

The following presentation
on

Equine Body Stress Patterns
And
Orthopaedic Balance

is formulated from practical and clinical studies carried out by

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Grad Dip Animal Chiropractic CVA

Equine Orthopaedic Balance®

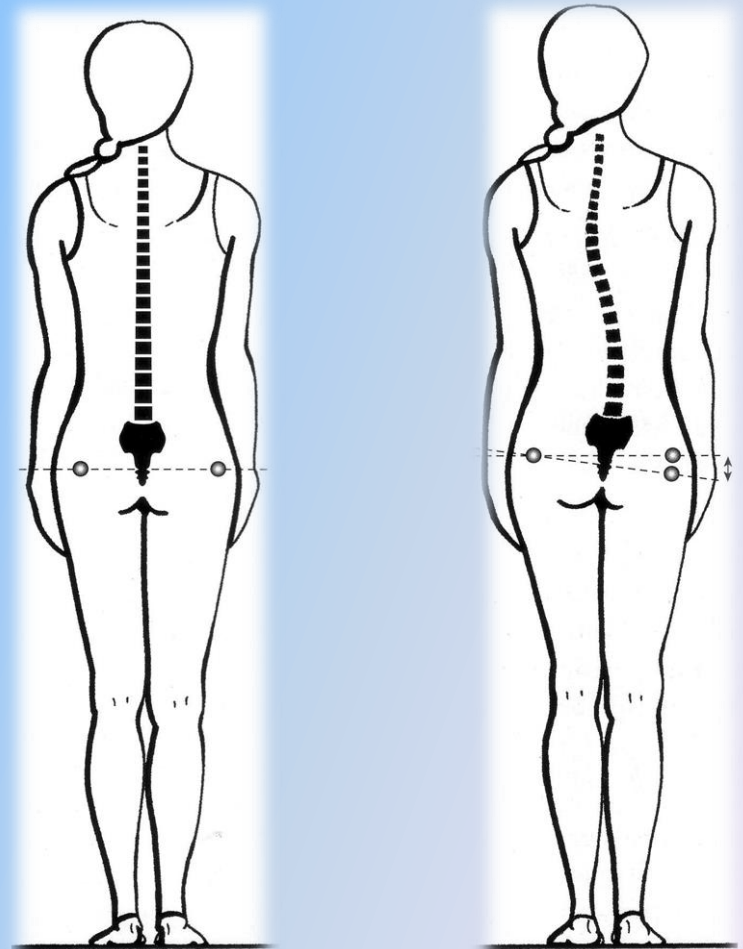
The entire musculoskeletal system in motion and at rest, not just the hoof pastern axis alignment

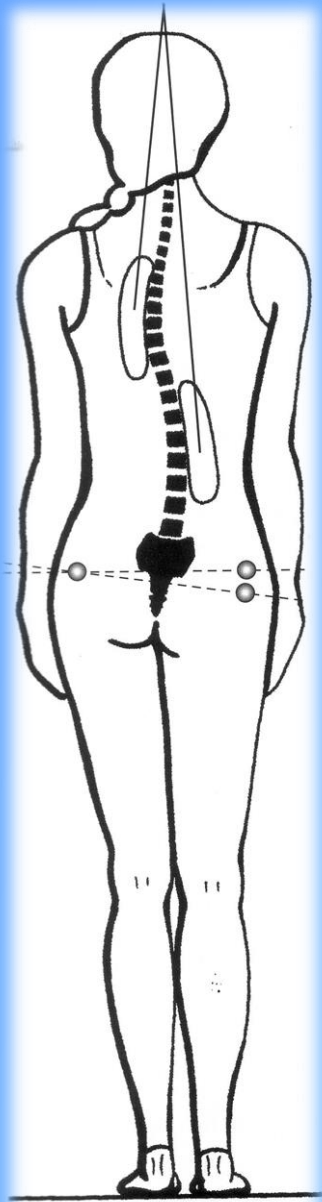


In uprights....

A difference in leg length will affect the balance of the sacro-pelvis and scoliosis of the thoraco-lumbar spine.

The length difference can be traumatic, functional or as a result of chronic compensation.





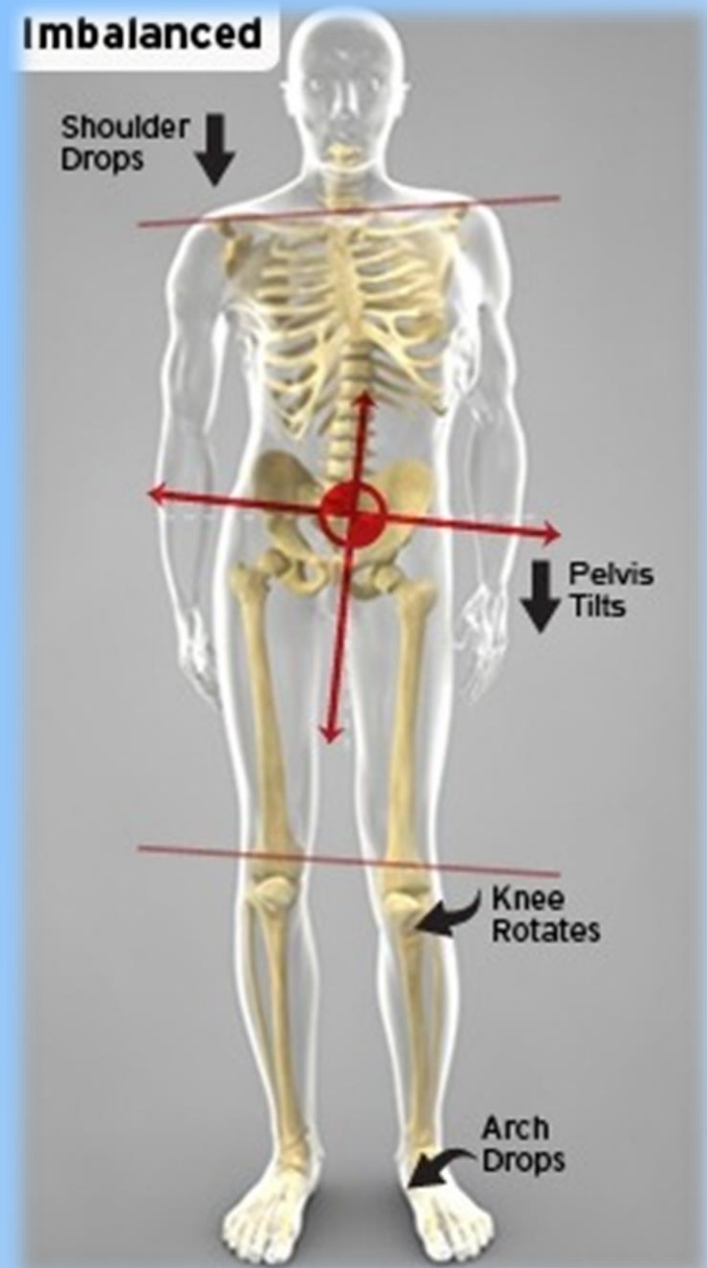
Uncorrected, there will soon be consequent back pain and muscle changes & balance adjustment.

There will be changes in shoulder height, and consequent secondary cervical pain. The thoracic involvement affects respiratory function through rib involvement.

The shoulder differences affect arm and hand function. The thoracic inlet function is compromised.

The posture and architecture of the feet can have a significant effect on posture and the consequent function, leading to fascial tension and pain.

The situation in equines is more complex, but certain patterns can be identified



10%

Centre of Mass moves forward with neck extension and back with neck flexion and head height

This is an important consideration in every horse you treat

WA change in loading from the foot balance will cause all the functional movement systems to adapt



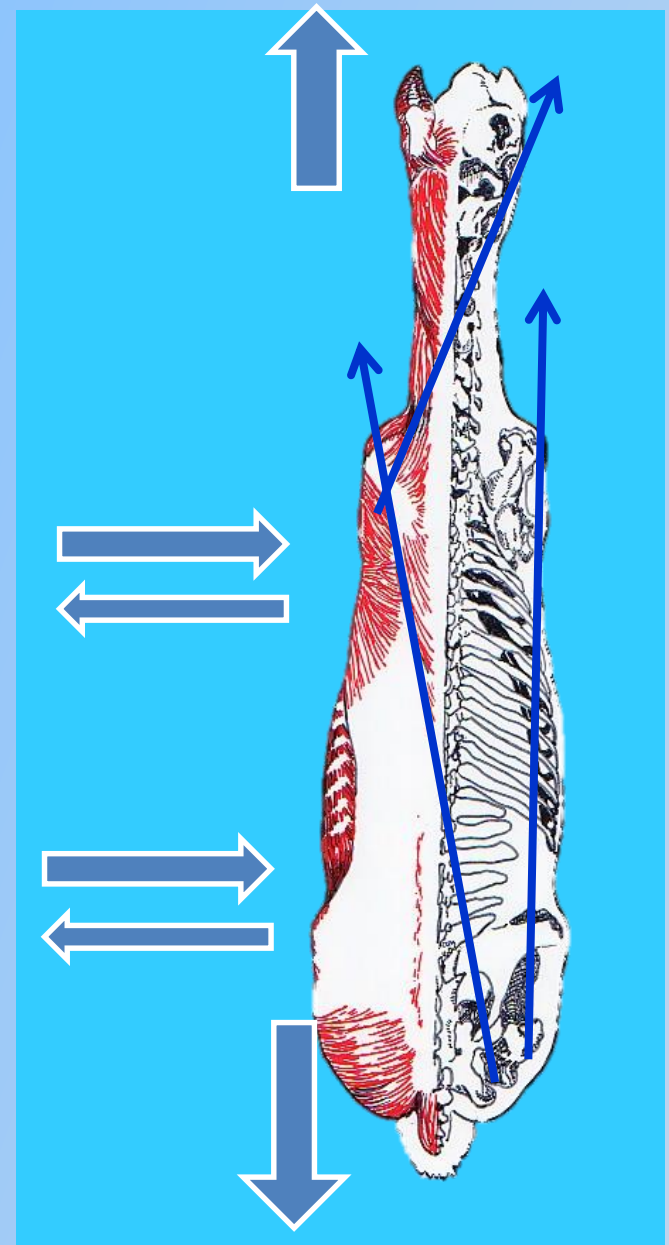
Cantilever - Head and neck act as a counter balance for abdomen

