

# HORSES INSIDE OUT

## *The Anatomy of Muscles*

*Part 1.*

*by Gillian Higgins*

This is the first in a three-part series about the horse's muscular system. It will cover muscle types, fibre arrangements, how muscles contract, create movement, support posture and how they strengthen and respond to training.



*Gillian Higgins* is an Equine Sports and Remedial Therapist, BHS Senior Coach, Lecturer, Author and founder of Horses inside Out. With a background in human therapy, Gillian's ethos is strongly based around muscle function and balance.

"To enable optimum performance, suppleness, flexibility and range of movement, muscles need to be appropriately strong, supple and working together in harmony and balance," says Gillian.

"Muscles that have a tendency to become tight and sore require regular stretching and muscles that have a tendency to be ineffective, slow to support, long or weak benefit from regular strengthening exercises. Knowing which muscles need to be strengthened and which need to be stretched comes from an understanding of the anatomy and biomechanics of the musculoskeletal system, movement and experience."

### *Muscles*

Muscles control every aspect of movement both internal and external. They form the largest tissue mass in the horse's body. There are various types of muscles performing a wide variety of tasks all working in a similar way. Electrical impulses instruct the fibres to contract and shorten then relax and lengthen.

There are 3 types of muscle. Smooth and cardiac, which function automatically as a result of voluntary or autonomic activity within the brain and skeletal, which under voluntary or conscious control, co-ordinate and create movement.



**Smooth Muscle.** This is involuntary muscle which functions automatically. It surrounds and is found in all internal tissues and organs. Smooth muscle responds to stimuli from the autonomic nervous system. It is responsible for pushing food through the digestive system and the physical control of the bladder and bowel. It is also found in the vascular and reproductive systems.

**Cardiac Muscle.** This highly specialised, strong, thick and striated muscle is fatigue resistant. Beating around 100,000 times a day throughout the horse's lifetime it co-ordinates the propulsion of blood in and out of the heart.

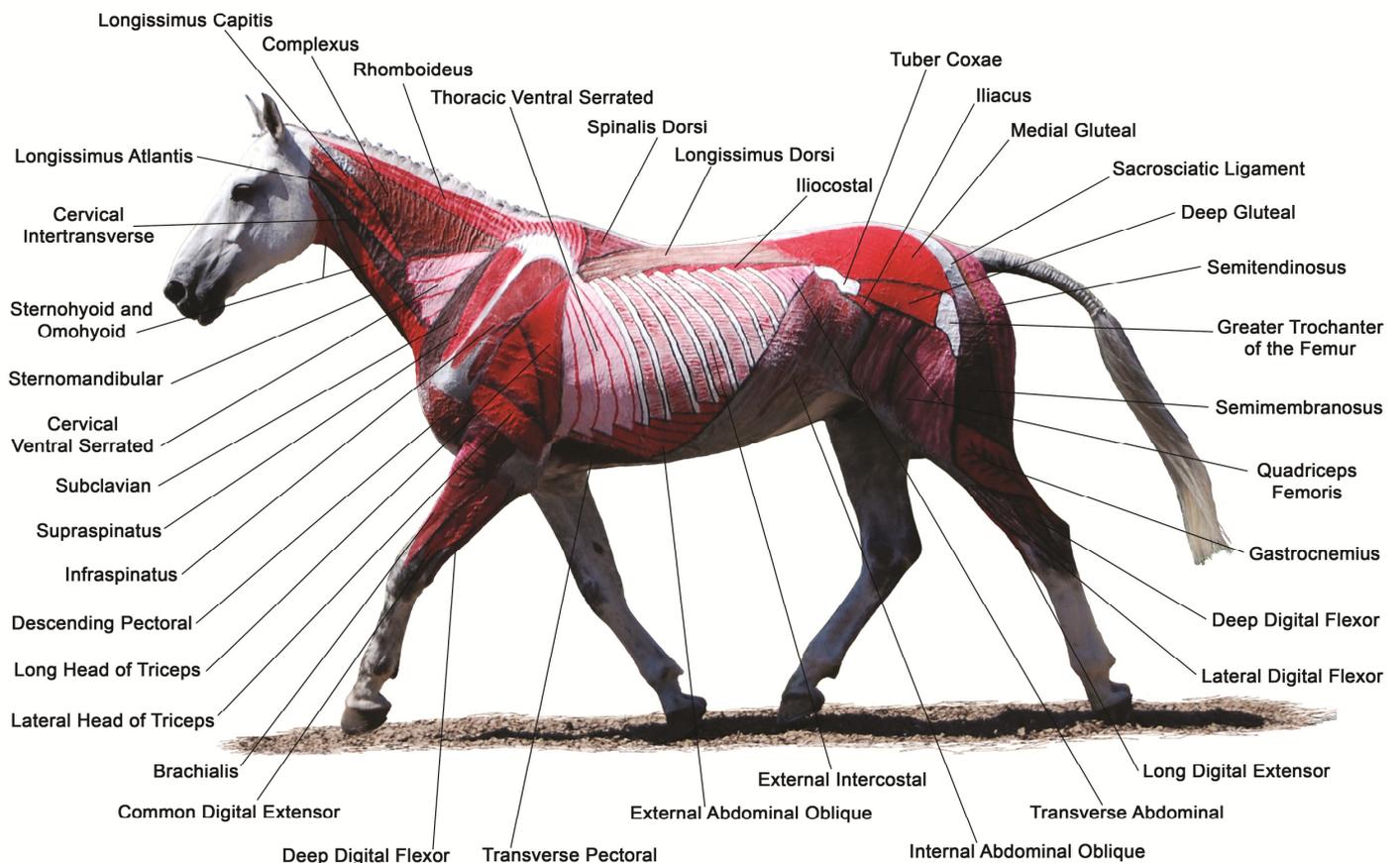
**Skeletal Muscle.** There are over 700 different skeletal muscles in the horse. The Central Nervous System sends a signal to the muscles via nerves which then convert chemical energy into movement and the muscles, which are highly elastic and have strong contractile powers, react accordingly. The function of skeletal muscle is to:

