

# **The Practice of Spaying and Neutering Poodles: Possible Joint Disorders, Cancers and Addison's Disease *Differences Between the Standard, Miniature and Toy Poodles***

A Study Conducted at the UC Davis School of Veterinary Medicine  
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## **General Study parameters**

Using data from the computerized veterinary hospital records of the University of California-Davis, Veterinary Medical Teaching Hospital, for the last 14.5 years, this study retrospectively examined the occurrence of joint disorders and cancers in males and females of the three main varieties of Poodles for those left intact and those neutered in the periods of < 6 mo., 6-11 mo., 1 year (12 to 23 mo.) and 2 to 8 years-11mo. The occurrences of Addison's Disease, urinary incontinence and pyometra in females were also tracked through the same ages. Mammary cancer, was tracked until the dogs were about to turn 12 years of age. For all neutered dogs, records were reviewed to ensure that neutering occurred prior to the first clinical signs or diagnosis of any disease of interest.

For cases where the hospital records on referral cases did not include age at neutering, telephone calls to the referring veterinarians were made to obtain the specific neutering dates. Because there were neutered dogs where age at neutering was not available, from either the record or from the referring veterinarian, and these cases could not be included, there were proportionately more intact cases in the final dataset than would be expected in general.

Patients diagnosed with hip dysplasia, cranial cruciate ligament tear/rupture, or elbow dysplasia presented with clinical signs such as difficulty moving, standing up, lameness, and/or joint pain; diagnoses were confirmed based on radiographic evidence, orthopedic physical examination and/or surgical confirmation. Diagnoses of hemangiosarcoma, lymphoma and mast cell tumors were based on clinical signs such as enlarged lymph nodes, lumps on the skin or presence of masses, and confirmed based on imaging, appropriate blood cell analyses, chemical panels, histopathology and/or cytology.

Statistical procedures involved survival analysis (Cox proportional hazard models) to compare incidence rates of each disease between groups of animals defined in terms of their age at neutering. Patients were diagnosed at different ages and with varying years at risk from the effects of gonadal hormone removal. For statistical tests the two-tailed level of significance was set at  $p < 0.05$ . The numbers of cases reported for each disease varied somewhat because a case could be excluded for one disease analysis but included for another disease analysis.

## Main findings

**Standard Poodles.** The complete dataset totaled about 350 cases evenly split between males and females. Within each gender, 70-80 percent were neutered or spayed.

Hip dysplasia does occasionally occur in gonadally intact males and females (up to 2-3 percent). There is a modest, non-significant increase in this joint disorder in males neutered at < 6 mo. No other joint disorder increased with early spaying or neutering however, which is a contrast to our published work on Labs, Golden Retrievers and German Shepherds (doi's: <http://dx.doi.org/10.1371/journal.pone.0102241.g001> and [onlinelibrary.wiley.com/doi/10.1002/vms3.34/full](http://onlinelibrary.wiley.com/doi/10.1002/vms3.34/full))

A cancer of concern is lymphoma, which was not diagnosed in either male or female intact dogs but was diagnosed in about a quarter of males neutered during the first year: a significant finding ( $p < 0.01$ ). There was a modest trend for females spayed before one year to have the cancer (non-significant).

Addison's Disease did not occur in any intact males or females, but females are at risk for this disease when spayed before 6 mo., where over 10 percent were diagnosed with this disease: a significant occurrence ( $p < 0.02$ ). Males neutered before 1 year seem to have about half the risk of females for this disease (non-significant).

Bottom line: for males, consider delaying neutering until they reach the age of two to avoid the increased risk of lymphoma, hip dysplasia and Addison's Disease. For females, delaying spaying females until they are at least a year old seems to avoid increasing the risk of Addison's Disease, and waiting until 2 years avoids the possible increased risk of lymphoma. Delaying spaying does not appear to increase the risk of mammary cancer, and even leaving a female intact raises the risk to only 4 percent.

**Miniature Poodle.** The complete dataset for Miniature Poodles totaled about 240 cases with a few more females than males, and 70-80 percent of each gender being neutered or spayed.

There is virtually no occurrence of joint disorders, or the cancers followed, in the dogs left intact and no indication of an increasing likelihood of these diseases with neutering or spaying at any age. Mirroring the occurrence of Addison's Disease in early spayed Standard females, spayed Miniature females during the first year may be at a slight risk for this disease (non-significant). While leaving a female intact does not appear to increase the risk of mammary cancer, spaying in the later years may slightly increase the risk of this disease (non-significant).

Bottom line: with the exception of a possible increase in Addison's Disease, as mentioned above, there appear to be no important disease considerations related to spaying or neutering at any age.

**Toy Poodle.** The complete dataset for Toy Poodles totaled about 275 cases with a few more females than males, and 60-70 percent of each gender being neutered or spayed.

Mirroring the tendency for Lab, Golden and German Shepherd dogs neutered or spayed in the first year to acquire a cranial cruciate ligament tear or rupture, there is an indication that male Toy Poodles neutered at 6-11 mo. have an increased chance of this joint disorder (non-significant). There is no indication of the cancers followed, or Addison's Disease, increasing in likelihood with neutering.

Bottom line: consider spaying females at any age and neutering males beyond one year.

