

Title:

Incisor Guidance for Optimal Biomechanics and Neural Regulation

Author:

Martine Groeneveld – Green Animal Osteopathy

Abstract:

Equine posture and performance are governed by a finely tuned interaction between dental form, musculoskeletal coordination, and neural regulation. Within this system, **incisor guidance** functions as a crucial determinant of mandibular motion and a regulator of proprioceptive feedback influencing the horse's global biomechanics. Traditionally viewed through a mechanical lens, the incisors are now recognised as key contributors to **sensorimotor integration**, linking oral balance to spinal alignment, movement efficiency, and postural stability.

This presentation explores how **variations in incisor guidance** affect both **neurological feedback loops** and **muscular recruitment patterns** throughout the body. Research into malocclusion and spinal dynamics indicates that altered occlusal relationships can disrupt trigeminal sensory pathways, leading to asymmetrical motor responses and adaptive postural strategies. These compensatory mechanisms are expressed through **Dynamic Guidance Lines (DGLs)** and **primary strike adaptation patterns**, where subtle imbalances at the level of the incisors initiate compensations along the axial chain, influencing stride length, symmetry, and movement fluidity.

Particular attention is given to the **adverse myotatic and avoidance reflexes** that arise from uneven incisor loading. These reflex responses act as protective mechanisms but may contribute to muscular tension, restricted flexibility, and inefficient energy transfer. When incisor balance is compromised, the horse's ability to achieve full and symmetrical **lateral excursion** can deteriorate, a feature increasingly recognised as an indicator of cranial and spinal asymmetry. Current research correlates compromised lateral excursion with changes in spinal curvature, uneven muscular tone, and altered proprioceptive control.

Drawing from case-based observations and comparative movement analysis, Martine Groeneveld will demonstrate how **dental-derived sensory input** influences adaptive postural responses, particularly in the axial skeleton. The **form-to-function-to-form principle** provides a framework for understanding how dental morphology directs neuromuscular behaviour, which in turn remodels structural balance over time. When incisor alignment is restored, improved proprioceptive clarity and muscular harmony often follow, reinforcing the connection between cranial balance and locomotor quality.

By tracing the **DGL3 chain**, this presentation highlights the sequential links between incisor equilibrium, spinal organisation, and overall postural coordination. Delegates will gain insight into evaluating the **functional quality of incisor guidance** as a diagnostic and therapeutic tool within holistic performance assessment.

Ultimately, this work proposes that incisor guidance acts not merely as a dental or mechanical element but as a **neurobiomechanical regulator**, influencing global balance, spinal alignment, and adaptive motor control. Understanding this relationship encourages a more integrative approach to equine care, one that views the mouth as both a sensor and initiator of whole-body harmony.

Keywords: incisor guidance; neural regulation; biomechanics; malocclusion; Dynamic Guidance Lines; myotatic reflex; proprioception; postural adaptation

Incisors

A powerful lever arm on the TMJ

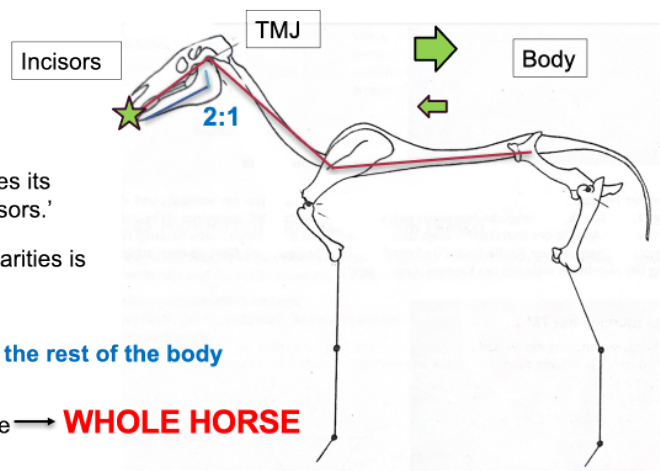
Zezo, D., (2021)

- 'The TMJ is a stress-bearing joint and it receives its greatest force when the load moves to the incisors.'
- 'The margin of compensation for incisor irregularities is less than for molars due to the long lever.'