Quadruped Balance and Loading Principle

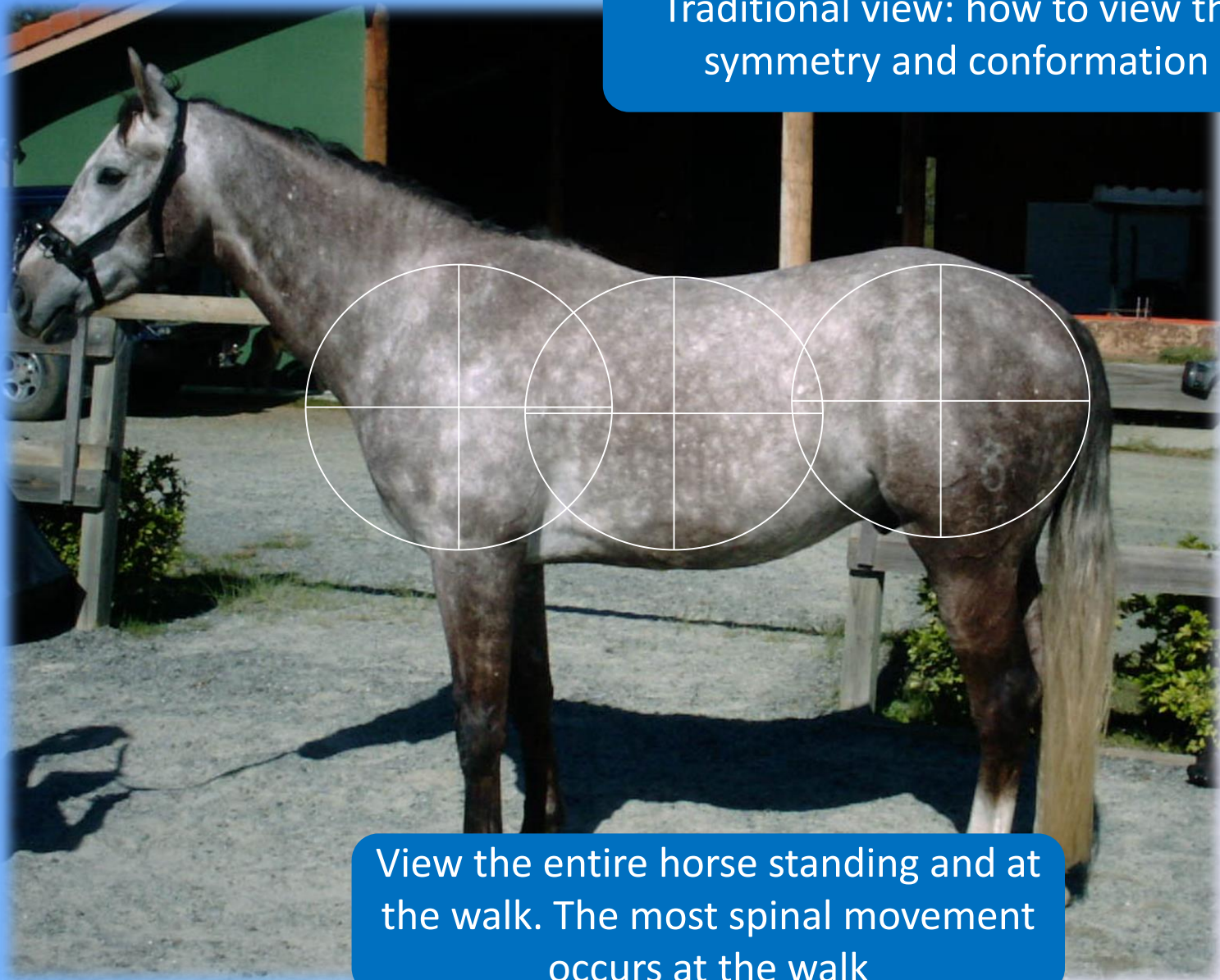
A weakness or imbalance in any limb will be compensated by reloading and working another limb or limbs.

The standing balance is affected. Stressed tissue will resist side to side movement and/or cranial to caudal movement.

This has a large bearing on which segments you are adjusting.

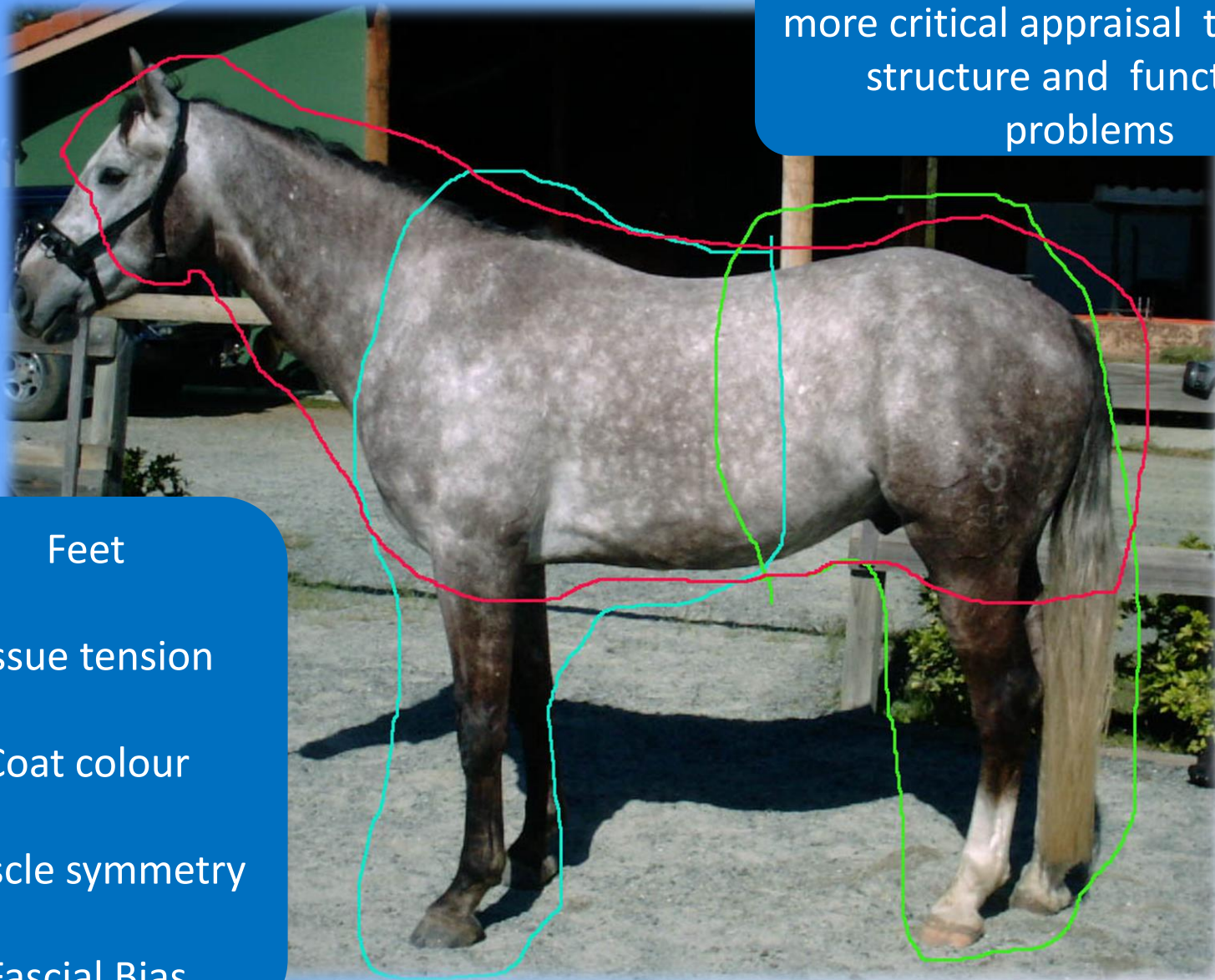


Traditional view: how to view the
symmetry and conformation



View the entire horse standing and at
the walk. The most spinal movement
occurs at the walk

The view of the horse needs a more critical appraisal to connect structure and functional problems



Feet

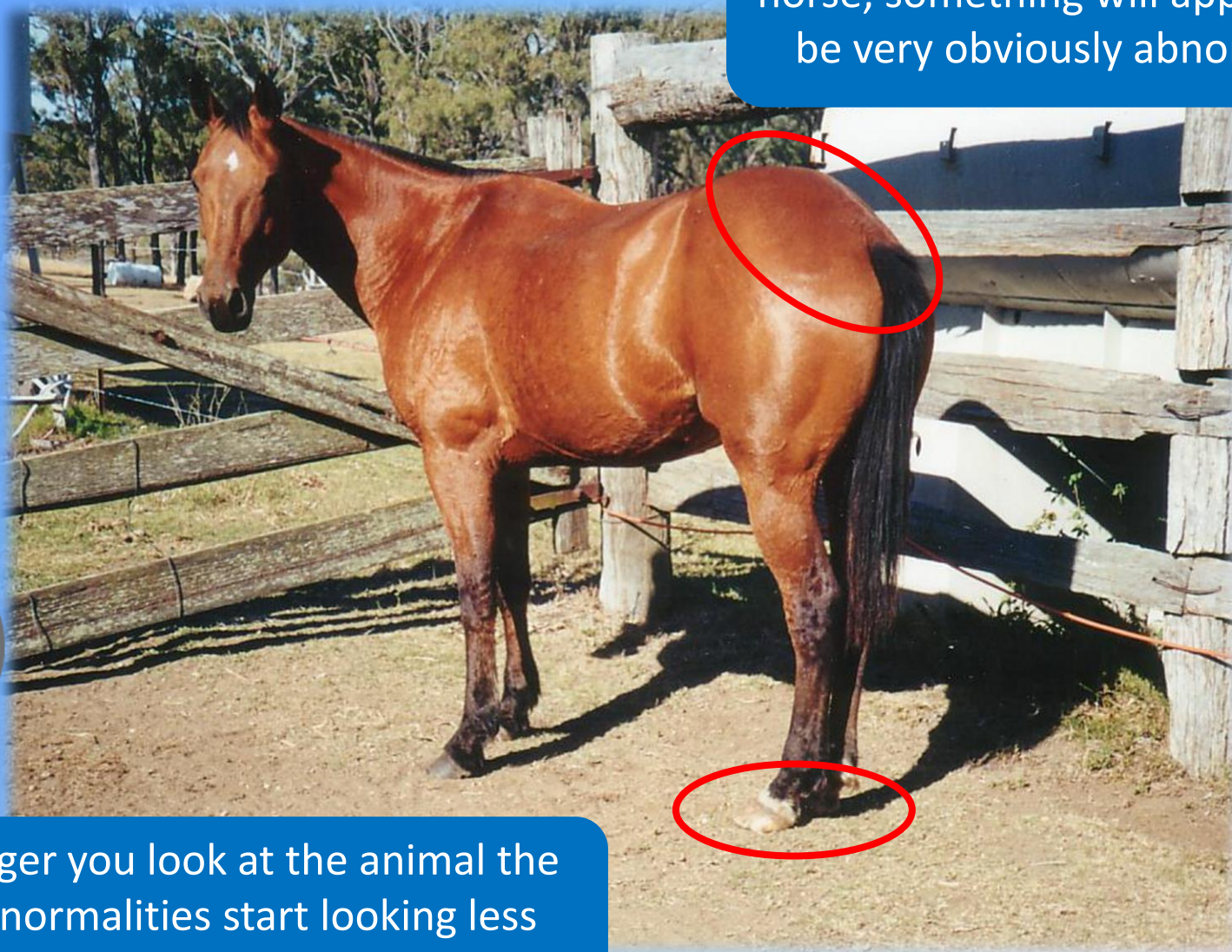
Tissue tension

Coat colour

Muscle symmetry

Fascial Bias

When you initially see the horse, something will appear to be very obviously abnormal



The longer you look at the animal the abnormalities start looking less of a problem.

What Are You Looking For





Hoof Imbalances

Forelimbs:

1. High – Low Heels
2. High Heels
3. Medial – Lateral
4. Mixed

Hind Limbs

5. Low Heels
6. Medial - Lateral



Hoof Imbalances

All Feet

- 7. All heels low
- 8. All toes and heels high
- 9. Extensive pathology



The high heel low heel syndrome is a common presentation causing persisting upper body muscle stress



Scapula more vertical

Affects saddle placement
and rider balance



Shoulder
moved
caudally

Descending pectorals
hypertrophy on high side

Pastern in extension low side

Further implications of imbalance

Lower heel foot usually wider
Hoof spreads with greater weight

More pumping of hoof mechanism

More frog contact etc.

