**Exam 1 Part C. Your Name:**

**Please TYPE your answers in an MS Word Document. When complete send your exam answers as an ATTACHMENT to an Email to Dr. Kravitz. Exam 1 Part C is due Friday February 5 by 12midnight. No late papers accepted. Also, academic honesty is totally active here. Please do your OWN work! Use AS MUCH SPACE as you wish in your answers!**

*This EXAM is open note. Please use the August 24-August 28 LINK to guide your answers.*

**A. Please answer the following questions. (3 pts each for a total of 51 pts )**

1. With motor unit recruitment, are specific motor units ‘emphasized’ or ‘isolated?

2. Compare the diameter of the nerve and diameter of the muscle fiber of a Type I and Type IIa motor unit. (which has the greater diameter)?

3. Compare the diameter of the nerve and diameter of the muscle fiber of a Type IIa and Type IIx motor unit (which has the greater diameter).

4. Where is the calcium ion housed in muscle?   
5. Calcium has a strong affinity to what protein?  
6. Which protein shifts during a muscle action?  
7. What causes the S1 units to disconnect from actin binding sites?   
8. Which protein on actin is composed of 'three component structures'?   
9. The binding sites on actin are covered by what protein (in a resting state)?   
10. After the nerve impulse stops what happens to the calcium ions?

11. The movement of actin over myosin is called a \_\_\_\_\_\_\_\_\_\_\_ stroke?   
12. Before myosin S1 units attach to binding sites on actin, what has to happen to ATP?

13. In the YOUTUBE video Dr. Kravitz explained that the sarcolemma, motor end plate and T-Tubules have a very interesting physiological commonality. What is this?

14. Which muscle fiber type generates more force: fast twitch or slow twitch?

15. Which muscle fibers are more resistant to fatigue?

16. Which muscle fibers easily fatigue?

17. What does a proprioceptor sense in the body?

**B. Describe, in your own words, motor unit recruitment. Break it down step by step with Type I, Type IIa and Type IIx motor units and identify the factor that most influences motor unit recruitment. (25 pts)**

**C. The sequential events of muscle contraction within skeletal muscle are placed out of order. Please place them in correct order. I have started for you. (28 pts)**

\_\_\_\_\_ Calcium ions bind with troponin

\_\_\_\_\_ Impulse stops; calcium ions are returned to the sarcoplasmic reticulum

\_\_\_\_\_ ATPase splits ATP to ADP + Pi + Energy

\_\_\_\_\_ Power Stroke

\_\_\_\_\_ Tropomyosin shifts, binding sites available

\_\_\_\_\_ S1 units binds actin

\_\_\_\_\_ Tropomyosin returns over binding sites

\_\_1\_\_ Calcium ions released

**D. The sequential events of the arrival of the nerve impulse at the neuromuscular junction are placed out of order. Please place them in correct order. I have started for you. (28 pts)**

\_\_\_\_\_ ACh binds with motor end plate

\_\_\_\_\_ Impulse travels along transverse tubules

\_\_\_\_\_ ACh released from synaptic vesicles (called exocytosis)

\_\_\_\_\_ Transverse tubules excite sarcoplasmic reticulum to release calcium ions

\_\_1\_\_ Impulse arrives at axon terminal

\_\_\_\_\_ Synaptic vesicles fuse with nerve cell membrane

\_\_\_\_\_ Calcium ions rush in; react with synaptic vesicles

\_\_\_\_\_ Depolarization of motor end plate

**E. In your own words, explain what a muscle spindle does? (4 pts)**

**F. In your own words, explain what a golgi tendon organ does? (4 pts)**

**G. What is the double role of calcium ions in muscle contraction as discussed in the YOUTUBE video. (6 pts)**

**END**