Use of mRNA expression and serum biomarkers as tools to monitor musculoskeletal adaptation in Thoroughbred horses returning to race training

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Our duty to care for and heightened public awareness of racehorses has led to increased pressure for additional research into racehorse well-being and injury prevention. An important area that requires dedicated research is in identifying and preventing non-fatal injuries given the direct link between previous lameness and/or being placed on a “vet list” and the risk of fatal injury. As such, a critical unmet need is the development of a sensitive and specific screening tool to pre-emptively identify horses at risk of injury.

Studies have demonstrated that racehorses returning following a layoff/spell are at an increased risk for injury as they return to training and racing. This is due to changes in bone that occur when the stresses of training and racing are removed. Racehorses being imported into Hong Kong provide an important opportunity to monitor these changes during reconditioning, where approximately 20% of these horses will experience an injury within the first 3-4 months following import. Based on our prior and ongoing work, we believe that messenger RNA (mRNA) expression analysis in combination with cortisol and bone biomarker measurement could provide a means for identifying racehorses whose skeletons are not coping with training and are at risk of injury such that intervention prior to injury may be possible.

As such, we hypothesize that messenger RNA expression analysis combined with cortisol and bone biomarker measurements can be utilized to monitor racehorses in training and identify those at risk for poor performance and/or injury. Weekly veterinary examinations and trainer feedback will identify horses with signs of injury/illness or performance concerns while additional records will be collected for analysis. This project will use regularly collected samples from 80 previously trained +/- raced Thoroughbred horses that undergo a substantial period of deconditioning during importation quarantine for Hong Kong, and monitor their weekly responses to retraining/reconditioning by measuring changes in mRNA expression, serum cortisol, and bone biomarkers.

Ultimately, this project will provide essential data to improve the welfare of horses not only entering Hong Kong, but across the globe. A critical step in this process is to better understand the responses of equine athletes to conditioning and reconditioning using existing tests that have proven useful for identifying fracture risk. Data collected during this project will serve as important building blocks for future projects as we strive for better methods to reliably detect and prevent injuries in Thoroughbred racehorses.