Higher heel foot usually contracted
Less weight to spread heels of hoof
Horses tend to favour higher heel side
Problems taking lead on high heel side

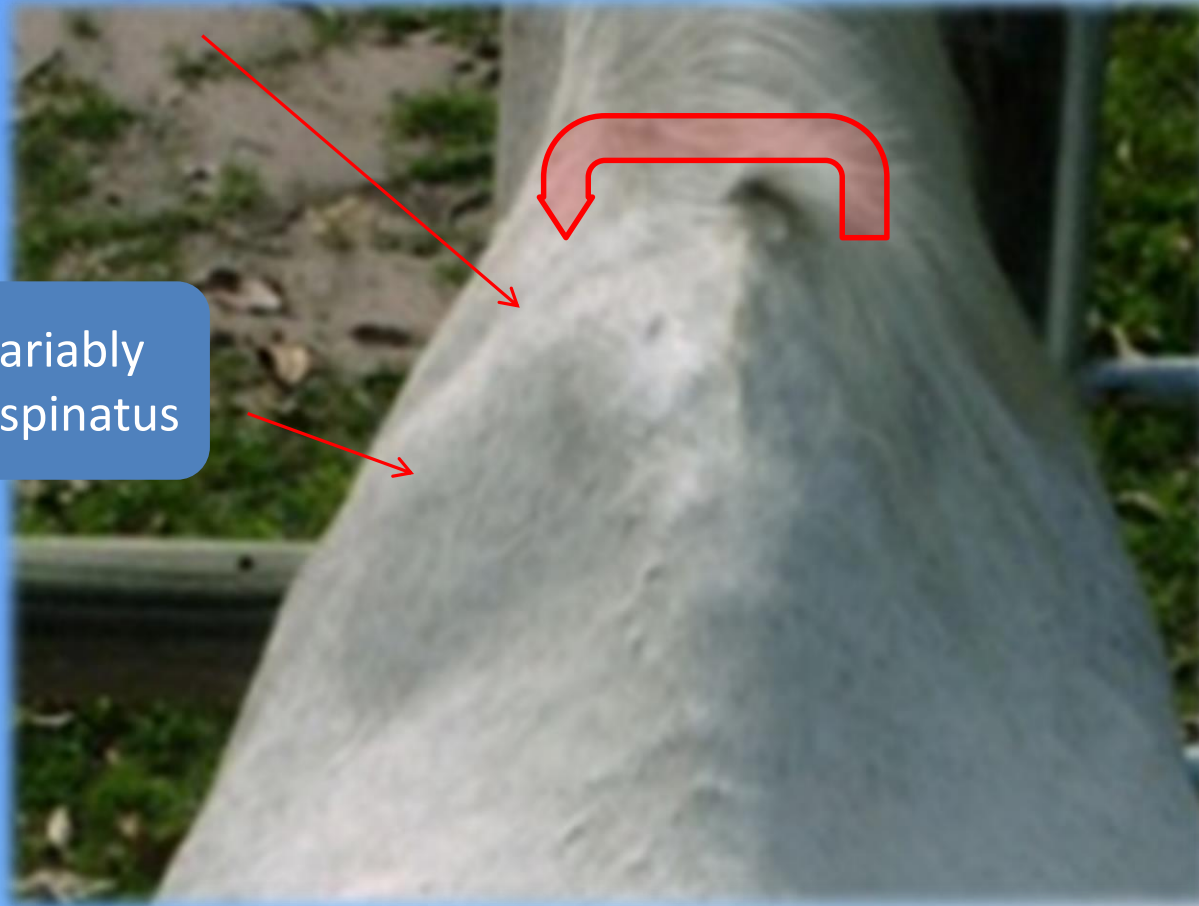


Tend to lean to low heel side.

Lateral bulge on low heel
side

The horse will tend to have loading problems

Invariably
infraspinatus



Forelimbs Heels High



Decreased Work Performance



Ewe shaped
neck

Muscle hypertrophy / reduced lateral
flexion

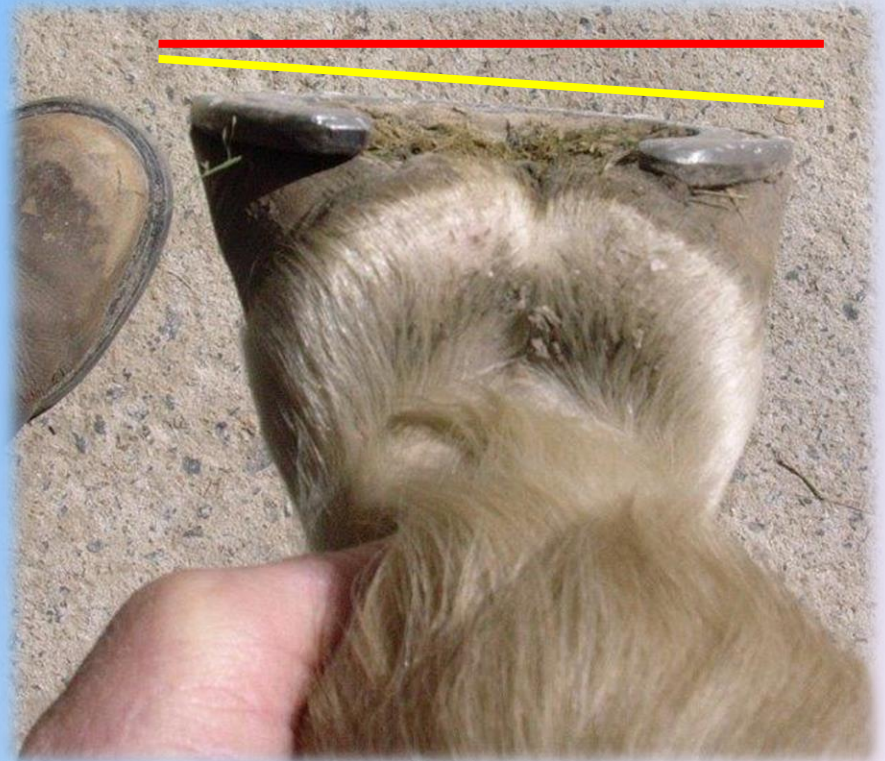
Reduced flexion upper thoracics

Pain though thoracic spine
coat discolouration

Medial & Lateral Imbalance



Acceptable



Lateral - Medial

Tendons and Lateral – Medial Imbalance



Balloon Theory

Consider the foot as a viscous, fluid filled balloon.

The hoof capsule is like a balloon with an imperfect elastic memory

With the pressure on the centre of the balloon, the balloon will spread in all directions



*Pressure (the angle of force) however
is seldom centred*

1. Due to conformation
2. Due to unsuitable trimming.
3. Due to unsuitable shoeing.
4. Due to the training program.
5. Due to the rider balance.
6. Also the ground that is being ridden on



Pressure over time creates distortion of the hoof capsule

Distortion exacerbates imbalance

The imbalance is resisted or corrected by the shoulder girdle muscles



The most important principle is that the foot shape , limb loading and foot balance can be different and must be examined and assessed in each individual horse. This will determine how the case is treated to achieve the desired outcome.

There is no cook book.

