Honors Biology Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
NDHS Per: \_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Muscle Contraction**

Basis of Muscle Contraction = **Actin filaments (microfilaments) and Myosin Proteins**

**Muscle Structure:**

Muscle is made of **Fascicles**.
Fascicles are made of clusters of **muscle fibers (Muscle Cells)**Muscle fibers are made of **Myofibrils**
Myofibrils are made of **sarcomeres**
Sarcomeres are made of **Actin and Myosin**



Almost every muscle is attaches to a **bone at each end using tendons.** Exception: the **tongue**.

When muscles contract they pull on the **tendons** which pull on the **bones** causing the **bones to move**.

**Muscle Contraction**

**Requirements:** Energy: **ATP (Adensosine Triphosphate)** **Calcium Ions** – stored in the **smooth E.R. of the Sarcomere** – called the **Sarcoplasmic Reticulum**
 Actin and Myosin

**Process:**1) A signal is sent from the brain to the muscle by a **motor neuron**
2) The motor neuron releases a chemical called **acetylcholine**
3) Acetylcholine causes the **Sarcoplasmic Reticulum to release Calcium Ions**
4) Calcium Ions allow **myosin to bind to actin and pull the actin filaments closer together**

Myosin must first be **activated by ATP**.
ATP **binds to Myosin** making it ready to bind to the actin
When the mysosin binds to the actin, the **ATP leaves and the myosin moves the actin forward**
This repeats until the muscle is fully contracted.

**Muscle Relaxation:
Calcium ions** are pumped back into the **Sarcoplasmic Reticulum**
Myosin can’t bind to the actin anymore so the actin **slides back into place**.
This is added by **Potassium (K+) Ions**

**Building Muscle**Exercise creates **microtears** in the muscle fibers = **soreness**
When the microtears are repaired the muscle cells get **thicker** = **bigger muscles**

Lactic Acid causes the “burning” in your muscles during and shortly after a workout but is gone within hours of the end of the workout.