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Investigation into the origins of lateral condylar fractures in Thoroughbred racehorses

Determining which features are associated with lateral condylar fractures to decrease the risk of this type of fracture occurring

SPrj:002

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Pilot investigation into the involvement of a low oxygen environment in the pathogenesis of lateral condylar fracture in Thoroughbred racehorses

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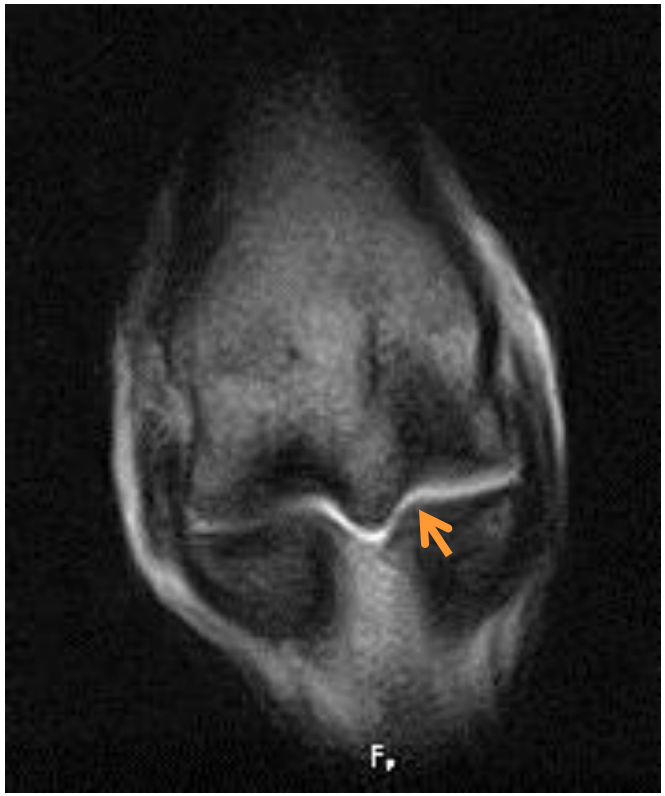
Reason for study

- Lateral condylar (LC) fractures of the cannon bone are the most common fracture suffered by racehorses
- LC fractures generally develop in an area called the lateral parasaggital groove (arrow)



Reason for study

- We have previously:
  - Identified various racetrack, horse and bone features that are associated with this type of fracture
  - Described the detailed structure of un-fractured bones
- **BUT** we do not know the detailed structure of fractured bones

Relevance to the Thoroughbred

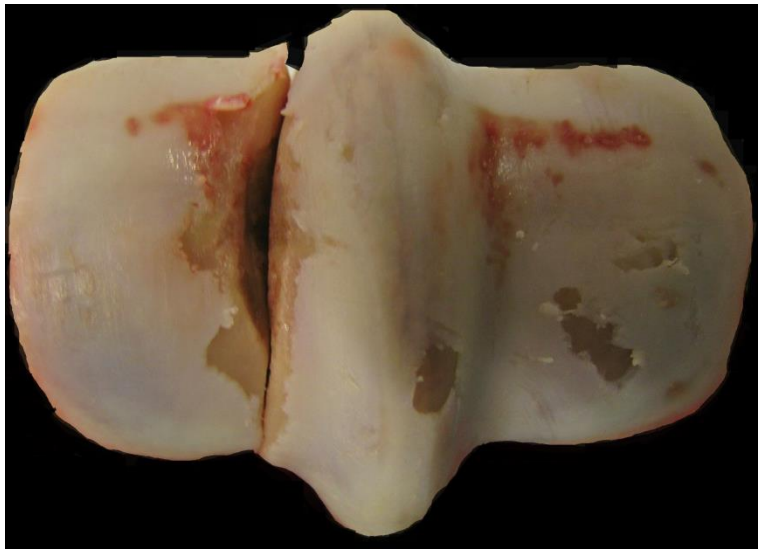
A greater understanding of the potential causes of LC fractures will decrease the risk of this type of catastrophic fracture occurring in training and on the racetrack

Objectives

- Carry out histological (microscopic) examination of 15 cannon bones with LC fracture for indications of haemorrhage breakdown, microcracks and other features
- Correlate these features with the severity of dense bone pathology

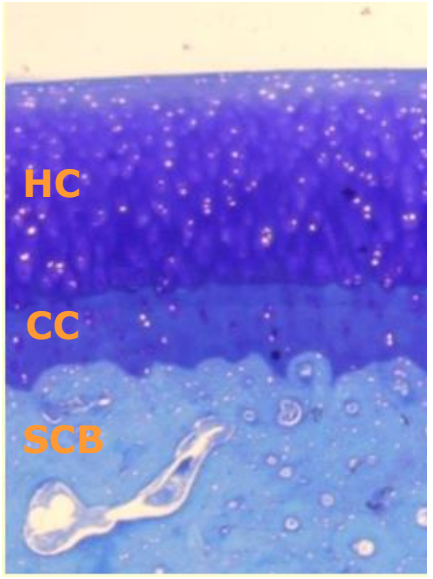
How did we do this?