Imbalance can be medial side high or lateral side high



Medial - Lateral



Lateral - Medial

Major Muscle Group Changes



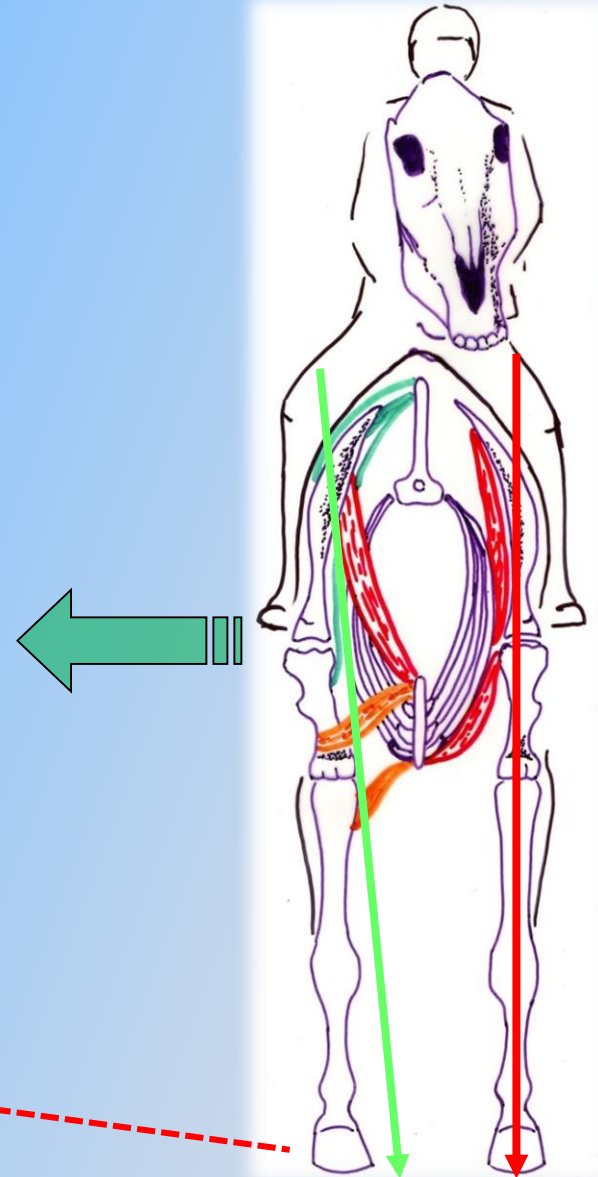
Rhomboid

Trapezius

Subclavius

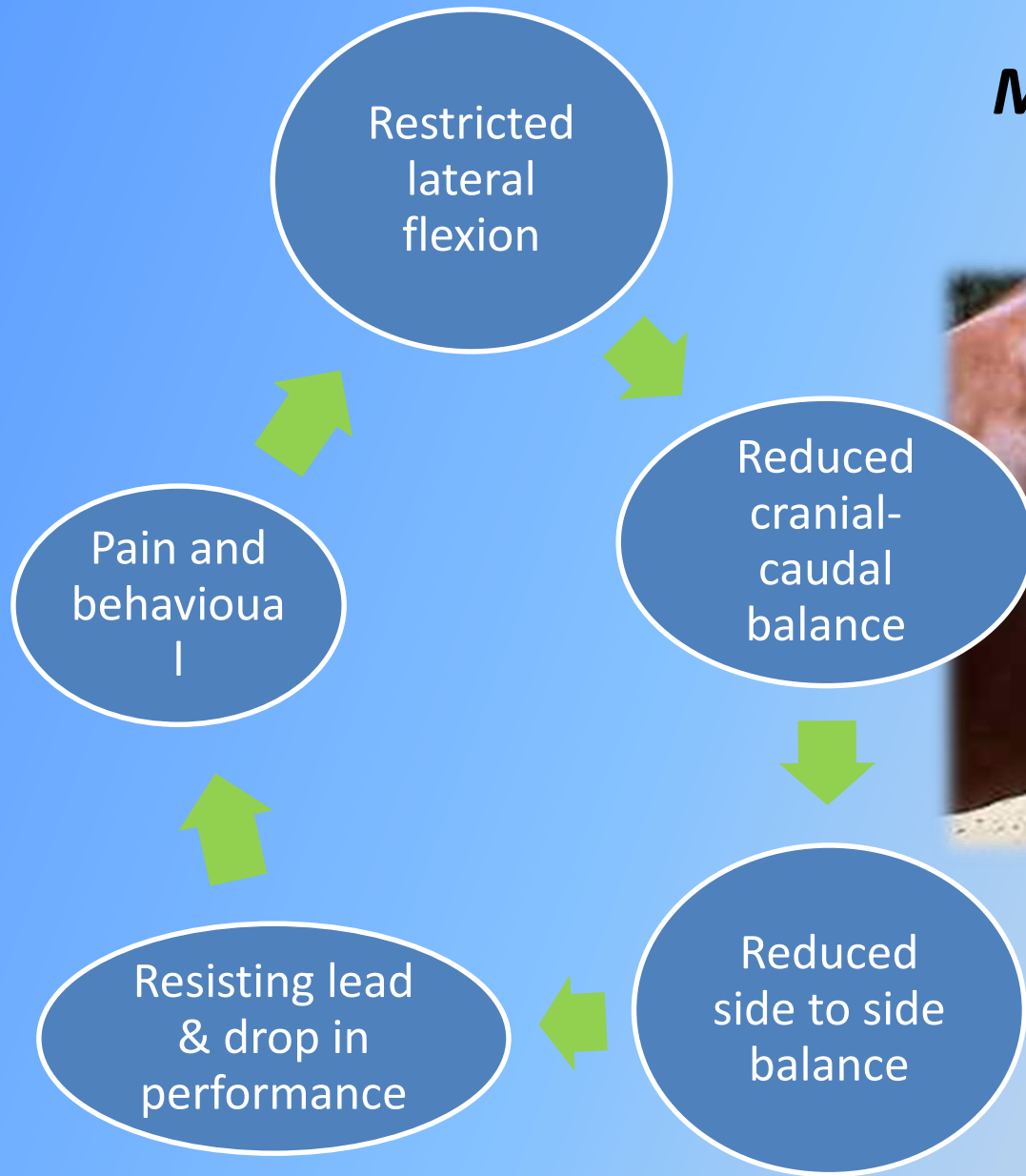
Effect of lateral-medial imbalance
on upper body muscles
(lateral wall vertical, medial flaring)

The imbalance may be caused from
another area of the body or some
other source



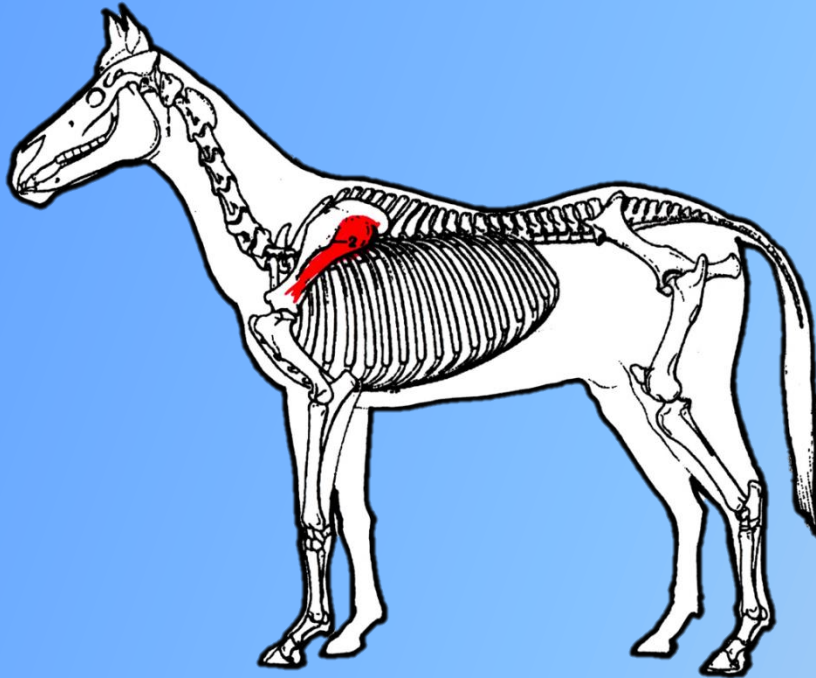
The loading is on the higher side

Major Outcomes

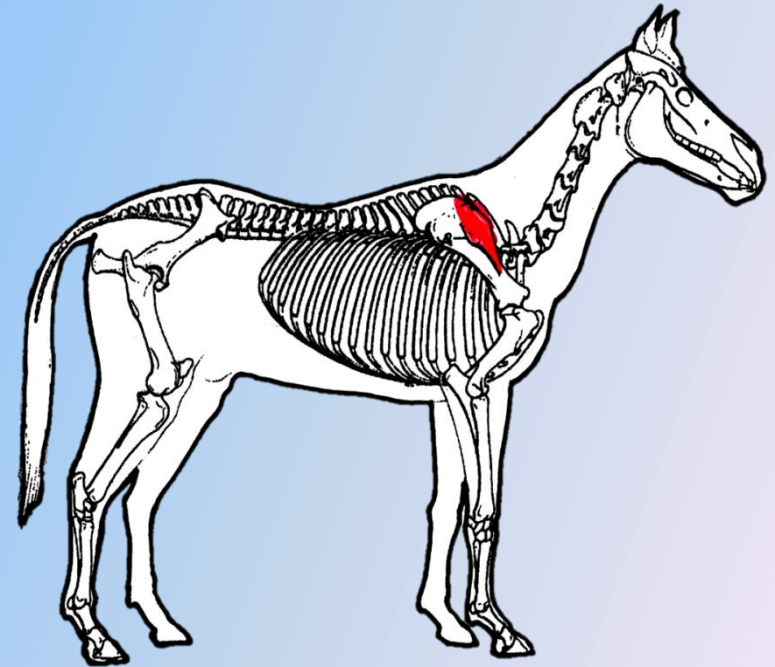


A lateral – medial imbalance causes the Infraspinatus m. to hypertrophy and becomes tender over the scapular cartilage

A medial to lateral imbalance usually causes hypertrophy of the Supraspinatus m.

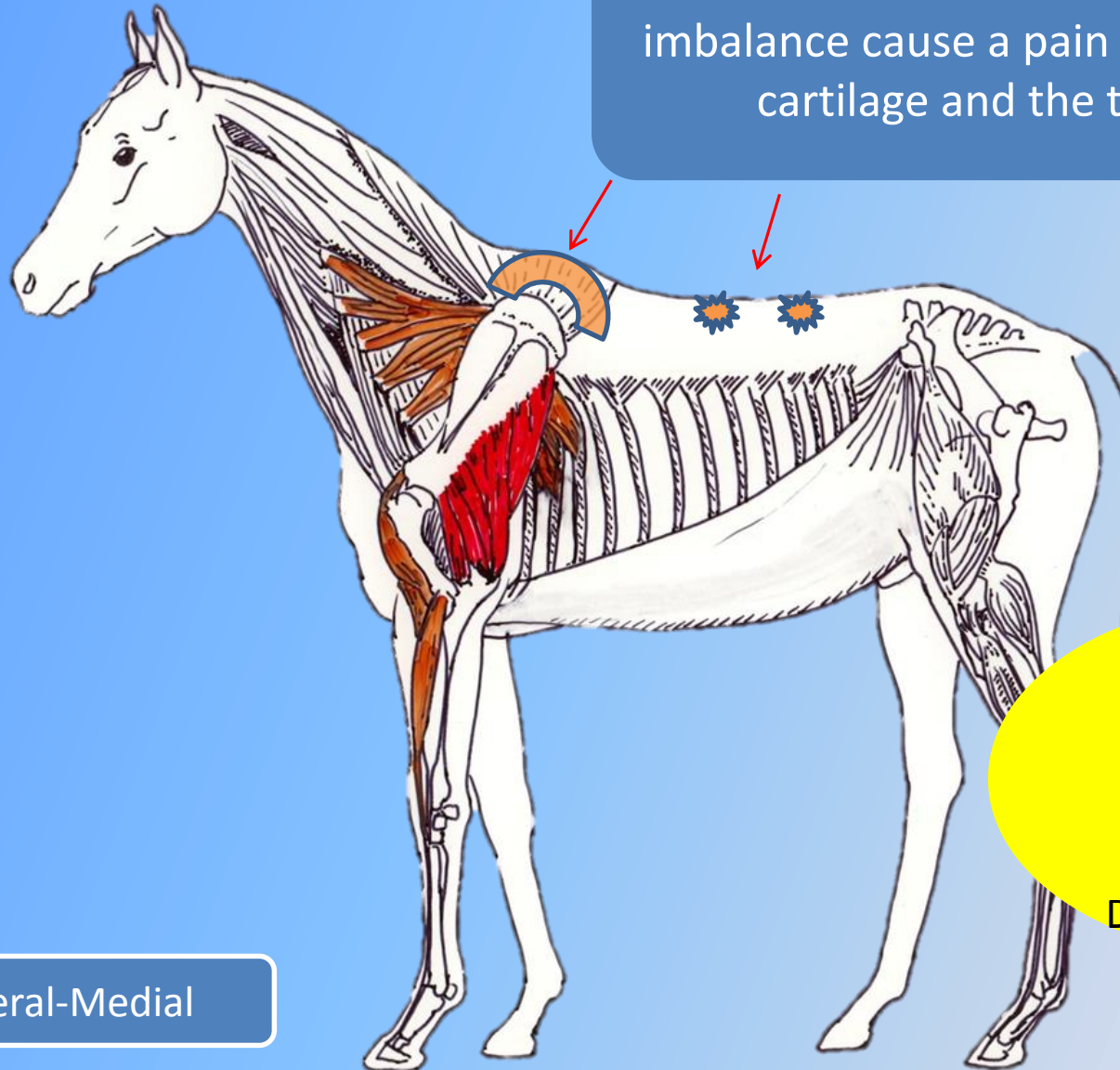


Lateral-Medial



Medial -Lateral

Both medial to lateral and lateral to medial imbalance cause a pain above the scapular cartilage and the thoracic spine



These areas correspond to stress points described by Meagher and Denoix and others

