

**Femoral asymmetry in the Thoroughbred racehorse.**

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**Summary**

**Reasons for performing the study:** Musculo-skeletal injuries remain a significant cause of wastage in training and racing horses. Asymmetrical loading of bones during exercise induces skeletal adaptation which may increase the risk of injury. The occurrence of asymmetrical adaptations in hind limb bones of racing horses has not been investigated.

**Objectives:** To investigate the occurrence of geometrical asymmetries in the macro-architecture of left and right femurs from horses previously trained and raced on curved tracks.

**Methods:** Detailed post-mortem measurements were made of 37 characteristics of left and right femurs from eight thoroughbred racehorses euthanased for reasons unrelated to the study. Measurements focused on articulating surfaces and sites of attachment of muscles and ligaments known to be associated with hind limb locomotion

**Results:** Several measurements were shown to be significantly larger in left compared to right femurs ( $P < 0.05$ ) indicating bone hypertrophy in sites of muscle and ligament attachment.

**Conclusions:** The bone adaptations observed in this study are suggested to be related to asymmetrical loading of the outside hind limb most likely associated with repeated negotiation of turns on curved tracks.

**Potential relevance:** Possible modifications to the design of curved tracks used in training and racing Thoroughbreds should reduce the asymmetrical loading of limbs of horses thereby

reducing the need for significant bone adaptation in these horses and the concomitant risk of musculo-skeletal injuries.

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**Volume 34, Issue 9, Pages 1110–1113, September 2014**

**Variations and implications of the gross anatomy in the equine nuchal ligament lamellae.**

**Sharon May-Davis and Janeen Kleine.**

**Abstract**

Early literature depicting equine anatomy began with stylised illustrations portraying anatomical structures in a congenial format. This study shows that modern day literature often reflects those early portrayals and in particular, the description and depiction of the Nuchal ligament lamellae (NLL) and its attachments from the 2nd to the 7th cervical vertebrae. In the dissection of 35 horses of no specific breed, were unrelated and of mixed gender and age, it was noted that the NLL was not attached to the 6th and 7th cervical vertebrae. Furthermore, the attachment of the NLL on the 5th cervical vertebrae was quite thin and feeble in 9 of those horses and that incomplete fibres were noted in the caudal attachments of the NLL in 15 horses. These variations do not correlate to those early depictions or to the majority of existing equine anatomical text. This new information on the equine NLL has functional and clinical implications, with particular reference in the way we currently understand the postural and locomotive properties of the equine neck and cervicothoracic junction.

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**The Occurrence of a Congenital Malformation in the 6<sup>th</sup> and 7<sup>th</sup> Cervical Vertebrae predominantly observed in Thoroughbred Horses.**

**Sharon May-Davis**

**Abstract**

During the dissection and skeletal examination of 123 horses, it was observed that a significant number had a gross skeletal congenital malformation of the 6<sup>th</sup> and 7<sup>th</sup> cervical vertebrae. In the 6<sup>th</sup> cervical vertebra (C6), either a unilateral or bilateral absence of the caudal ventral tubercle (CVT) was noted. In the presence of the C6 malformation, the 7<sup>th</sup> cervical vertebra (C7) presented either as normal, or, with a unilateral or bilateral transposition of the CVT from C6 onto the ventral surface of C7 with an arterial foramen. This transposition onto C7 was noted to be present on the corresponding side as the absent CVT on C6. Of the 123 horses examined, the congenital malformation of C6 was noted in 19/50 Thoroughbred horses; 3/3 Thoroughbred derivative horses; 1/15 non-descript bred horses and 0/55 purpose bred horses of mixed breeds. In total, 23 horses expressed a C6 congenital malformation of which, 22 were Thoroughbreds or Thoroughbred derivatives. Of these 22 Thoroughbred and Thoroughbred derivative horses, 11/22 expressed either a unilateral or bilateral transposition of the CVT from C6 onto the ventral surface of C7 with an

arterial foramen on the corresponding side. This malformation could have functional and clinical ramifications in the postural and locomotive properties of the equine neck and cervicothoracic junction as reported in other species.

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**MULTIPARTITE NAVICULAR BONES OF A RACEHORSE: CASE REPORT**

Peter Kerkenezov & Sharon May-Davis

**Introduction**

Bipartite and tripartite sesamoid bones have been described in the horse previously. This case study records a racehorse with concurrent quadripartite, tripartite and bipartite navicular bones (distal sesamoid bones).