- support the skeleton and create movement
- maintain joint stability and posture
- control range of movement
- protect the skeleton and internal organs from trauma
- contribute to thermoregulation by shivering.

The muscles attach to the bone via the periosteum at the point of origin, which is nearest the body centre and the point of insertion which is furthest away.

## HORSES INSIDE OUT - The Deep Muscles

By Gillian Higgins



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The function of the deep muscles is posture and stability. They:

- attach directly to the bone
- are located close to the joints
- often have a number of points of origin and insertion
- are often responsible for supporting individual joints for example, the deep gluteal muscle only affects the hip joint
- have a high number of nerve endings which makes them more sensitive to postural alignment.

## Superficial Muscles

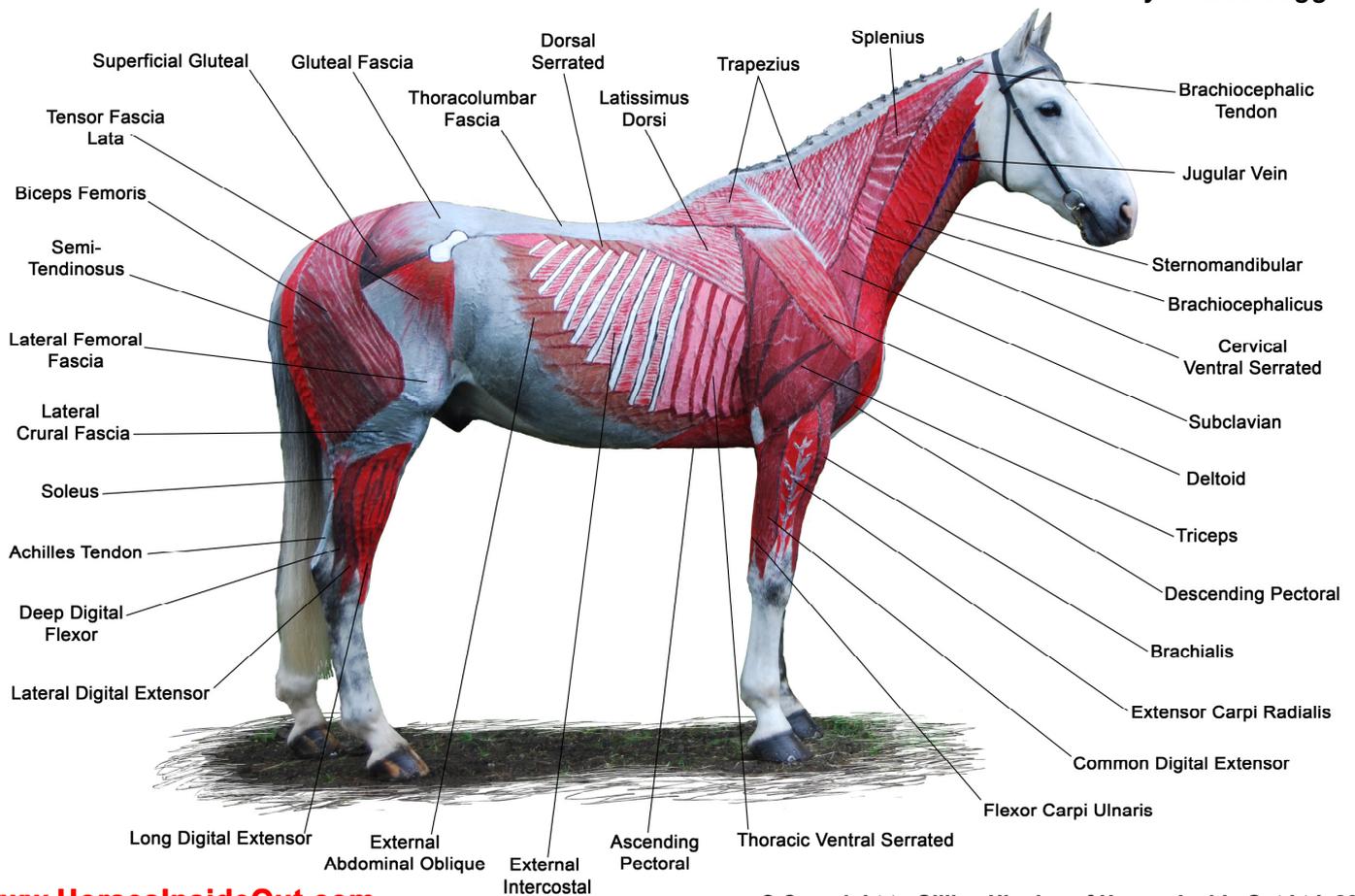
The superficial muscles are located between the deep muscles and skin. Although they vary in size and shape they are generally classified as movement muscles. They are either :-

- bulky, such as the superficial gluteal muscles, around 25cm thick in a 16 hand horse, the triceps muscles, around 20cm thick or the masseter muscle that moves the jaw or
- sheet like, such as the external abdominal oblique which spans the entire abdomen and contributes to rib movement, bend and protraction of the hind limb.

Deep muscles tend to have fibre arrangements for posture and support whereas the superficial muscles tend to have fibre arrangements for movement.