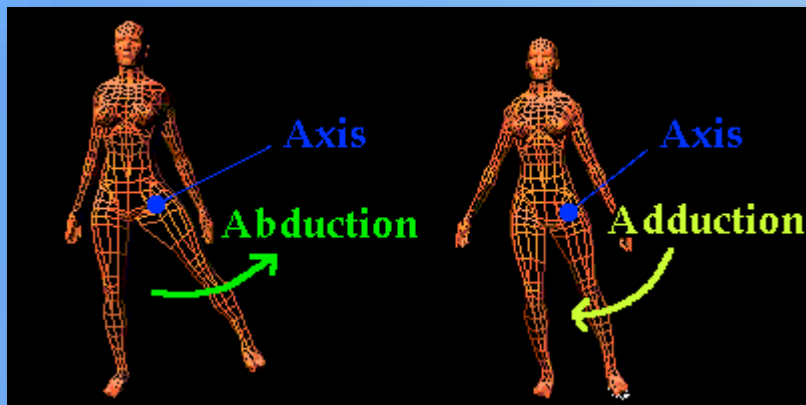
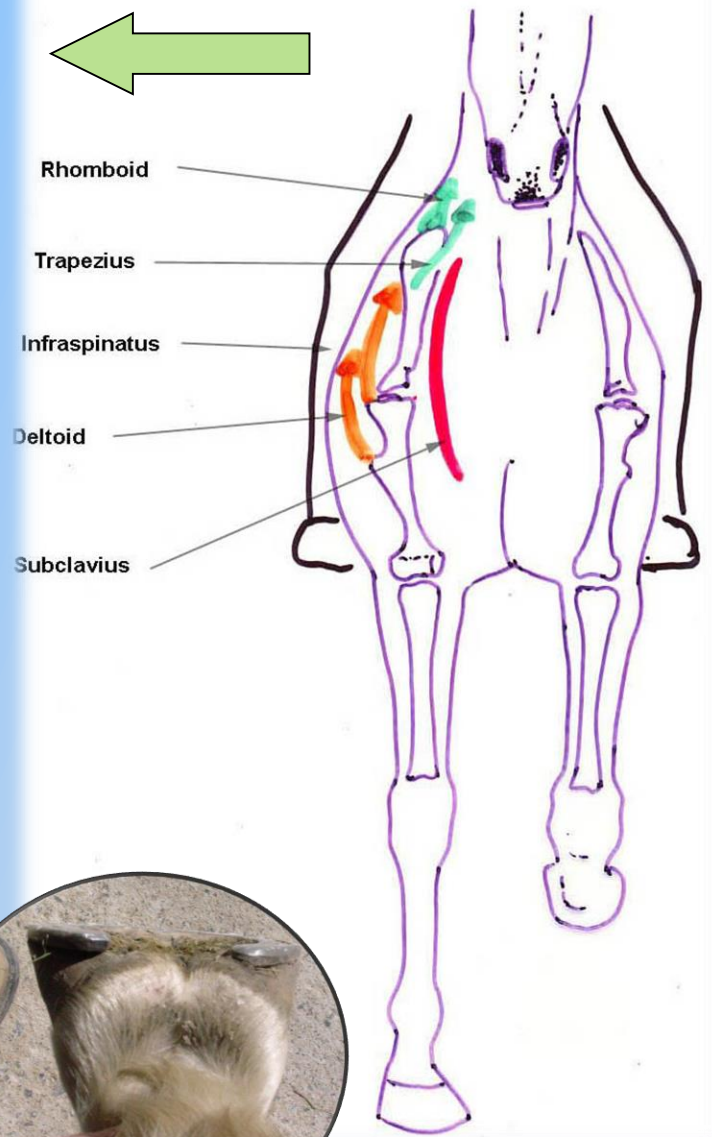
Lateral-Medial

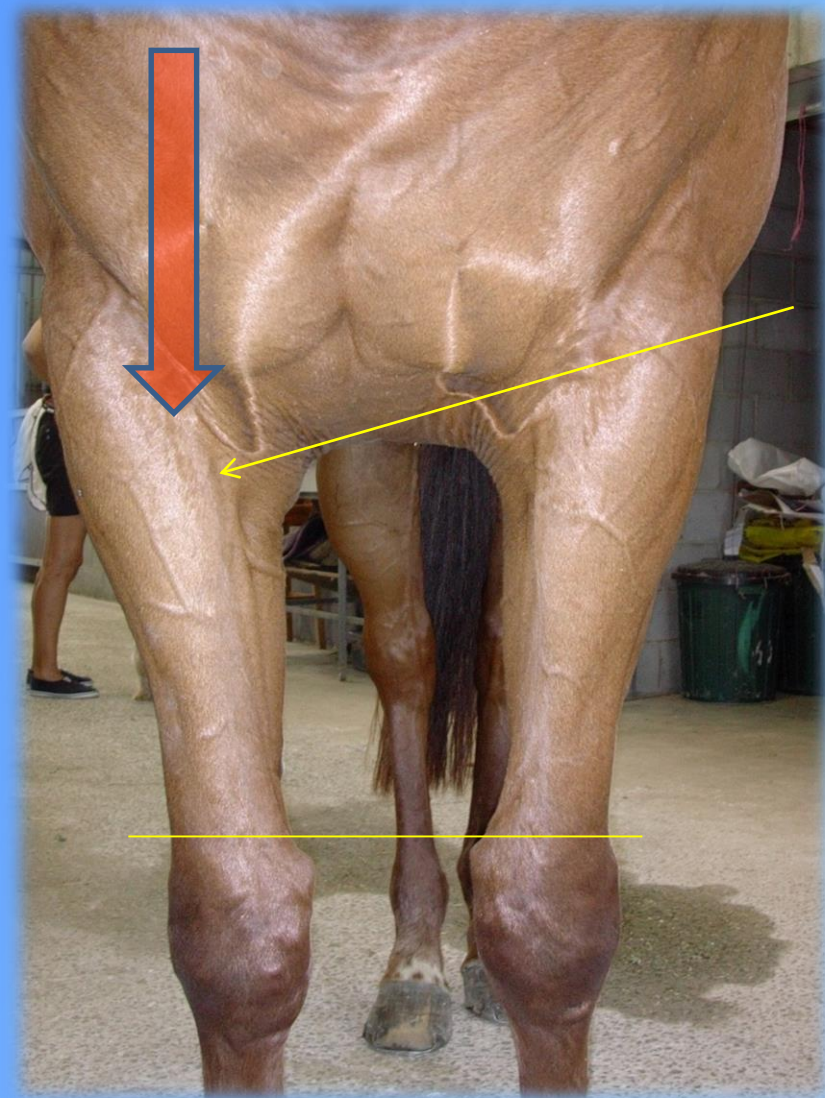


Infraspinatus hypertrophy

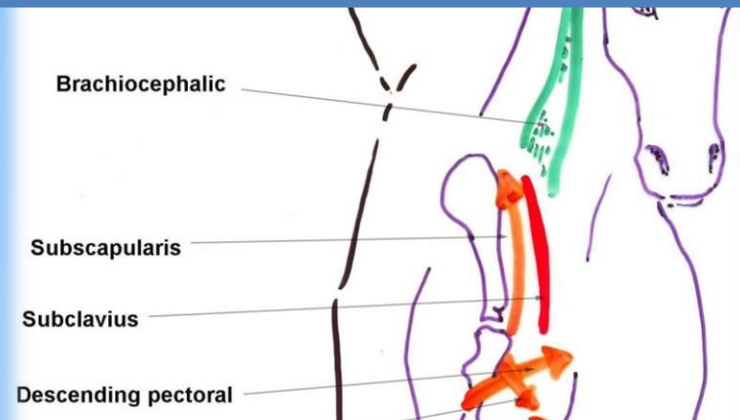
Lateral high – Medial low

Fore limb abductors work to resist the tendency of the limb to adduct (go underneath the body) to keep the horse straight. This problem is obvious when the horse is asked for *shoulder in*.





Forelimb adductors work to keep the horse straight as the limb tends to abduct outside the line of flight.



The build up of tension in the muscles results in difficult lateral flexion and eventual refusal to take the right rein.

