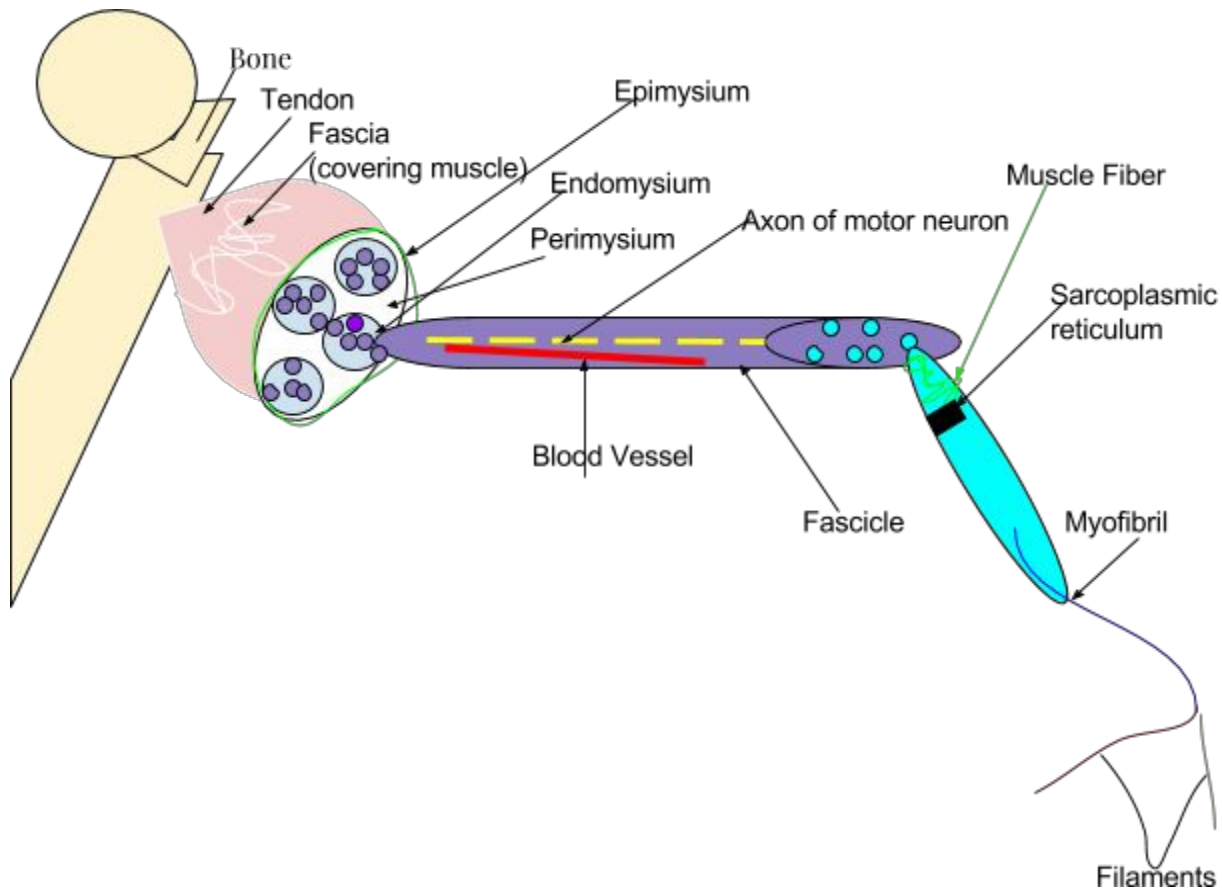


Figure 1

There are a variety of tissues that make up the skeletal muscle. To break it down, you start with the bone, coming off the bones are tendons. covering the muscle is fascia. Epimysium, is a

type of connective tissue, which lies just beneath the fascia. Perimysium stretches inside the the structure of the muscle where is seperates the fascicle. The 3rd connective tissue, is Endomysium, which actually separates the individual muscle fibers. Blood vessels and nerves pass through these layers. So, in a brief run down is it goes from muscle to fascicles, to muscle fibers, to myofibrils, to the thick (myosin) and thin (actin) filaments. Myosin, is a motor protein that generates the force in a muscle contraction resembling the stroke of an oar. Actin is a spherical protein that forms, among other things, that makes up the thin filament in muscle cells

