

# Health Implications in Early Spay and Neuter in Dogs

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Recent results from research funded by the AKC Canine Health Foundation have the potential to significantly impact recommendations for spaying and neutering dogs in the United States. Most dogs in the United States are spayed or neutered, and for years the procedures have been completed prior to maturity. The study, published in the prominent, open access journal PLOS One, suggests that veterinarians should be more cautious about the age at which they spay and neuter in order to protect the overall health of dogs.

A team of researchers led by Dr. Benjamin L. Hart at the University of California, Davis has completed the most detailed study performed to date that evaluates incidence of cancer diagnoses and joint problems in one breed -- Golden Retrievers -- by neuter status: early (before 12 months old), late (12 months or older), and intact. Consistent with previous studies on the topic, the results showed increased likelihood of hemangiosarcoma, lymphoma, mast cell tumors, and canine cruciate ligament (CCL) rupture in neutered dogs.

The most profound observations were in hip dysplasia in male dogs when comparing early and late-neutering. The risk of development of hip dysplasia doubles, and disease occurs at a younger age in the early-neuter group compared to both the intact and late-neuter group. No occurrence of CCL disease was observed in intact male or intact female dogs, or in late-neutered females. In early-neutered dogs, the incidence of CCL was 5.1 percent in males and 7.7 percent in females, suggesting that neutering prior to sexual maturity significantly increases a dog's risk of developing CCL disease. With respect to cancer, cases of lymphoma were 3-fold greater in the early-neutered males. Interestingly, incidence of mast cell tumors (male and female dogs) and hemangiosarcoma (female dogs only) were highest in the late-neuter group.

“Dr. Hart’s landmark study is the first to provide evidence for when to spay or neuter dogs. For years the veterinary community has been aware that early-spay and neuter may impact orthopedic health in dogs. Through a very detailed analysis and inclusion of body condition score as a risk factor, Dr. Hart was able to show that timing of spay and neuter does indeed have health implications,” said Dr. Shila Nordone, Chief Scientific Officer for the AKC Canine Health Foundation.

“CCL disease is painful, debilitating, and costs dog owners \$1 billion annually to treat. The AKC Canine Health Foundation is committed to funding research, like Dr. Hart’s study, that can lead to evidence-based health recommendations. Armed with prudent guidelines for when to spay and neuter dogs we will have a significant impact on the quality of life for dogs,” continued Dr. Nordone.

Importantly, the task at hand is now to determine if the observations in this study are indeed true across all breeds and mixed breeds of dogs. Dr. Hart is interested in continuing his work by studying Labrador Retrievers, German Shepherd Dogs, and Dachshunds. Additionally, gaps in knowledge continue to exist concerning the complex relationship between sex hormones and cancer.

Last summer the AKC Canine Health Foundation released a podcast interview with Dr. Hart on his early-spay and neuter research as part of a series dedicated to the health of the canine athlete. To listen to the podcast visit [www.akcchf.org/canineathlete](http://www.akcchf.org/canineathlete)

The publication “Neutering Dogs: Effects on Joint Disorders and Cancers in Golden Retrievers” is available online through the open access journal [PLOS One](https://doi.org/10.1371/journal.plosone.0148801). The work was funded by the AKC Canine Health Foundation with sponsorship from the Golden Retriever Foundation, Schooley's Mountain Kennel Club, the Siberian Husky Club of America, and the Vizsla Club of America Welfare Foundation.

## Related Grants

- [01488-A: Health Implications of Spay and Neuter: Golden Retriever and Labrador Retriever](#)

## Related Multimedia

- [Early Spay and Neuter](#)