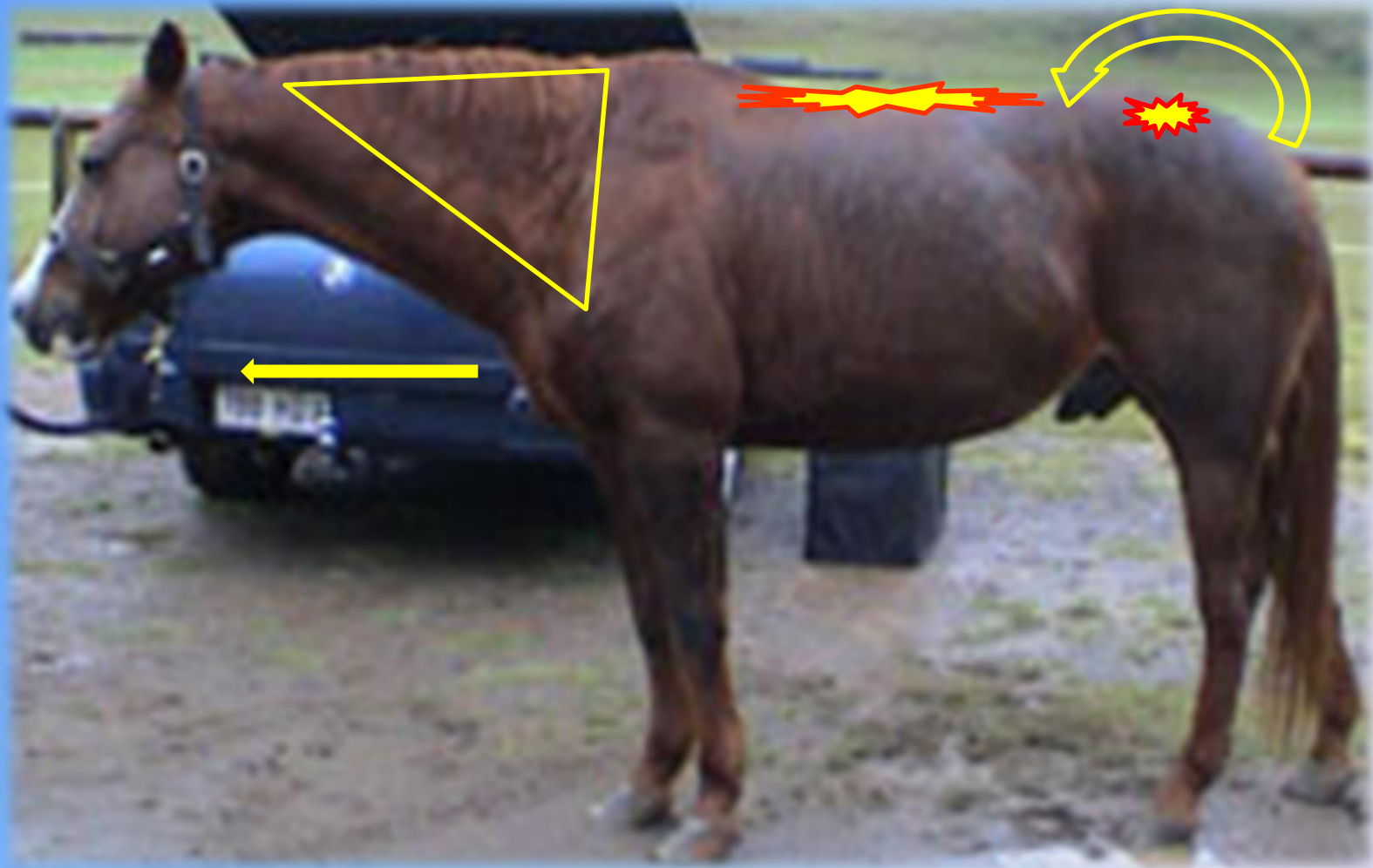
Medial - Lateral



Head and Poll Issues



Long Toe Affect

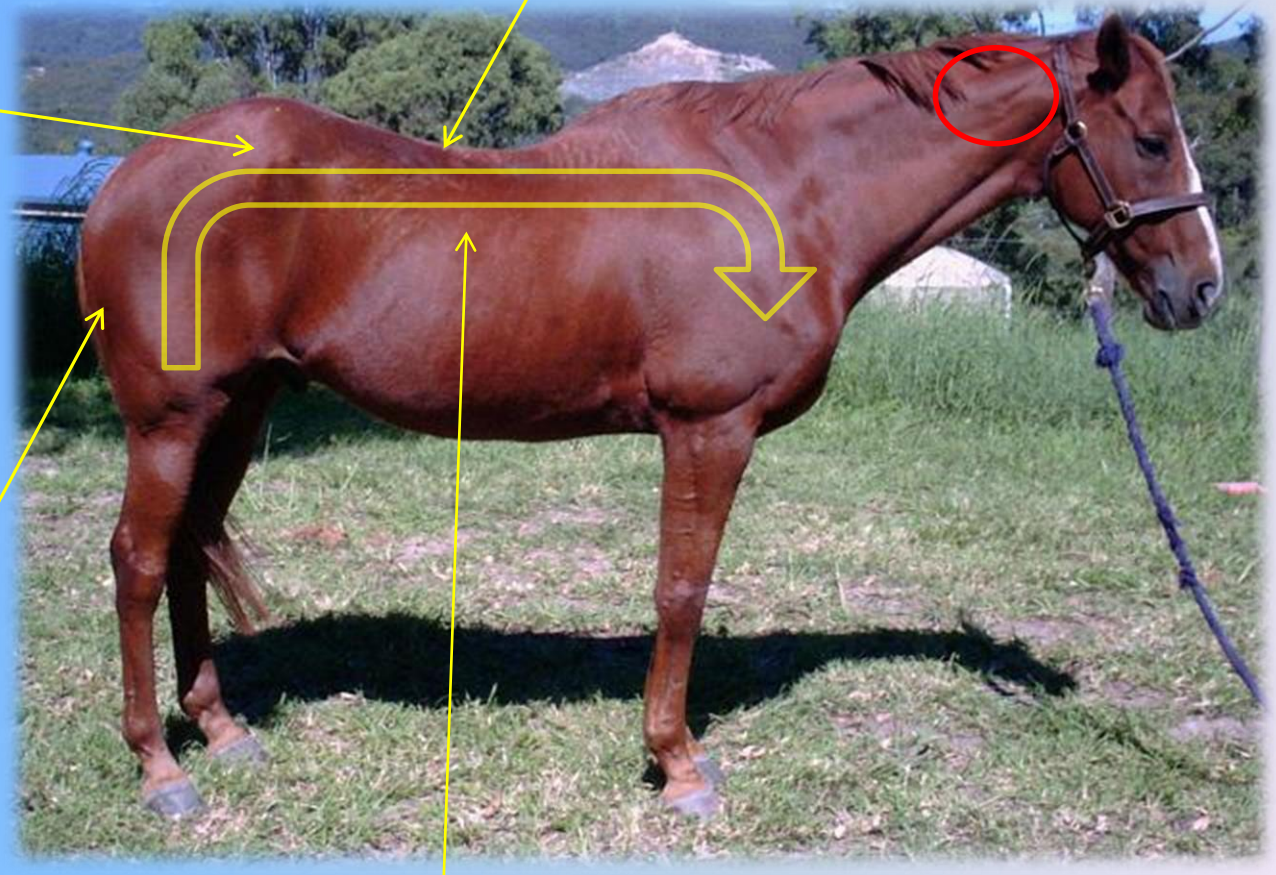


Low Hind Heels

Lumbar slope, longissimus
degeneration

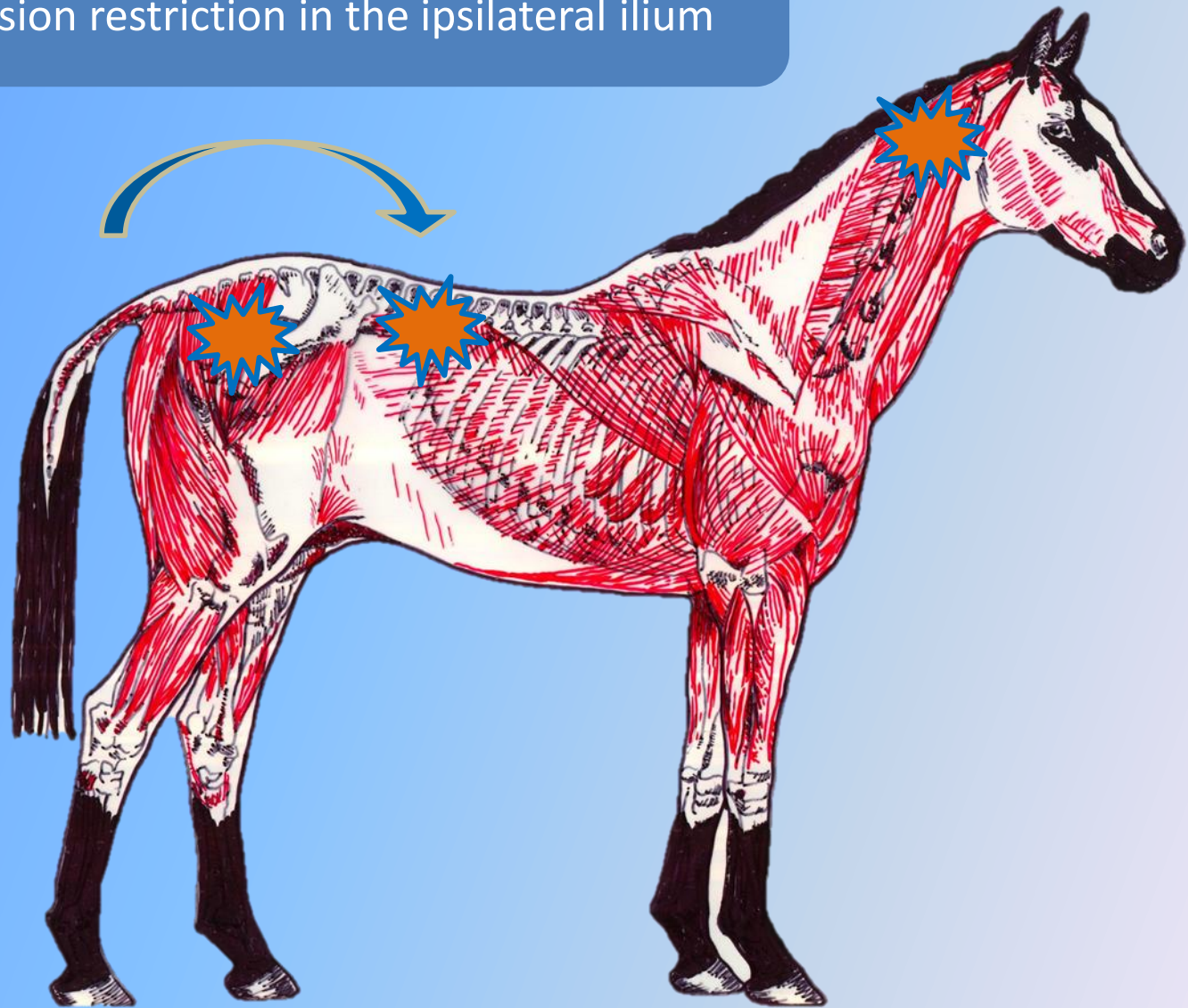
Pelvis, bilateral PI

Hamstring tension



Fascial bias

Muscle tension pattern over C2 to C3 consistently find flexion or extension restriction in the ipsilateral ilium



Mixed Heights and Balance



When each foot has different heights and balances the horse can commonly be shod with a bar shoe.



No amount of 'corrective' shoeing will result in better performance

An example of uncommon orthopaedic imbalance compensation



Each limb is causing a different stress pattern in the muscle groups

- Restricted lateral cervical flexion
- Chronic spinal restriction patterns
- Chronic performance problems

Upper Body Imbalances on Feet



Rider balance will influence foot shape as will incorrect training and the balance of the mandibles. There will signs in 2 to 3 weeks.

Effects on Rider – Rider Compensation



Neck

Shoulders

Pelvis

Knees

Unequally
weighted
stirrups

Medial-Lateral Imbalance Hind Limbs



Chronic cases will have lumbar & sacro pelvis involvement

Initial pain over superficial gluteal muscle

Change in tone adductor muscles

Gait Changes often twisting

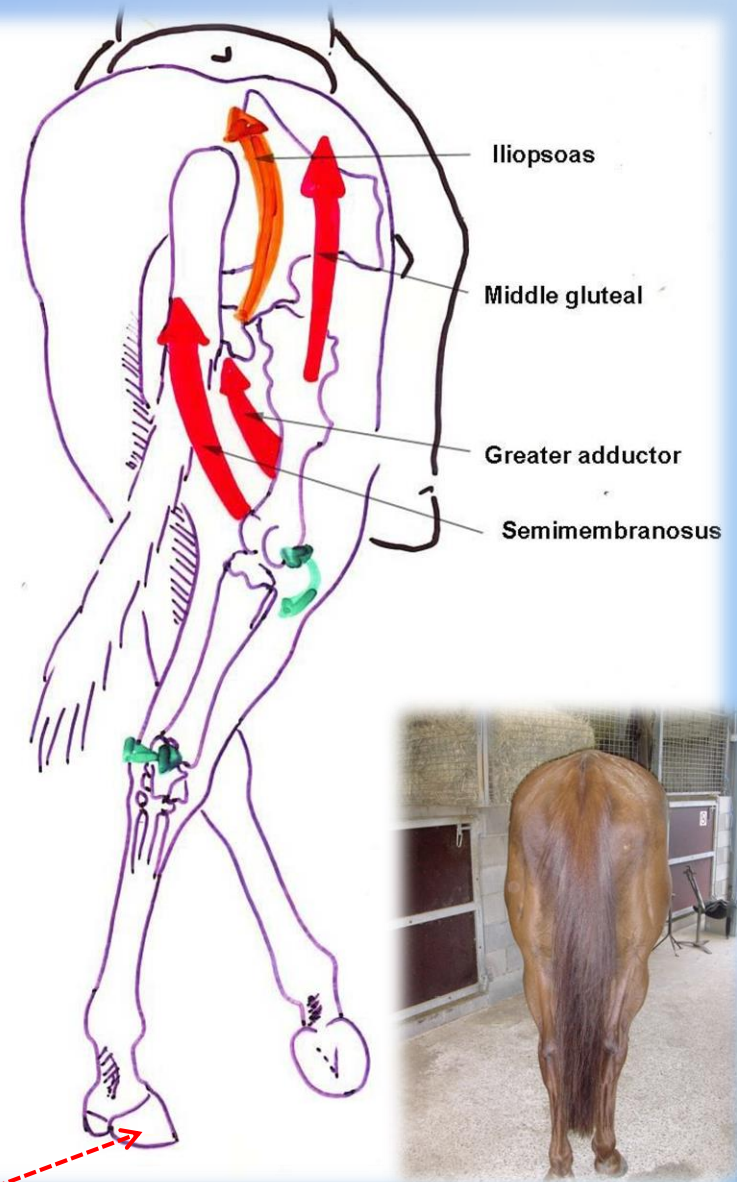
Performance problems

Hind limb adductors work to resist the abduction of the limb

The high lateral wall and rotating of the hoof capsule contributes to the hoof twisting outwards on propulsion

