HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI
ELÄINLÄÄKETIETEELLINEN TIEDEKUNTA
VETERINÄRMEDICINSKA FAKULTETEN
FACULTY OF VETERINARY MEDICINE

A Human Model? Analysing Vitamins A, D and E in Dogs

L. Penttinen DVM, F. Atroshi DVM, PhD, S. Sankari DVM, PhD, A. Hielm-Björkman DVM, PhD
The Faculty of Veterinary Medicine, Department of Equine and Small Animal Medicine, University of Helsinki, Finland

Introduction

Dogs suffer spontaneously from many of the diseases that humans have but as they live shorter lives they get them sooner. Dogs live in homes, so diet interventions can be conducted in the human environment. While human diet interventions with long duration are difficult to conduct and control it is much easier with dogs: they eat only what humans give them and can eat the same food for months without it being unpleasant for the dog, nor for the owner. All these reduce confounding factors of the blood values and allow possible generalisations onto humans.

Several studies concerning vitamins in dog blood have been made using various protocols, but no final reference values have been set for the concentration of vitamins in dog blood or tissues. Here we are piloting the methods.

Objectives

Ultimately, to establish canine reference values for vitamins and to see how they compare with human values. This way pet dogs could be used as a model in diseases that humans and dogs share and where lipid-soluble vitamins would be analyzed. They could also be used in diet interventions to see how blood vitamin levels change in reaction to a certain type of diet.

Materials and methods

Serum samples for vitamin analysis were collected from 28 healthy Finnish pet dogs. Three medium-/small-sized breeds were chosen: Longhaired Collies (n=8), Flat-coated Retrievers (n=5) and Staffordshire Bull Terriers (n=15). All dogs were healthy, male/female ratio was 5/23, median age was 3.25 (range 0.5 - 12,5) years. Dogs were diagnosed as healthy using basic clinical examinations, haematology and serum biochemistry. Vitamins A, D and E were measured from the serum in a laboratory that analyses mainly human samples using the same protocols they use for human samples. The method used was reversed phase high-performance liquid chromatography.

Results

Canine reference values compared well but were not equal with human values. Canine mean vitamin A was 3.92 µmol/l (95% CI; 3.49-4.35), compared to humans 1.1–3.7 µmol/l, and canine mean vitamin D 63.26 nmol/l (95% CI; 54.83-71.69), compared to humans 75-130 nmol/l. Canine vitamin E mean 112.25 µmol/l (95% CI; 91.47-133.03), was somewhat higher than the human reference value of 8-48 µmol/l, possibly due to Vitamin E enriched oil supplements.

Although mean values were quite similar between breeds, there was a significant difference between Longhaired Collies and Staffordshire Bull Terriers in vitamin D3 concentrations ($p=0.028$), but n was low. There was no significant difference regarding age and sex between breeds.

