

Relationship between Thoroughbred racing and training workloads and the fatigue life of equine subchondral bone

Chris Whitton, The University of Melbourne, Australia
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Previous predictive models of limb injuries in racehorses have treated injury as a yes or no outcome – that is, the horse is either injured or not injured. However, damage accumulates over time even though an injury is only recognised when a threshold of damage is reached. For bone this is the process of bone material fatigue, the damage that accumulates through repeated loading of the skeleton when galloping. This is evidenced by the large number of horses with catastrophic injuries where pathology is found at post-mortem that was clearly present prior to injury. Bone fatigue is more likely to occur when loads are higher (horses are galloping faster) and the number of strides increases in a galloping horse.

This study will build on our previous research which used racing data only, combining records of both racing and training workloads to estimate bone fatigue accumulation in order to provide a more detailed prediction of limb injury. To achieve this, we will use ten years of training and racing data from The Hong Kong Jockey Club to develop mathematical models that estimate the proportion of an individual horse's bone fatigue life that has been used up and therefore how close it is to developing an injury. This method will then be investigated as a predictor of limb injury.

The strength of this approach is that rather than only predicting the endpoint to musculoskeletal injury per previous epidemiological studies, we will be able to map the development of limb injuries over time which will allow for much earlier intervention. The findings of this research could be used to inform the development of a real-time tracking system for injury progression in individual horses.