Repeated work results in tension in the adductors and pain over the SI joint

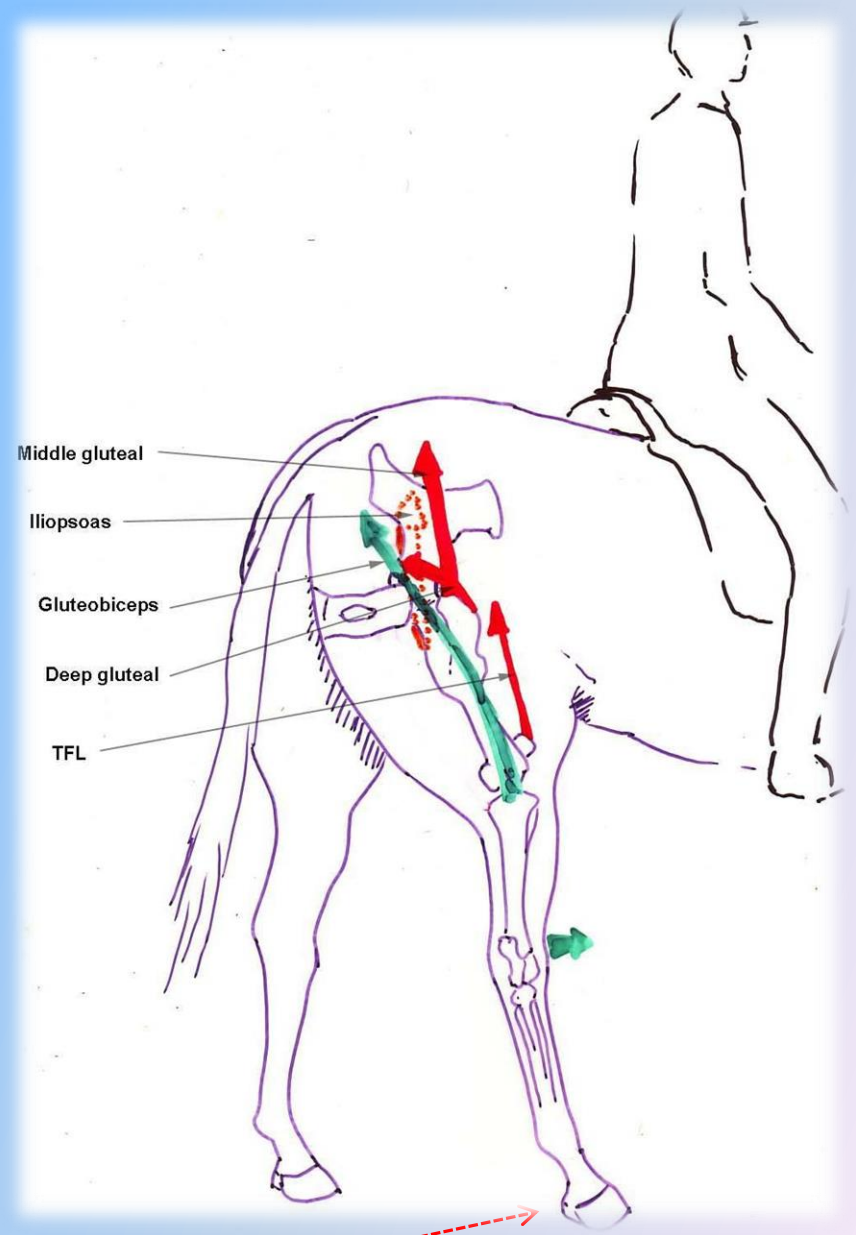
The pain is also found down the lumbar spine



Hind limb lateral to medial imbalance

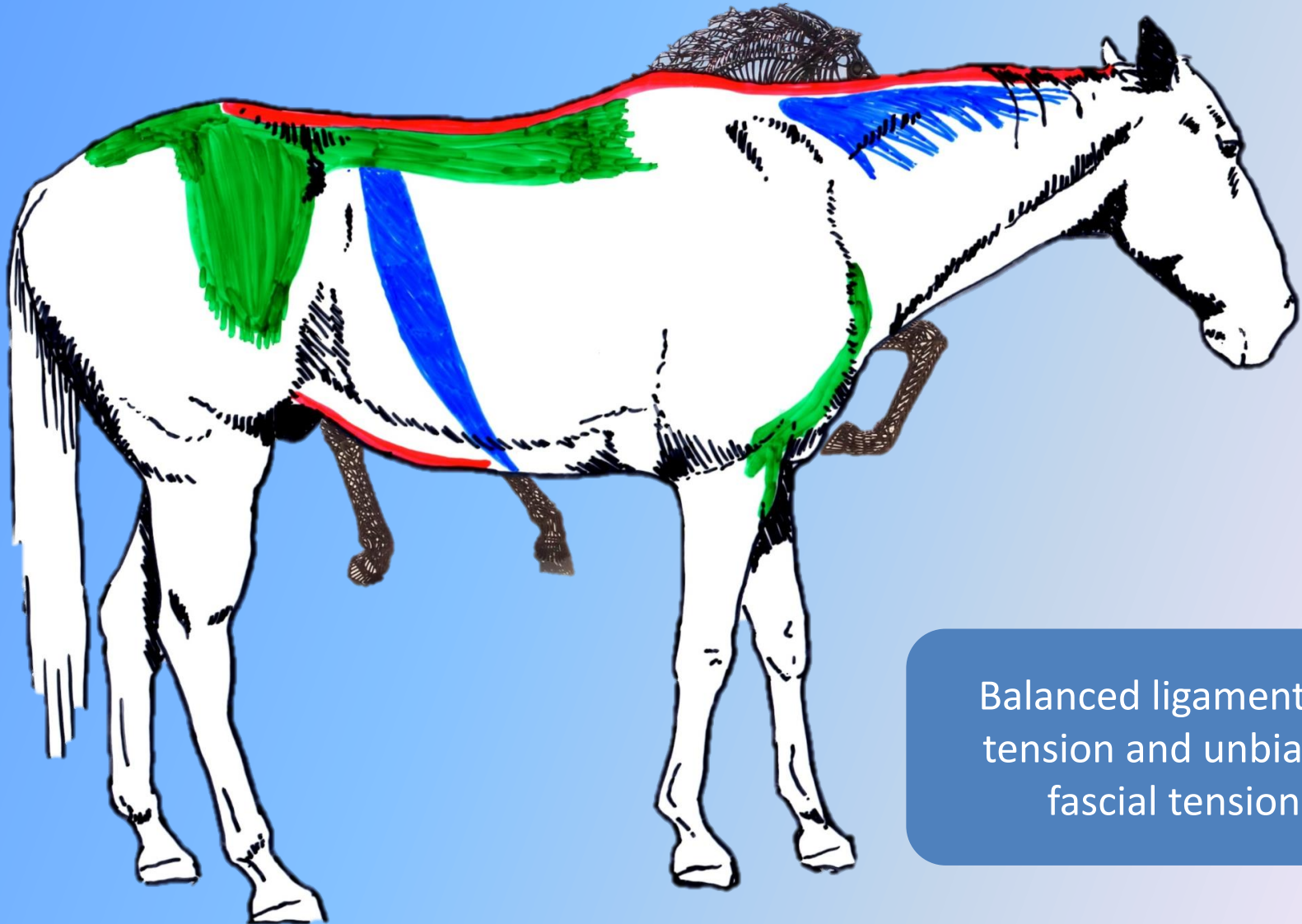
Hind limb muscles of abduction overwork to resist the limb adducting due to the high medial hoof wall. Again the iliopsoas involves the lumbar spine and overdevelopment of the longissimus lumborum occurs before degeneration and lumbar sloping

Removal of back shoes and trimming is necessary.
Using shoe devices to limit rotation results in exacerbating upper body pain



Medial to Lateral Imbalance

Fascial tension clues



Balanced ligamentous
tension and unbiased
fascial tension

Ridges in the subcutaneous fascia

Almost always in horses which are
on the fore, that is working fore
limbs

Vary in severity

Fade with foot and body balance
correction





Dorsal origin of cutaneous trunci muscle

Dissected out anatomy texts

Lines disappear as horse gets stronger

Can't palpate caudally under scapular –
subclavius muscle hypertonic

Hoof/ start to stress in dorsal wall

Foaling Trauma – Origins of Orthopaedic Imbalance

Rib fractures and costochondral contusions are a common complication of birth

Schambourg *et al* (2003) in Canada necropsy of 760 foals between 1990 and 2000 found only 9% had thoracic trauma. Twenty foals had fractured ribs and a further 28 had rib contusions most common site of injury, 94% was the costochondral junction

Jean *et al* (1999) study in Kentucky of 263 foals 32 had rib fractures

Fifty five foals (20.1%) had TCA (thoracic cage asymmetry)

The foal is wedged into the birth canal at a diagonal, the widest part being the thorax across the shoulders

The neonate can start life with imbalance across the forelimbs





The outcome can be the foal favouring one limb, this can contribute to one-sidedness, and high heel low heel





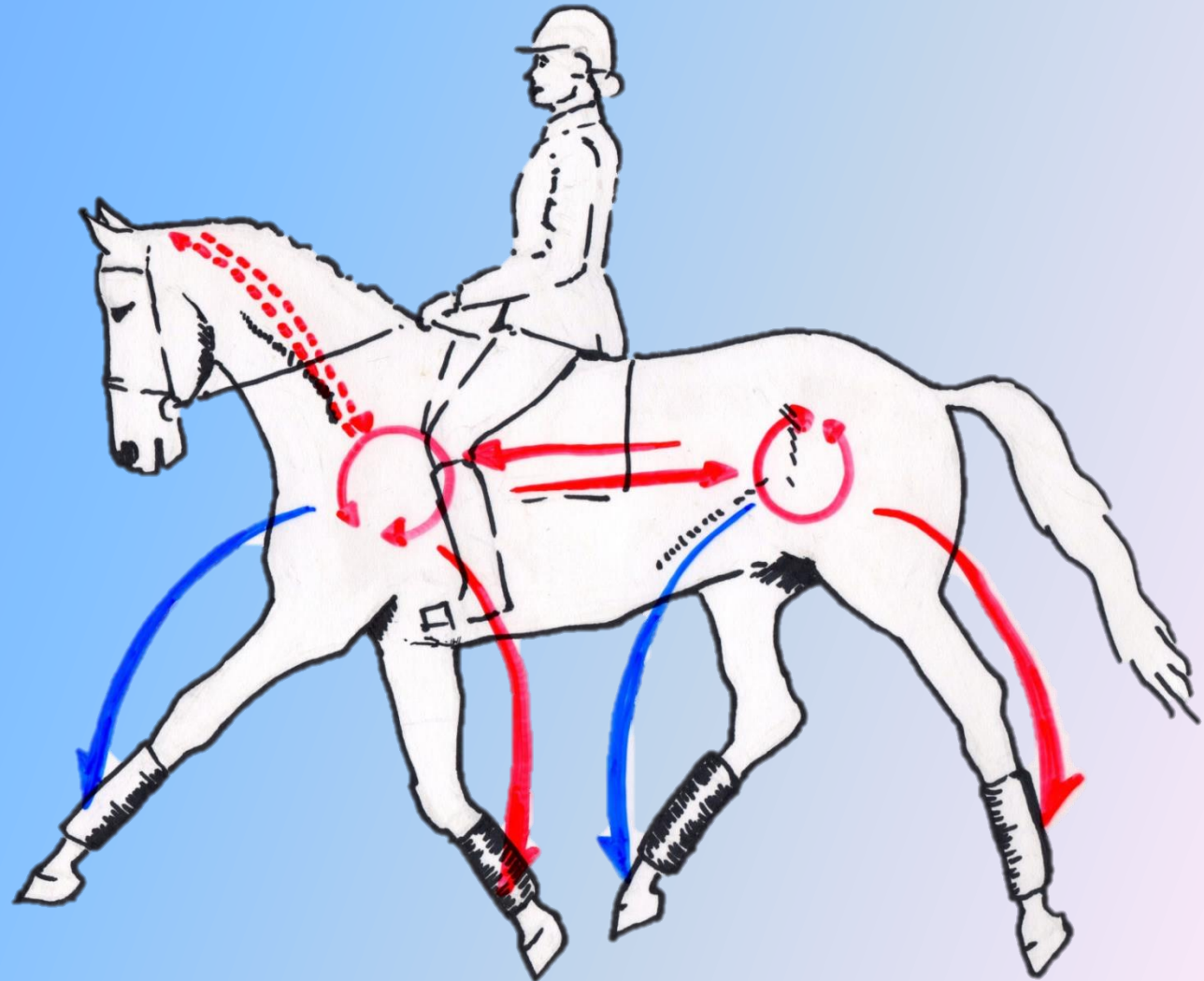
Chiropractic care of neonates will contribute to treating effectively the problems acquired from birth trauma. Best carried out after trimming.