- 15 fractured cannon bones were sliced into very thin sections
- Sections were stained with 2 different dyes to identify features in the different tissues



How did we do this?

- Sections were assessed for evidence of different histological features in the:
  - Hyaline cartilage (HC)
  - Calcified cartilage (CC)
  - HC and CC interface
  - Subchondral bone (SCB)
  - CC and SCB interface
  - Cancellous bone

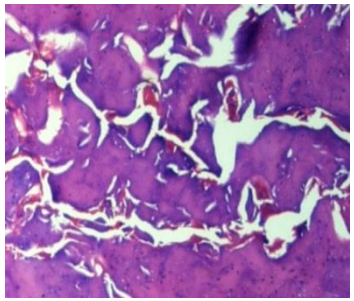


How did we do this?

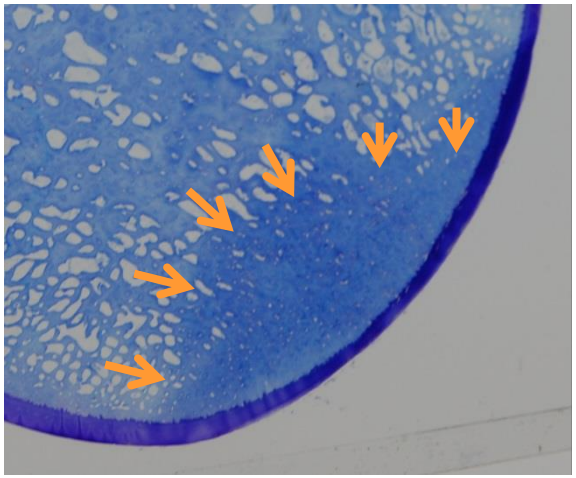
- Statistical tests were used to determine which SCB features are associated with:
  - Haemorrhage breakdown
  - Microcracks in the cancellous bone
  - Cartilage features

What did we find?

- No evidence of haemorrhage breakdown was detected in this group of bones

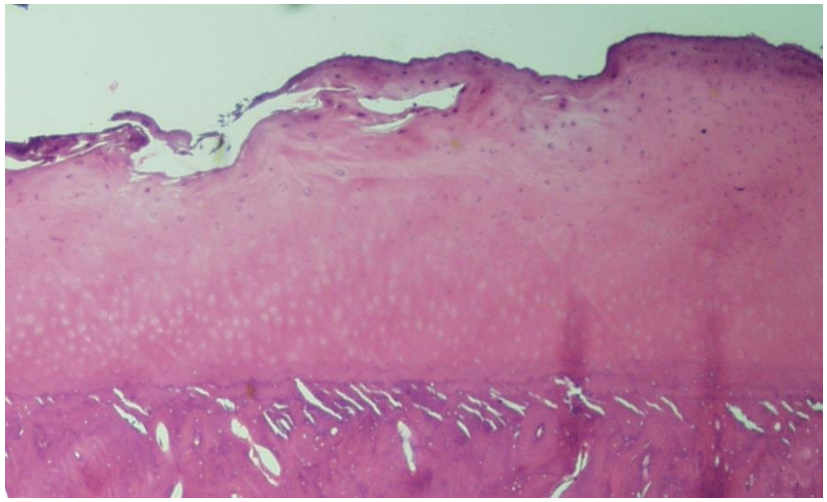


- Subchondral bone collapse (top) and remodeling/sclerosis (bottom: area between the arrows and cartilage)are associated with microcracks in the cancellous bone



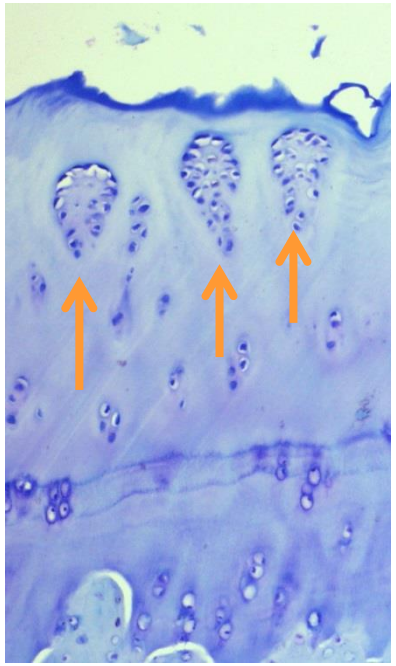
What did we find?

- Hyaline cartilage features associated with microcracks in the bone



Irregular staining, disorganised cellular arrangement and an uneven HC surface

Multiple large chondrocyte clusters (arrows) within HC



Impact on the Thoroughbred

- This study has shown that SCB collapse/remodeling/sclerosis are associated with microcracks in the cancellous bone
- We have previously shown that these SCB features can be identified on MRI

Impact on the Thoroughbred

- It may be possible to use MRI to monitor horses in training to detect early evidence of bone damage, and potentially modify training regimes to manage this damage before catastrophic fracture

Potential next steps…

- Findings suggest that a similar study should be carried out in:
  - a larger group of bones
  - freshly fractured bones
- Work is required to learn more about the effects of different training regimes on bone damage and repair