

Size Matters: The Link Between Dogs and Health

A new study sheds light on why larger dogs might have shorter lifespans and distinct health issues compared to their smaller counterparts.

Analysis by Dr. Karen Shaw Becker

STORY AT-A-GLANCE

- Researchers with the Dog Aging Project are looking into the health conditions that affect small and large dogs throughout their lives, with the goal of quantifying how the pattern of disease history varies across the spectrum of dog size, dog age, and their interaction
- In a study published a few months ago, the researchers demonstrated that overall, larger dogs are more likely to face lifespan-limiting health conditions such as cancer, bone-related disease, GI disorders, and neurological and endocrine conditions
- It's common knowledge that small dogs typically have much longer lifespans than large and giant breeds; past research shows large dogs age much faster than smaller dogs, and suggests cell damage from excessive amounts of free radicals starts at a young age in large breed puppies

In a study published in the open-access journal PLOS ONE in mid-January,¹ a team of researchers with the **Dog Aging Project** linked dog size to health conditions over the span of a dog's life. The study looked at more than 25,000 U.S. dogs across 238 breeds. The co-authors write:

"Age in dogs is associated with the risk of many diseases, and canine size is a major factor in that risk. However, the size patterns are complex. While small size dogs tend to live longer, some diseases are more prevalent among small dogs," noted the researchers.

"In this study we seek to quantify how the pattern of disease history varies across the spectrum of dog size, dog age, and their interaction."²

Size Plays Role in the Types of Diseases Dogs Acquire

It's common knowledge that smaller dogs tend to live longer than larger dogs. Previous research suggests that big dogs aren't prone to more health conditions, but that dogs of different sizes may face different levels of risk for different conditions.

Lead study author Yunbi Nam of the University of Washington and colleagues reviewed Dog Aging Project survey data from the owners of 27,541 dogs of 238 breeds. They discovered that overall, larger dogs were at some point in their lives more likely to have faced health conditions such as cancer, bone-related disease, gastrointestinal (GI) disorders, ear/nose/throat issues, neurological and endocrine conditions, and infectious diseases.

Smaller dogs, on the other hand, were more likely to have dealt with ocular, cardiac, liver/pancreas, and respiratory diseases. The incidence of kidney/urinary disease didn't differ significantly between the two groups; however, for many types of conditions, including cancer, ocular, cardiac, orthopedic, and ear/nose/throat conditions, different dog sizes were associated with differing patterns of risk over the course of a dog's lifespan.

The results held up even after the researchers accounted for variables such as the dogs' sex, living environment, and whether they were purebred or mixed breed.

The researchers make clear that their study results don't confirm a causal relationship between dog size, age, and disease. However, the findings should prove valuable in gaining a deeper understanding of the types of conditions that may underlie the shorter lifespan of larger dogs.

"Our study has several strengths and limitations that should be noted. Strengths include the large sample size of this study, which allows us to estimate patterns with high power across the whole age and size spectrum," the researchers wrote. "Additionally, we have a very diverse sample of dogs distributed across the entire United States. Since the sample is not veterinary-hospital or clinic-based it may be more representative of the general population of dogs.

*Conversely, while our observations can suggest which conditions manifest differently across age and size, they do not prove any causal relationships due to the cross-sectional nature of the analysis. Over time, longitudinal data will be collected on these dogs, and we will be able to examine disease incidence."*³

A Big Dog's Life 'Unwinds in Fast Motion'

Contrary to what happens in the canine species, when it comes to the lifespan of most mammals, the general rule is the bigger the creature, the longer it will live. For example, **elephants** in their natural habitat can live into their 60s. The average lifespan of a squirrel, on the other hand, is only about 6 years.

Small mammals normally have lower metabolic rates than larger species, which is why larger animals with higher metabolic rates live longer. However, when it comes to domestic dog breeds, even though smaller dogs have lower metabolic rates, they live longer than large and giant breeds.

This is essentially the opposite of what occurs in other species. A Yorkshire Terrier, for example, can be expected to live from 13 to 16 years, whereas a Great Dane will live only about half that long.

A 2013 study established that big dogs die younger primarily because they age quickly.⁴ Study authors believe these findings can help scientists understand the biological links between growth and mortality.

Dogs were the perfect subjects for the study, because humans have bred them throughout history to be wildly variable in size. The heaviest dog on record was probably an English Mastiff that weighed 343 pounds, while the smallest was a terrier weighing in at under a quarter pound.⁵ There is no other species of mammal with such tremendous size disparity.

The study looked at ages of death in 74 breeds and over 56,000 dogs that visited veterinary teaching hospitals. Researchers learned that large breeds seem to age at faster rates than smaller breeds, and the speed at which the risk of death increases with age is also greater with big dogs.