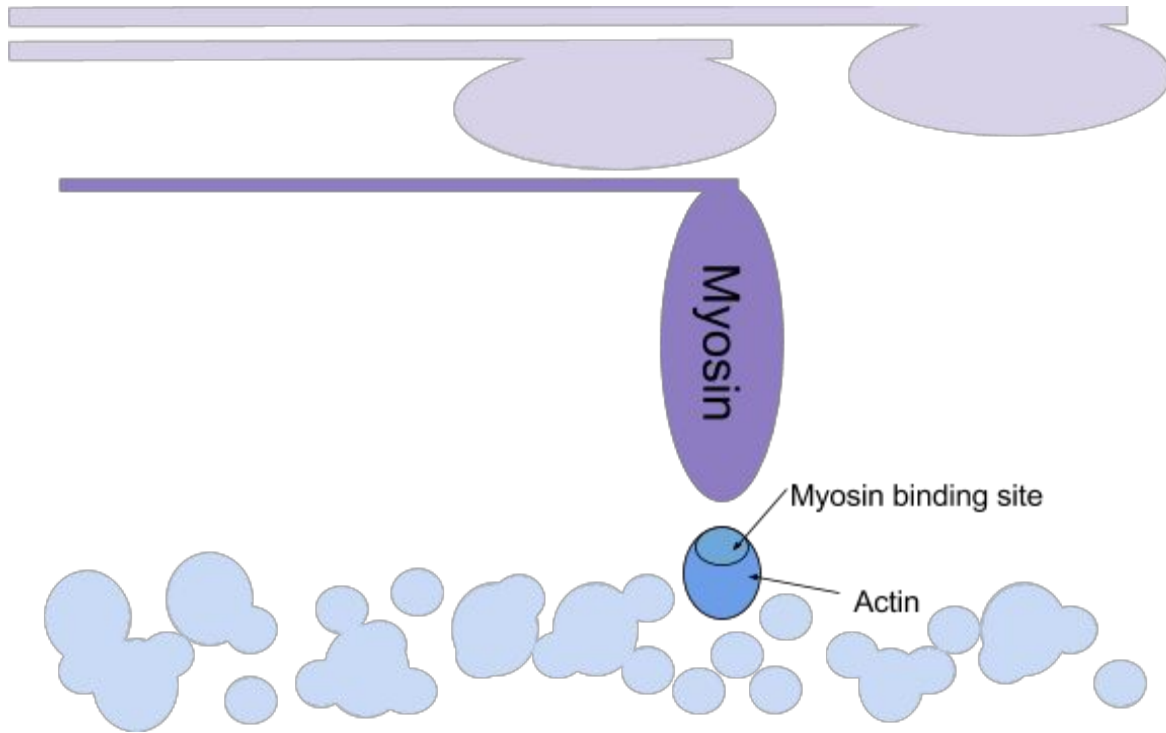
Part 2: Muscle Contraction

Muscle Fiber lengths in mm	Before ATP Length	After ATP Length	Before ATP Width	After ATP Width
1	11 mm	3 mm	2 mm	1 mm
2	10 mm	4 mm	2 mm	
3	9 mm	2 mm	2mm	
4	13mm	5 mm	3 mm	
Averages				

After, ATP (energy) was applied we saw that the Muscle fiber started to contract. The reason the muscle contracted after the ATP was added was because it breaks down the myosin-actin crossbridge freeing the myosin for contraction.

