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FARAH

Proceedings of the 9th FARAH-Day

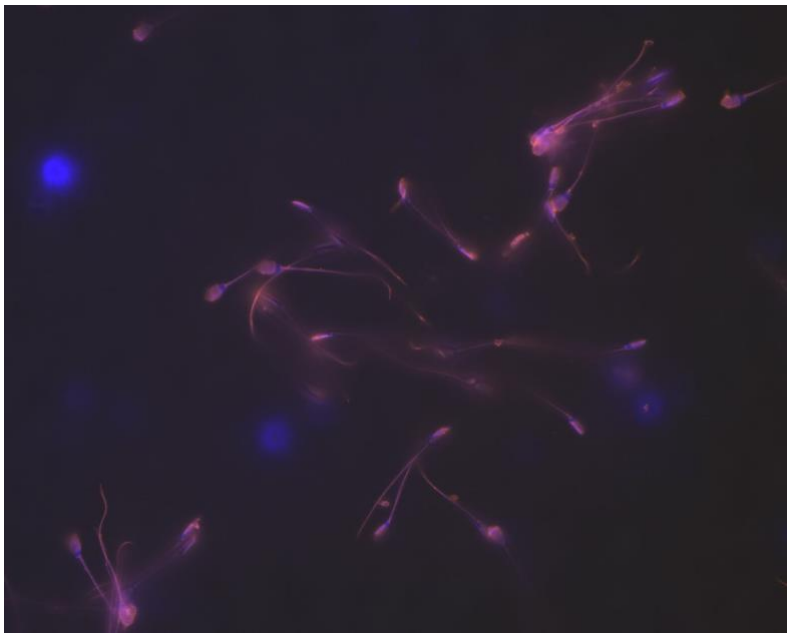
Faculty of Veterinary Medicine

(University of Liège - Belgium)

December 15, 2022

One Health

L'Animal et l'Homme, une même santé



First steps in discipline-specific canine exercise physiology: a field study on canicross dogs.

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Canicross and its derivatives are burgeoning sports activities for the dog-master duo; nonetheless, scientific knowledge in this field is lacking. Our aim was to work on this gap, thus helping owners and veterinarians for their sports and profession. On December 2021 (5°C, 80% humidity) and May 2022 (20°C, 54% humidity) we recruited 9 and 11 dogs covering a distance of 5.7 and 4 km, respectively. We collected physical and blood parameters as heart rate (HR), respiratory rate (RR), rectal temperature (RT), hematology, biochemistry, blood lactate and glucose, at rest (T0), immediately (T1) and 1 hour after exercise (T2). We performed a one-way ANOVA on repeated measures. On December as on May, we observed a significant increase in RT and HR. Mean RT at T1 was more than 1°C higher on May (40.49±0.88) than on December (39.29±1.06). Hematocrit increased significantly with exercise only in December. Concerning blood electrolytes, only Mg decreased with exercise on December, whereas also other electrolytes (Cl, K, Ca, P, Mg) changed with exercise on May. Biochemistry was unchanged, except for creatinine, and only on May. Interestingly, lactate was not affected by exercise on December, whereas it increased significantly on May from T0 to T1. In conclusion, few parameters were modified in cold racing conditions, while other electrolytes and lactate significantly changed in warmer conditions. The difference in the increase of RT between December and May is a crucial parameter when considering animal welfare. Hypomagnesemia with exercise was a common finding in both situations. These data have to be further investigated and explained in the light of comparative exercise physiology.

AlHV-1 infection causes oligoclonal expansion and activation of CD8$^+$ T lymphocytes resulting in bovine malignant catarrhal fever via interaction with T cell signaling pathway

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Alcelaphine herpesvirus 1 (AlHV-1), a member of the Gammaherpesvirinae subfamily, induces malignant catarrhal fever (MCF), a fatal peripheral T-cell lymphoproliferative disease, in a diversity of ruminant species, including cattle. Here, we first confirmed in the bovine species that AlHV-1 latency-associated gene expression is essential for persistent infection of CD8$^+$ T cells and MCF development. Next, we performed an in-depth characterization of peripheral CD8$^+$ T cells during bovine MCF. T cell receptor sequencing of both CDR3α and β revealed oligoclonal expansion of CD8$^+$ T cells, and we observed severe transcriptomic and epigenetic changes in CD8$^+$ T cells using RNA-seq and ATAC-seq analyses. We also observed upregulation of effector, memory, and exhausted CD8$^+$ T cell signature genes, and performing viral tracking at the single cell level, revealed that viruses are mainly enriched in effector, memory, and exhausted-like CD8T cells. Analysis of the viral genome transcription identified viral genomic regions being expressed in infected bovine CD8$^+$ T cells, such as the region predicted to encode the gene A10. We demonstrated that A10 is phosphorylated in T cells *in vitro* and affects T cell signaling. Furthermore, impaired expression of A10 did not affect AlHV-1 replication in vitro but rendered AlHV-1 unable to induce MCF in the rabbit model. Overall, we provide a thorough description of CD8$^+$ T cell responses during MCF to uncover a novel mechanism explaining how AlHV-1 dysregulates T cell signaling leading to MCF.