According to study authors, large dogs age at an accelerated pace, suggesting “their adult life unwinds in fast motion.”⁶ For a dog, every 4.4 pounds of body mass takes about a month off his life.⁷

The researchers believe that going forward, we need to look at the growth and health histories of dogs to narrow down the leading causes of death for large breeds. For example, bigger dogs more often acquire **cancer**, which makes sense when you consider they grow more than small dogs, and cancer is the result of abnormal cell growth.

It is possible humans have inadvertently selected for characteristics such as rapid growth that predispose large dogs to cancer. Other large animals like elephants that have many more cells than smaller creatures — and should therefore also be at greater risk for cancer — seem to have evolved special defense mechanisms against disease.

These mechanisms probably developed through natural selection over a very long period of time, whereas most dog breeds have evolved through **selection by humans**, and over a much shorter period of time.

Evolutionarily speaking, dogs have evolved in the blink of an eye, and protective mechanisms against cancer and other diseases haven’t had time to catch up.

Oxidative Stress Levels in Large vs. Small Dogs

In 2017, two undergraduate students at Colgate University decided to investigate why smaller dogs seem to age more slowly than large ones.⁸ For their study, the undergrads wanted to look specifically at the influence of free radicals and oxidative stress on the aging process in dogs.

Oxidative stress, which is associated with aging, is defined as physiological stress on the body caused by the cumulative damage done by oxygen free radicals inadequately neutralized by antioxidants. Free radicals are unstable molecules with an uneven number of electrons.

These unstable molecules travel around the body looking to bond with stable molecules so they can steal an electron and stabilize themselves. When they are successful, they create new unstable molecules that damage cell membranes and eventually contribute to cancer and other diseases.

The researchers contacted veterinarians and collected about 80 tissue samples from both large and small breeds of varying ages, from puppies to old dogs. With the help of a Colgate animal physiologist, they isolated cells from the tissues, grew them in a lab dish for several weeks, and then analyzed them.

Cell Damage From Free Radicals Starts Early in Large Dogs

The students discovered that energy and free radical production in the cells from the adult dogs was comparable for both large and small breeds, as was the amount of antioxidants. However, the cells from large breed puppies had excessive amounts of free radicals — too many for antioxidants to effectively neutralize.

Large breed puppies have faster metabolisms and growth rates than smaller breeds, and the results of this study suggest cellular damage starts accumulating at a young age in larger dogs. “Cell damage even at this young age can have long-lasting effects,” says researcher Josh Winward.

The Colgate study results are preliminary, but if they can be replicated in future research, according to Winward, it might be possible to extend the life of large and giant breeds by supplementing antioxidants in puppies to help destroy free radicals before they can do damage.

Helping Big Dogs Enjoy Long, Healthy Lives

If you're the pet parent of a large or giant breed dog or are thinking about adding one to the family, I hope you'll consider the **advice of Newfoundland breeder Dr. Jeff Bergin**, whose dogs live into their late teens. Some of the wonderful practices Dr. Bergin follows with his dogs include:

- **Feeding exclusively raw diets.**
- **Breeding for health, first and foremost** — Dr. Bergin breeds his dogs only once or twice during the course of their lives, with at least 6 years between litters. He does not breed dogs with congenital defects.
- **Performing regular chiropractic adjustments** — With large and giant breed dogs, it's very important to take care of the musculoskeletal system. Dr. Bergin happens to be both a licensed animal chiropractor as well as a human chiropractor. He performs regular manual orthopedic manipulation on all his dogs, from the moment they first stand on their own through the remainder of their lives. This practice is one of the keys to keeping a big dog's frame from degenerating with age.
- **Limiting vaccines and other assaults on the immune system** — Dr. Bergin only revaccinates his dogs against rabies, because the law requires it. By strictly limiting the number of vaccines they receive, he helps keep his dogs' immune systems strong and resilient. To measure ongoing protective immunity, rely on vaccine antibody titers instead.
- **Ensuring litters go to the right families** — Dr. Bergin performs a mandatory home visit to families interested in his dogs. He won't release a dog without seeing the new home. He conducts in-depth interviews with prospective owners to ensure the puppy will be well taken care of, and he also insists on a commitment from prospective owners to feed raw.

By focusing on what I call the three pillars of health: nutrition, maintenance of the frame (the musculoskeletal system), and a strong, resilient immune system, you can ensure you're providing your canine family member with everything she needs for an excellent quality of life for as long as she lives.

Sources and References

[ScienceDaily, January 17, 2024](#)

^{1,2,3} [Nam, Y. et al. PLOS ONE, January 17, 2024](#)

⁴ [The American Naturalist, Vol. 181, No. 4, April 2013](#)

^{5,6} [LiveScience, March 6, 2013](#)

⁷ [LiveScience, March 8, 2013](#)

⁸ [Meeting Abstract, Society for Integrative and Comparative Biology 2017 Annual Meeting](#)