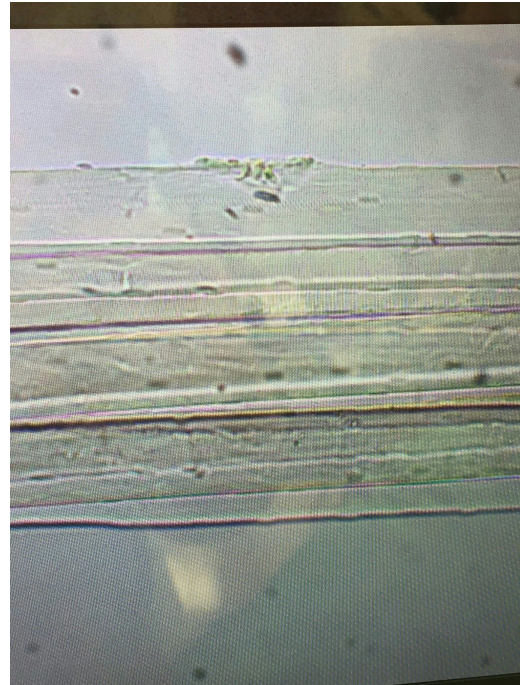
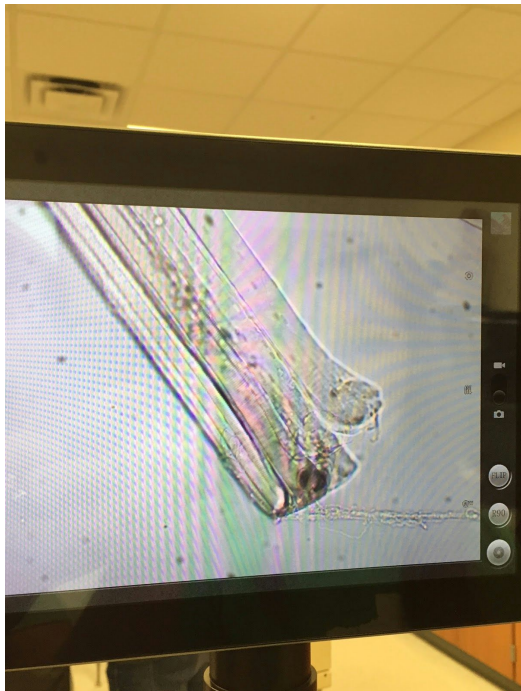
The bond between the myosin and the actin filaments are super strong.

There are two main proteins that regulate myosin and actin interactions. Tropomyosin and Troponin are the proteins. Tropomyosin is a long strand that loops around the actin chains in the thin filament. By covering the myosin-binding sites of the actin molecules, tropomyosin prevents muscle contraction.

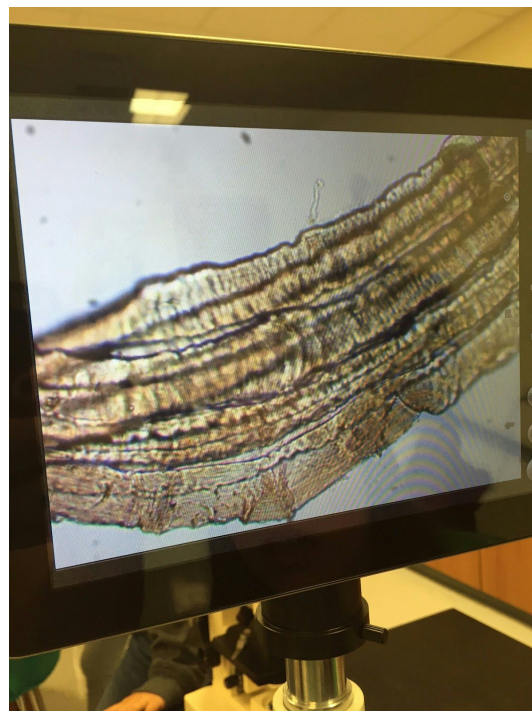
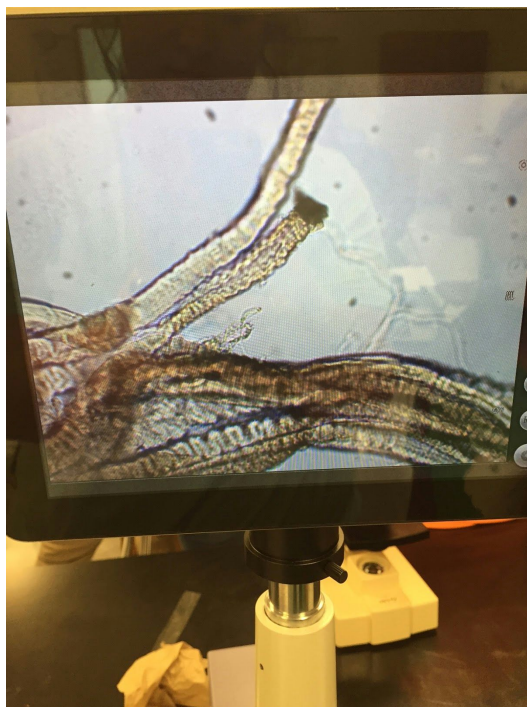


For a better understanding of how the myosin and actin's role here is a model.