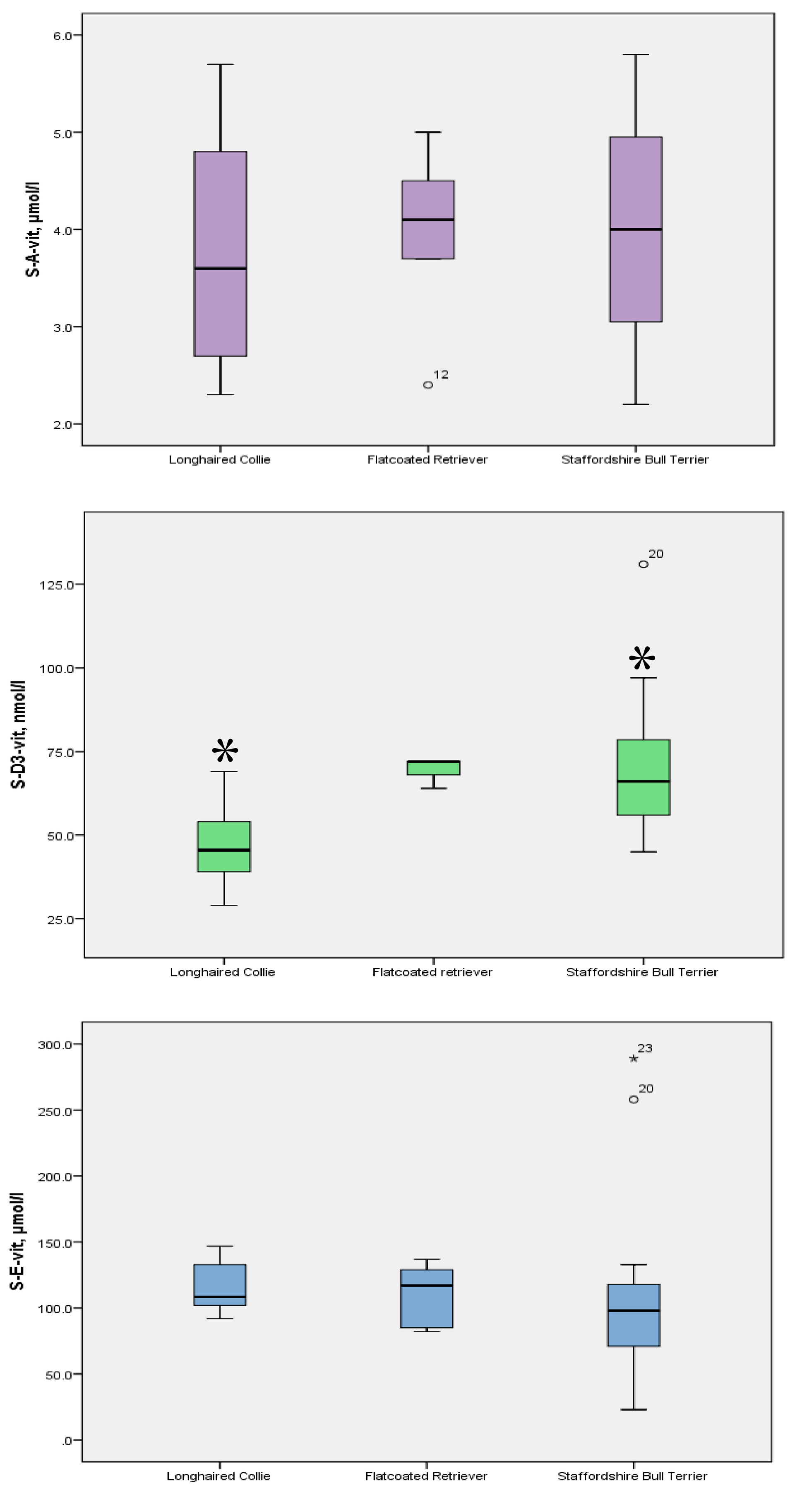
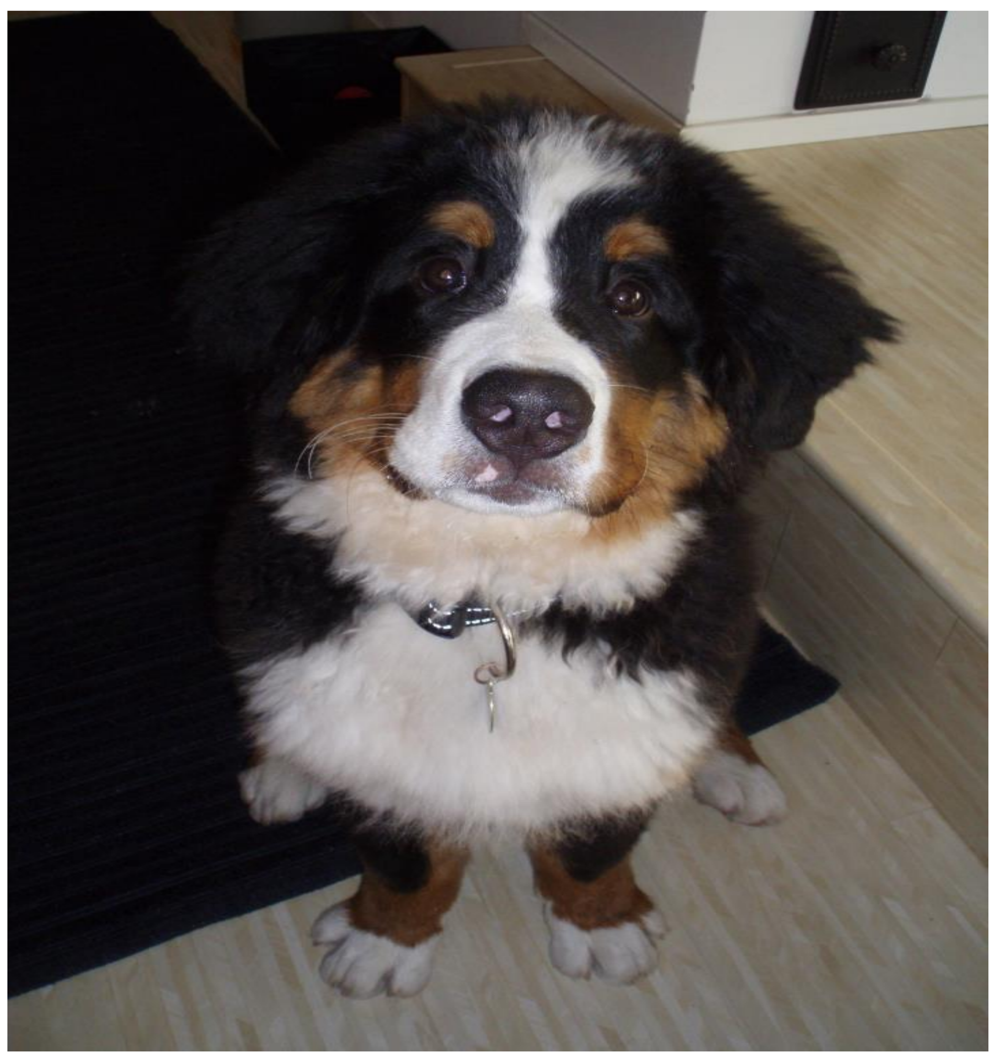


Figure 1. Box plot of the serum concentrations of vitamins A, D and D in three different pet dog breeds.
* = there was significant difference between the values.



Conclusions

As the canine serum concentrations of vitamins A, D and E are similar to those of humans and can be measured using the same protocols in a laboratory that analyses mainly human samples this could be an indication of an at least somewhat similar metabolism. This needs, however, to be studied further. Canine diet interventions could offer valuable results in a simpler and quicker format compared to human studies and it would be possible to evaluate lipid-soluble vitamins in these trials. Dogs are fairly inbred so we can see genetical differences between different breeds. This could explain, at least partially, the differences in vitamin concentrations between different breeds.

We want to thank our sponsors:
MILA laboratories, Helsinki, Finland and the Svenska Kulturfonden for their valuable support. However, none of the sponsors have had any influence on the reporting of data.

SVENSKA KULTUR FONDEN