### HORSES INSIDE OUT - The Superficial Muscles

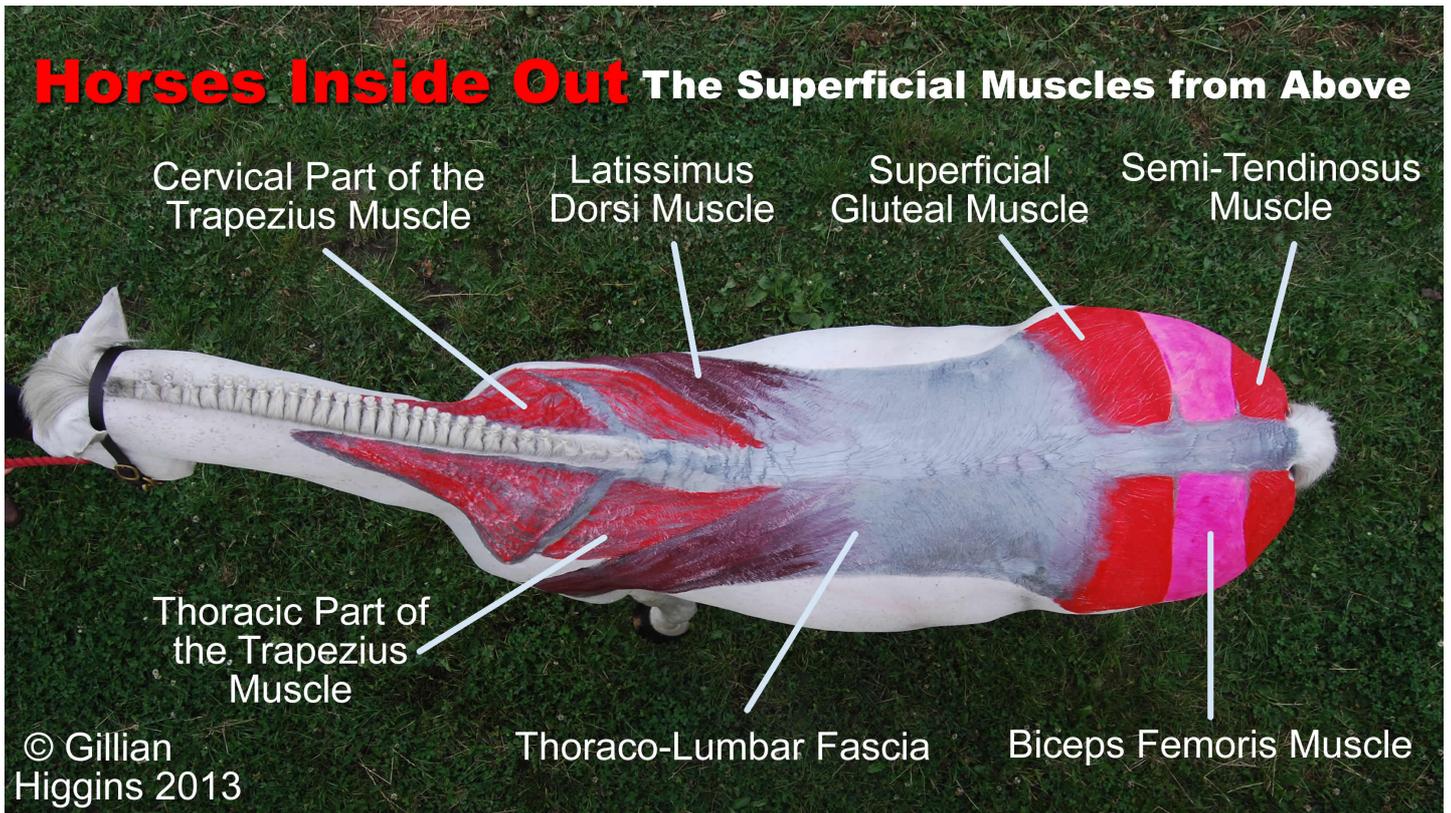
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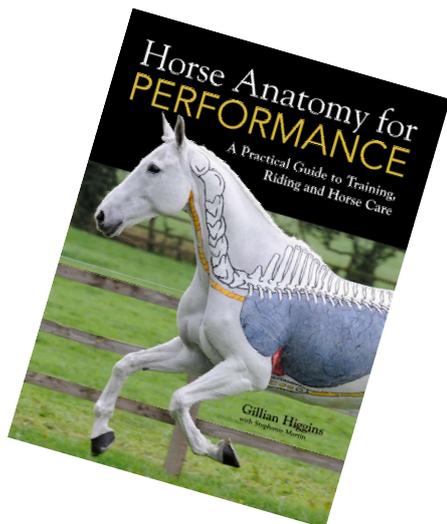
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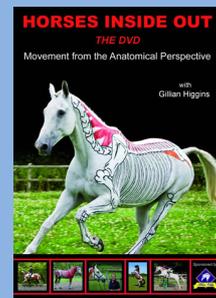
Superficial muscles in the hind quarters are large and powerful. Those running down the back of the hind legs extend the hip, stifle and hock joints and push the horse forwards over the planted hind limb. The superficial muscles between the front legs support the thorax and attach the forelimbs to the rest of the body whilst those and running down the front of the forelimbs bring the leg forwards in protraction.



Superficial muscles are located further away from bone and joints thereby having points of origin and insertion into fascia and other muscles as well as bone. The latissimus dorsi and superficial gluteal muscles attach into the thoracolumbar fascia. The surface of the superficial muscles can easily be felt for tension, heat and swelling. They are readily influenced by complementary therapies such as massage, magnetic therapy, active and passive stretches.



This is an extract from Horse Anatomy for Performance by Gillian Higgins and Stephanie Martin. For this and other Horses Inside Out Books and Videos please visit [www.HorsesInsideOut.com](http://www.HorsesInsideOut.com). Look out for part 2 of Horses Inside Out – The Anatomy of Muscles next month.



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**What are the titles of Gillian Higgins' 2 DVDs?**

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