Before ATP was added



After ATP was added



Part 3: Muscle Fatigue

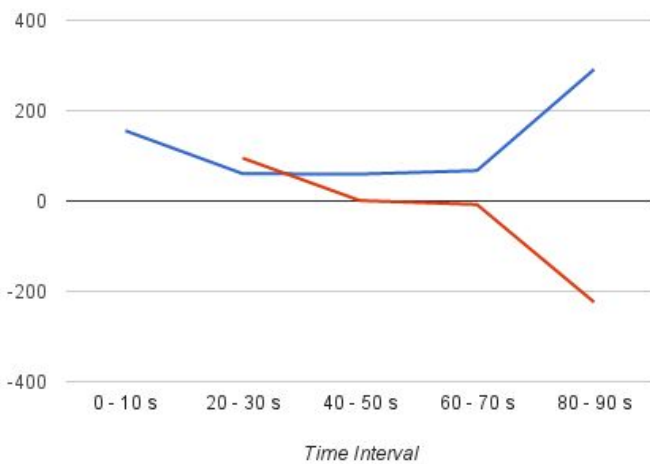
Grip Strength and Fatigue

Continuous Grip		
Time Interval	Maximum Force (N)	Δ Maximum Force (N)
0 - 10 s	155.5	
20 - 30 s	60.5	95
40 - 50 s	59.5	1
60 - 70 s	67.3	-7.8
80 - 90 s	291.3	-224

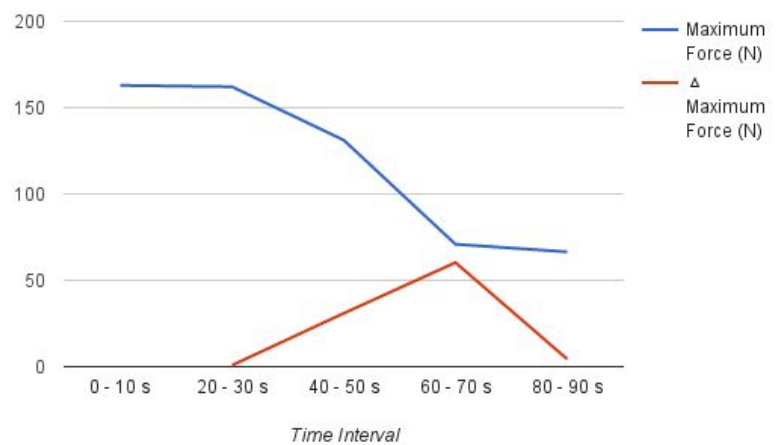
Repetitive Grip		
Time Interval	Maximum Force (N)	Δ Maximum Force (N)
0 - 10 s	162.9	
20 - 30 s	162.1	0.8
40 - 50 s	131.2	30.9
60 - 70 s	70.9	60.3
80 - 90 s	66.5	4.4

When we started this lab for Grip Strength and fatigue, I was thinking how cool, I can see how strong my grip is! Well, Lauren and Marcus we partners and me and Marcus started having a little competition, to see who had the strongest grip. Well at first it was easy i but everything i had into squeezing that little sensor, bound and determined to have the highest number. After a while I noticed my arm was getting really tired and that my grip wasn't as strong. Especially, when we did the continues grip i found that after 60 seconds I could barely squeeze the sensor. The point of this lab i think was to show and have us experience muscle fatigue. Muscle fatigue is a condition in which a muscle loses its ability to contract as a result of overactivity. It is usually a period after stimulation during which the muscle is unresponsive to a second stimulus.

Continuous Grip



Repetitive Grip



Work Cited

Chin, G. (n.d.). Muscle Contraction. Retrieved November 23, 2015, from <http://study.com/academy/lesson/muscle-contraction-actin-and-myocin-bonding.html>