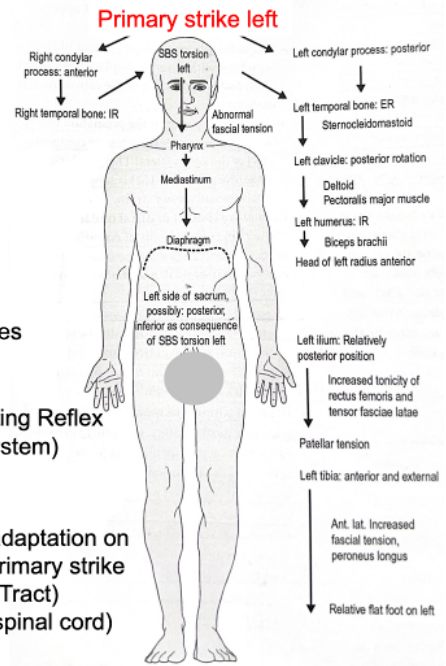
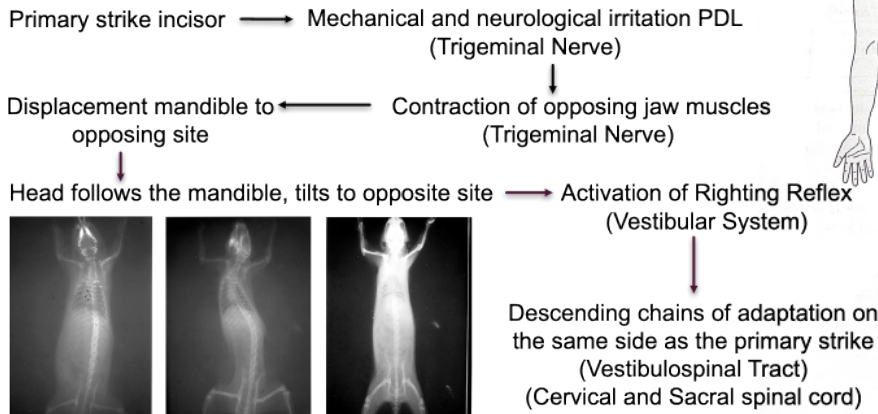
TMJ is the fulcrum between the INCISORS and the rest of the body

Mandible → position head → position spine → **WHOLE HORSE**

↑
Incisors



Myofascial adaptations as reaction to occlusal imbalances



MMS = Millimeter to Strike (mm)

EMC = Excursion to Molar Contact (mm)

Incisor and Molar Occlusion: Normal Ranges and Indications for Incisor Reduction

Rucker, B., (2014)

- 'EMC was 12+/-3.1mm'
- 'For the chewing cycle to operate at maximum efficiency, the incisors have to be horizontal and level from side to side'
- 'EMC below 15mm do not require incisor shortening given there is adequate cheek teeth occlusion during mastication' (Body condition, chewing ability, fecal fiber length, EMC distance and residual molar reserve crown)

- '60% had incisor occlusal surface abnormalities'
- 'An additional 18.6% had EMC exceeding 15mm following cheek teeth floating'

Analysis of the relationship between occlusal and clinical parameters and the need for incisor reduction in confined horses – a retrospective study

Pimentel, L., F. and Zoppa, A., L., (2014)

5yrs, mare
Barrel racing



Left side is preferred
chewing side



Left leg is preferred
weight bearing leg

DGL 4

Left dominant horse

Left side (2-3) is
working side

Right side (1-4)
is balancing side

Loading more the left side

Chewing food bolus, less functional
molar contact, less wear

Concentration of shearing forces of
functional molar contact, **most wear**
EMC longer distance

Left leg/hoof
is loading side

Right leg/hoof
is balancing side

Loading forces front part hoof, less
on heel (**heel higher**)

Loading forces back part hoof
(forward leg position), pressure
heel (**heel lower**)