**Variations and Implications of the gross anatomy in the Longus colli muscle in Thoroughbred and Thoroughbred derivative horses presenting with a congenital malformation of the 6<sup>th</sup> and 7<sup>th</sup> cervical.**

**Sharon May-Davis and Catherine Walker**

**Abstract**

During the dissection of 7 Thoroughbred (Tb) and 2 Thoroughbred derivative (TbD) horses (9) displaying the congenital malformation of C6 and or C6 and C7; variations in the gross morphology of the *Longus colli* muscle were noted. In the absence of the caudal ventral tubercle (CVT) on C6 only, the insertion of the medial and ventral layers, and thoracic portion of the *L. colli* muscle attached to the cranial ventral tubercle (CrVT) on C6. However, upon transposition of the CVT from C6 onto the ventral surface of C7, the medial and ventral layers, a single deep bundle and thoracic portion of the *L. colli* muscle attached to the CrVT on C6 and the transposed CVT on C7. In the unilateral malformation, this placed a distinct asymmetry in the paired left to right longitudinal presentation and cross sectional samples of the *L. colli* muscle. In the bilateral malformation, the CrVTs were longitudinally malaligned and the *L. colli* replicated the unilateral presentation to a lesser extent. In this presentation, asymmetry was noted in entheses patterns and articular process joints, implying abnormal

mechanical load, as was confirmed in the cross sections. As the *L. colli* muscle has specific cybernetic roles linked to posture and locomotion; these anatomic variations imply dysfunction. Pre mortem examinations confirmed 8 of the 9 horses exhibited proprioceptive and neurological dysfunction (stillborn not included). This raises questions as to the equilibrium of affected horses and therefore the safety in handling and riding such horses; as was found in this study.

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### **Congenital Malformations of the First Sternal Rib**

Sharon May-Davis

#### **Abstract**

During the dissection and skeletal examination of 151 horses, a congenital malformation (CM) of the 1<sup>st</sup> sternal rib that influenced the aperture of the Thoracic inlet was noted in 6 horses. The presentation of this CM was variable between horses in gross anatomic appearance, notably; an absent 1<sup>st</sup> sternal rib; bifid Tuberculum costae; bifid Sternochondral articulation onto the sternum; flared shaft; normal 1<sup>st</sup> sternal rib inserting onto the cranial branch of a bifid Sternochondral articulating 2<sup>nd</sup> sternal rib; straight costal shaft and an articulating rudimentary Tuberculum costae with a ligamentous extension replacing the bony shaft and attaching to a rudimentary Sternochondral articulation onto the sternum. Of the 151 horses examined, the CM of the 1<sup>st</sup> sternal rib was restricted to 6/60 Thoroughbred horses and only in those that were affected by either the unilateral or bilateral transposition of the caudal ventral tubercle (CVT) from C6 onto the ventral surface of C7. The normal anatomic presentation of the thoracic inlet was altered, along with associative musculature including neurological pathways. These CMs are likely to produce clinical and functional ramifications of the thoracic inlet, thoracic limb and thoracic viscera, with the probability of altering postural and locomotive function as noted in 4 horses demonstrating the CM.

**Preliminary Radiographic Protocols for Identifying Congenital Malformations of the Caudal Cervical Vertebrae**

Authors: May-Davis SER, Minowa F, Monoe S ✉

**Abstract**

In 2014, a published study based on dissections and skeletal examinations noted that 19:50 Thoroughbred horses had a congenital malformation of the 6<sup>th</sup> cervical vertebra (C6). In addition, it was found that in those 19 Thoroughbred horses expressing a congenital malformation of C6, 9 displayed a concurrent congenital malformation of the 7<sup>th</sup> cervical vertebra (C7). In this study, 3 Thoroughbred horses and 1 Thoroughbred type were clinically examined; 3 were radiographed for limb abnormalities and 2:3 radiographed for the congenital malformation of C6 and C7 prior to euthanasia. Upon dissection, 3:4 expressed a congenital malformation of C6 with 2:3 displaying a concurrent CM of C7. These 2 horses were positively radiographed for the CM of C6 and C7 prior to dissection. The radiographs of C6 were taken in direct lateral orientation with 0 degree of elevation and revealed the absence of the caudal ventral tubercle (CVT) of C6. Re-positioning the horse's forelimbs caudally with an outstretched neck, C7 was radiographed at a 30° oblique lateral angle in a cranial to caudal direction with 0 degree of elevation; the transverse process of C5 remained cranial to the beam. The caudal aspect of the plate was positioned medial the Cranial deep pectoral and rotated vertically to expand the field of view of the cervical vertebrae, whilst remaining perpendicular to the beam.

