

## **Muscular System**

All muscles work by contraction, opposing groups create flexion and extension.

Muscular system works in conjunction with skeletal system for locomotion. Muscles attach to bones via tendons.

### 3 Types of Muscle

1. skeletal muscle - for movement
2. smooth muscle - internal organs (stomach, intestines, etc.)
3. cardiac muscle - heart

### Circle of Muscles

The ring goes from poll down back to hocks, then from hip along belly up to chest. It is responsible for correct movement, and are the muscles that should be strengthened regardless of discipline.

Key muscles are the latissimus dorsi, longissimus dorsi, trapezius, ilio-psoas, rectus abdominus, external and internal obliques, scalenus, rhomboideus are the main muscles that form the ring.

For pictures and more information, see:

[https://c.ymcdn.com/sites/ponyclub.site-ym.com/resource/resmgr/quiz-instruction/ring\\_of\\_muscles\\_from\\_faceboo.pdf](https://c.ymcdn.com/sites/ponyclub.site-ym.com/resource/resmgr/quiz-instruction/ring_of_muscles_from_faceboo.pdf)

<http://midcalponyclub.org/images/files/Study-Guides/Study%20Guide%20HA%20Movement%20and%20Conformation%20Unsoundnesses.pdf>

[http://www.equinestudies.org/ring\\_revisited\\_2008/ring\\_of\\_muscles\\_2008\\_pdf.pdf](http://www.equinestudies.org/ring_revisited_2008/ring_of_muscles_2008_pdf.pdf)

## **Diseases and Conditions Affecting the Muscular System:**

### Tetanus

Affects muscular system and nervous system. Toxins released by the tetanus bacteria bind to interneurons, keeping them from inhibiting excitatory signaling, which leads to the involuntary contraction of muscles that is associated with tetanus.

### Muscle Strains

Comes from overexertion, tearing of muscle fibers requires treatment.

### Tying Up

*Symptoms:*

- short stride

- difficulty weight-bearing
- cramping of hindquarters
- elevated heart rate and respiration, sweating
- in severe cases, damage to muscles leads to release of myoglobin, causing dark reddish urine and creating potential for kidney damage

### *Diagnosis*

Tying up can be diagnosed with a blood test that identifies proteins released by damaged muscles

### *Causes and Types*

There is not a lot of clarity in terms of distinguishing cause, knowing what tying up, azoturia, and exertional rhabdomyolysis are.

#### 2 General categories:

1. Sporadic exertional rhabdomyolysis: occasional episodes, often caused by overexertion, electrolyte imbalance, possibly vitamin E/selenium deficiency
2. chronic exertional rhabdomyolysis: regular episodes, can limit athletic career, prior episodes make horses prone to future episodes

There is no consensus about the cause of chronic exertional rhabdomyolysis, ideas range from hormonal imbalance to vitamin deficiencies. However, there are 2 specific identified causes:

- a defect in how muscles contract causes recurrent exertional rhabdomyolysis (RER)
- a disorder that leads to excess carbohydrates being stored in muscle tissue: polysaccharide storage myopathy (PSSM)