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THE CURIOUS CASE OF CANINE CATARACT: NEW INSIGHTS INTO AGING IN DOGS

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It is well established that small dogs on average have a longer life span than do large dogs; however, the exact mechanisms responsible for this difference are a subject of considerable debate. Using clinical data of over 100,000 individual eye exams from 72 dog breeds of varying size and life span provided by the CERF database, we were able to establish that breed size, life span and the age at which dogs develop non-hereditary, age-related cataracts (ARC) interact. The smallest dog breeds had a lower ARC prevalence between both ages 4 to 5 and for overall life span than medium-sized breeds, which in turn had a lower prevalence than giant breeds. These differences became statistically more significant when comparing small and giant breeds only. Our data also confirmed the inverse relationship between breed size and life span that is generally accepted in the literature.

Given that ARC has been shown to be at least partially caused by the accumulation of oxidative damage to the lens, we suggest that it can not only be considered as a general biomarker for life expectancy in the domestic dog, but also for the systemic damages caused by reactive oxygen species (ROS) during the aging process. This suggests that large breeds accumulate more such damage earlier in life than small breeds do, which could be explained by their longer growth period and faster rate of growth, during which the body's normal anti-oxidative mechanisms may be insufficient.

The correlation between ARC incidence, lifespan, and body size suggests new ways of studying the gene expression pathways affecting these attributes, notably those involving insulin-like growth factor 1 (IGF-1). Accumulating more pathological, hormonal and molecular data for dog breeds of different body sizes and rates of growth should also provide new approaches regarding the influence of ROS and the IGF-1 pathway on life span, age-related pathologies and the rate and extent of cell replication that accompanies them.

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