

Abstract

Sled dogs are incredibly resilient animals that are integral to Alaska's culture. However, previous studies have shown that sled dogs, like humans, are prone to the negative effects of exhaustive exercise which include mild inflammation and muscular damage. Exhaustive exercise induces an altered cytokine (anti-inflammatory) profile. [3]. Interleukin 10 (IL-10) has been shown to increase with exercise in human and non-human animal species. [1] This experiment elucidates the role of wild Alaskan blueberries and inflammatory responses in dogs using IL-10 in blood samples from sled dogs before and after a 20-minute run at 75% VO₂ max was measured using ELISA. BioTek Gen 5 and GraphPad Prism 9 software was used to analyze raw data. There was a significant difference between the control/before run and treatment/after run ($p < 0.05$). The increased concentration of IL-10 in these groups suggests that diet interventions involving wild Alaskan blueberries in canines increases overall immune response.

Introduction

- Alaskan sled dogs, like humans, are prone to mild inflammation and muscular damage. This can induce an altered cytokine profile. [3]
- IL-10 is strongly linked to increase with exercise in human and non-human animal species. [1]
- Dietary supplements enriched antioxidants can reduce oxidative stress and has positive effects in long-term exercise performance and recovery. [2]

Methods

Eight sled dogs used for timed sprint races were run in two phases: control and treatment. For the control phase, the group ($n=8$) was run with their normal diet and a protein supplement. In treatment, the dogs were fed a weight-dependent (2g blueberries/ kg body weight) number of Alaskan blueberries twelve hours before timed exercise, as shown in *Table 1*. Blood was drawn immediately before and after the timed exercise trial, flash frozen, and stored in a -80°C freezer. An ELISA assay was then run to measure IL-10 concentrations in duplicate. BioTek Gen 5 software produced raw data, optical density (OD). Statistical analysis was run by Graphpad Prism 9 to analyze obtained absorbance values. Statistical differences compared to the control group were determined with the post-hoc Dunnett's multiple comparisons test.

Subject	Weight (lbs)	Sex	Blueberry Dosage (g)
1	93.0 lbs	Male	82.0 g
2	84.0 lbs	Neutered Male	74.0 g
3	72.6 lbs	Male	64.0 g
4	69.0 lbs	Male	61.0 g
5	57.4 lbs	Female	50.5 g
6	50.0 lbs	Female	44.0 g
7	50.0 lbs	Female	44.0 g
8	62.0 lbs	Female	55.0 g

Table 1. Canine test subjects, weight, sex, and weight-adjusted acute blueberry dosage (g).

Conclusion

- IL-10 concentrations increased after the exercise and blueberry treatment. This suggests that the increased concentration of IL-10 in these groups suggests that diet interventions involving wild Alaskan blueberries in canines increases overall immune response.
- There was not a significant difference between the control trial before and after exercise. This could be due to the timing of the exercise period, as it is currently understood that the longer a subject exerts itself, the greater the concentration of IL-10 will accumulate [1]
- The advanced medicinal properties of Alaskan-sourced blueberries could provide an economical niche for Alaskan farmers, strengthening the relationship between Alaskan tradition, agriculture, and One Health.

Future Research

- Due to an increasing IL-10 concentrations after exercise and wild Alaskan blueberry supplementation, it may be beneficial to replicate the experiment with a larger sample size.

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References

- Cabral-Santos, C., Lima Junior, E. A., Fernandes, I. M. da C., Pinto, R. Z., Rosa-Neto, J. C., Bishop, N. C., & Lira, F. S. (2018). Interleukin-10 responses from acute exercise in healthy subjects: A systematic review. *Journal of Cellular Physiology*, 234(7), 9956–9965. <https://doi.org/10.1002/jcp.27920>
- Taherkhani, S., Suzuki, K., & Castell, L. (2020). A Short Overview of Changes in Inflammatory Cytokines and Oxidative Stress in Response to Physical Activity and Antioxidant Supplementation. *Antioxidants*, 9(9), 886. <https://doi.org/10.3390/antiox9090886>
- von Pfeil, D. J. F., Cummings, B. P., Loftus, J. P., Levine, C. B., Mann, S., Downey, R. L., Griffiths, C., & Wakshlag, J. J. (2015). Evaluation of plasma inflammatory cytokine concentrations in racing sled dogs. *The Canadian Veterinary Journal = La Revue Veterinaire Canadienne*, 56(12), 1252–1256. <https://pubmed.ncbi.nlm.nih.gov/26663920/>



Figure 1. Wild Alaskan Blueberries.



Figure 2. Preparing to run.

Results

IL-10 Concentrations From Varying Exercise Trials

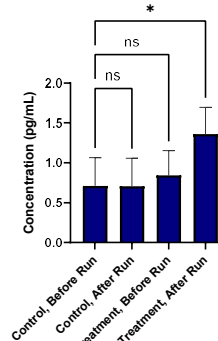


Figure 4. Bar graph results of Canine IL-10 levels. A significant difference was observed after treatment and after exercise, compared to control, before exercise ($p < 0.05$).

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LM0 TITLE:

-Must include your findings
from your experiment.

Lani Megliola,
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LM1 ABSTRACT:

-Why should people care
about your research? Your first
sentence should hook your
audience. Usually diseases and
such things that may affect an
individual will grab their
attention.

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LM2 -Please be mindfull that the
body of the poster must be the
same font size. Also the font
must be in Times New Roman.

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