TCA – getting this corrected is a vital part of neonatal treatment

Forelimb extension, rib cage symmetry and pelvic functional position and symmetry are the three most important approaches to adjusting foals

Central Pattern Generators & Orthopaedic balance

CPGs are a type of neural circuitry responsible for the synchronisation of limbs



Central Pattern Generators

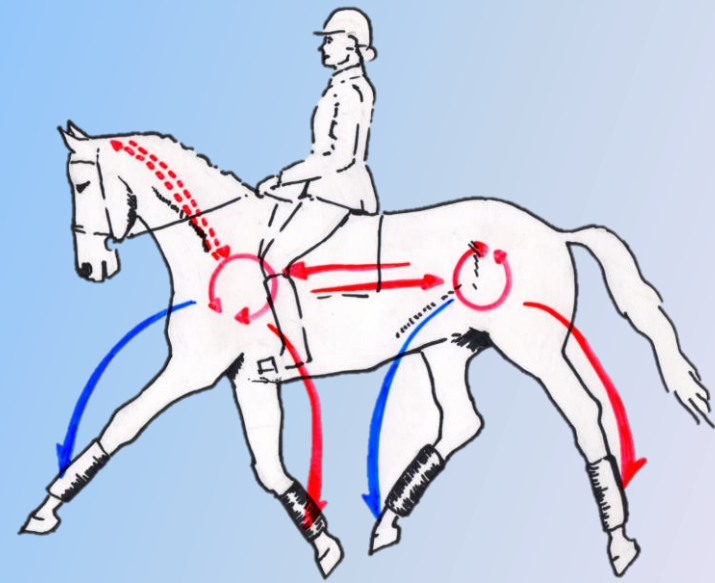
Present from birth -not learned

Diagonal connection – diagonal duplication

Movement in the forelimbs reflected in the hind limbs

Imbalance in the forelimbs must cause stress in the hind limbs and must lead to fascial bias, muscle pain, and back pain

Proposed degrees spinal stress from birth trauma may affect long term function of CPGs (Bidstrup, 2012)



Cerebral Dominance & Orthopaedic Balance



Hemisphere laterality or laterality in animals is called limb dominance

Lesinak et al Sweden 54 horses, 22 left lateralised 24 right lateralised 8 ambidextrous (a). Right lateralised group had toe angle larger in right foot (b) height of carpo metacarpal joint in the left lateralised group was longer in the right limb

Van Heel et al 3year old warmbloods foot stance in grazing influenced foot conformation and development. (a) . The relationship between laterality and uneven feet was stronger at 3years than foals or yearlings (b) horses with significant motor laterality had 4 times more unevenness and the relationships between body conformation and laterality were still present

Cerebral Dominance & Orthopaedic Balance

Austin and Rogers (2012) lateralisation limb preferences in 2 groups up to 10 generations feral (a) no preference in foot placing during grazing (b) left sided bias during agonistic interactions, vigilance and reactivity



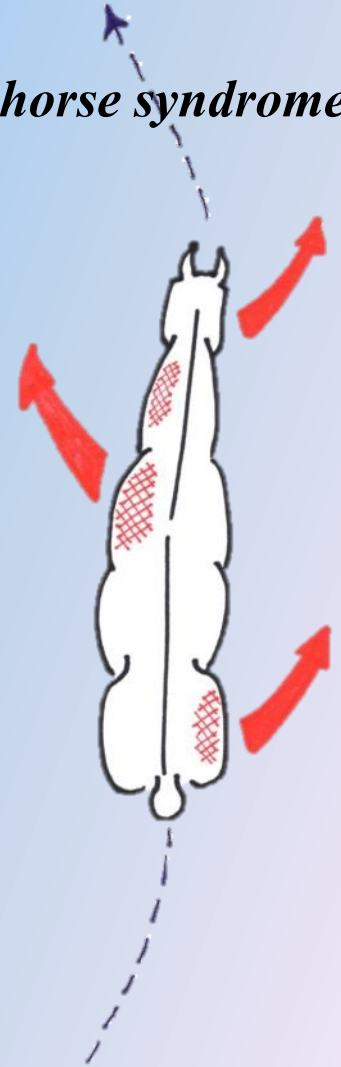
Suggests limb preference in domestic horses is a result of environment and intervention

Austin, NP Rogers LJ *Limb Preferences and lateralization of aggression, reactivity and vigilance in feral horses, Equus caballus*
Animal Behaviour Vol. 83, Issue 1, Jan 2012, pp239-247

Common Orthopaedic Compensation

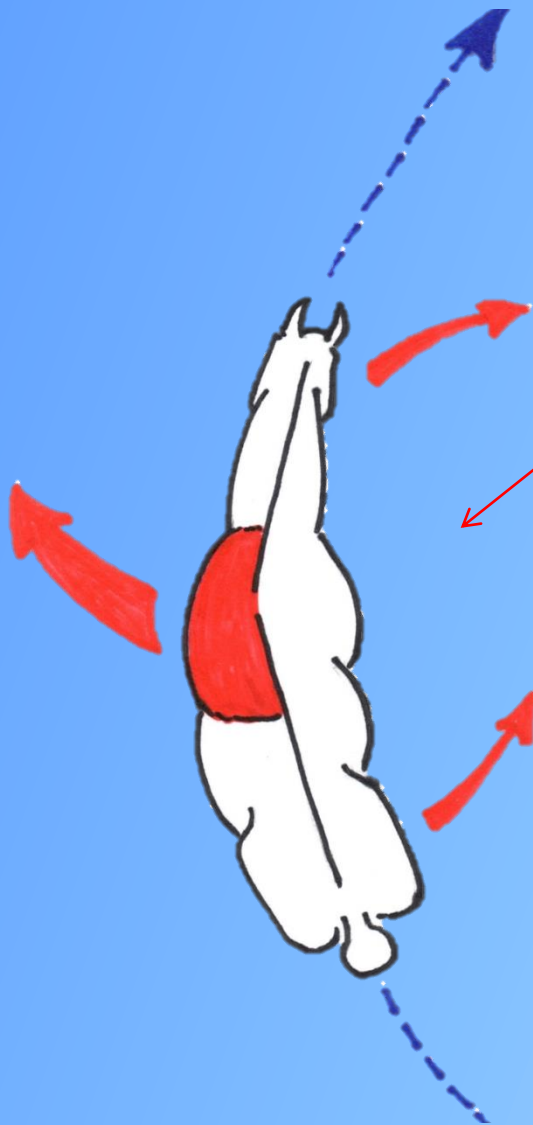
- Majority horses weaker in right hind limb
- 80% horses better on left hand than right
- Consistent between breeds
- Bidstrup 3000 treatments over 5 years 81% right sided rib cage sensitivity
- Right lateral cervical flexion difficult, right fore under tension, flexion restriction right sacroiliac joint
- Right fore will often have a lateral-medial imbalance
- Possible contribution to high heel low heel

“Crooked horse syndrome”

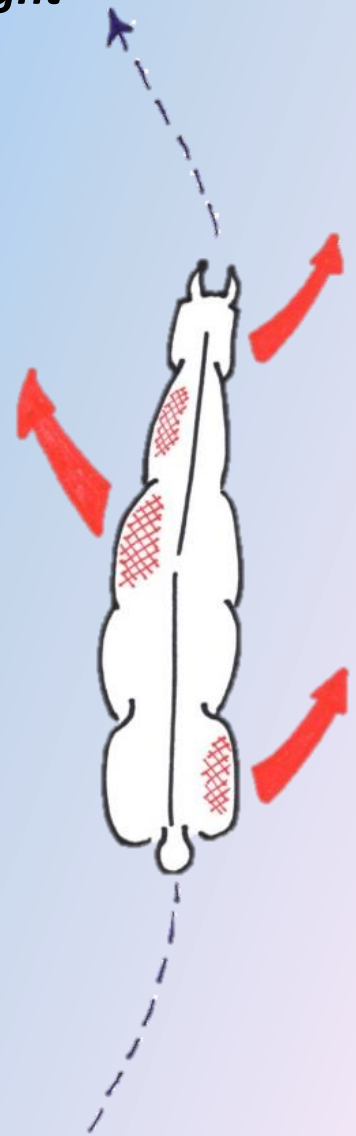


***Transition from trot to canter on the right
circle difficult***

Loads onto left fore
off right hind
Right hindquarters
drift out



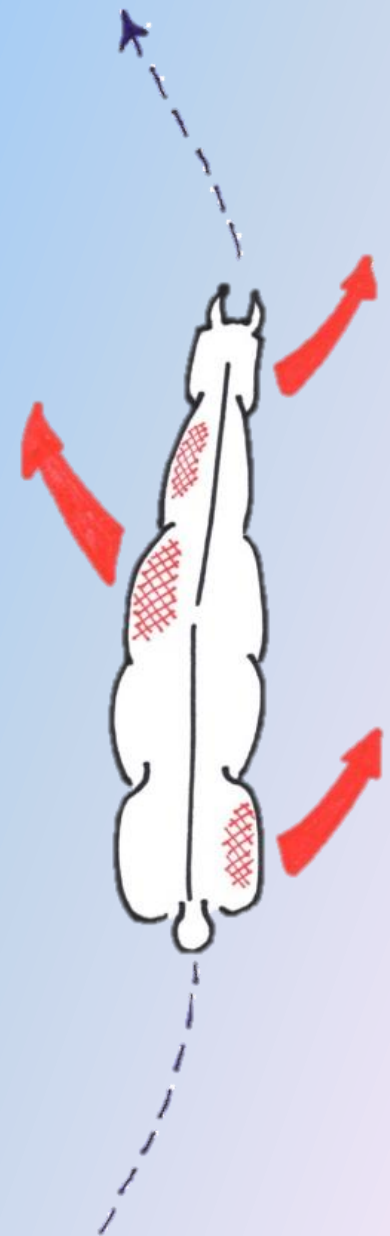
Right Circle



Left Circle



Hind quarter development



Closing Remarks

Feet imbalances have a significant bearing on upper body soft tissue and vertebral compensation changes. Modern management intervention may be an underlying cause of equine orthopaedic imbalances.



Thank you

I would like to thank you for attending this presentation.

