



Figure 2 - Spaying and neutering your dog has many health benefits, as well as helps reduce pet overpopulation.

How often you and your Westie visit your veterinarian depends on the age and the health of your dog. Most veterinarians would like to see your dog frequently (every few months) as a puppy, for vaccination against infectious diseases, to provide information on diet, to detect early signs of health problems, and to assess whether or not your puppy is affected by parasites. When dogs become mature, visits to the veterinarian may only be needed every 6-12 months. Of course, you and your dog should always see the veterinarian if there are any health problems, so they can be accurately diagnosed and treated.

Most dogs in the United States are now regularly maintained on medication to prevent the development of canine heartworm disease (“*dirofilariasis*”), a disease spread from one dog to another by mosquito bites. Veterinarians may also recommend the use of medications applied regularly to minimize the effects of fleas and ticks on dogs that go outdoors.

Breeding, Spaying and Neutering

Breeding, spaying and neutering are critical topics for discussion between you and your veterinarian. If you are an experienced dog breeder, you have a wealth of knowledge regarding breeding – perhaps more than your veterinarian. Most veterinarians will readily acknowledge this and will be happy to learn from your experiences. They may also have questions and observations that will foster dialogue, including discussions about the optimum timing for breeding, frequency of breeding, suggestions about nutrition for dam, sire and pups, vaccination schedules and protocols (to optimize puppy immunity), and a number of other topics. The ultimate outcomes of the dialogue between a breeder and veterinarian are happy, health Westie pups, Westie moms, and their human families!

The topic of spay/neuter is a personal decision, it is encouraged to follow your veterinarian's recommendation as to timing. The benefits of early spay/neuter are obvious and do have some health advantages such as reduced mammary and testicular cancer. Recent literature, especially in large breed dogs, encourages sterilization after sexual maturity to prevent some common orthopedic injuries.

Spaying your female dog (“*ovariohysterectomy*”) removes the ovaries and the uterus of the dog, so that she will not have puppies. Neutering male dogs removes the testes, and these dogs are sterile. These operations are done by your veterinarian in the hospital. Veterinarians first examine your dog to ensure that the dog is healthy enough for surgery, and then schedule the operation. Dogs that are spayed/neutered are placed under general anesthesia and prepared for sterile (aseptic surgery - *Figure 2*). After the operation, dogs will have a portion of their fur shaved, a sutured/stapled surgical site, and will require observation and aftercare. This will all be discussed with you by your veterinarian.

As noted above, there are important health consequences of spaying and neutering. Several studies have noted that the incidence of uterine infections (“*pyometra*”) and mammary gland tumors is markedly reduced in female dogs that have been spayed. The beneficial effect on the development of canine mammary gland tumors is seen in dogs that are spayed in the first year of life and somewhat in dogs spayed between 1-2 years of age. Female dogs of any age have a reduced risk of developing *pyometra*, as the spaying operation removes the uterus.

The benefits (aside from preventing pet overpopulation) of neutering male dogs may be a reduction in the incidence and growth of some types of skin tumors (“perianal gland adenoma”), decreased incidence of perianal fistula and problems associated with benign enlargement of the canine prostate, including prostatic cysts and abscesses. The results of recent research has not shown that neutering of male dogs decreases prostatic cancer in dogs; in fact, some findings indicate that neutered male dogs may be at a slightly increased risk for developing this very uncommon tumor.

The effect of spaying and neutering on the development of other diseases and on pet behavior (such as aggression) is less clear cut. Once again, a discussion of these topics with your veterinarian will help you make important decisions on pet breeding and pet neutering.

How Breed Influences Health in Dogs

One of the many things that are very important in determining the health of every dog is genetic makeup. Each cell in every dog contains a “blueprint” for the cell and for the dog. These “blueprints” are made up of DNA, formed into specific genes contained in chromosomes. The entire set of genes that contain the “blueprint” for each dog is known as its genome. The genome specifies how cells are made, how the cells form tissues, and how the tissues (such as the heart or skin) function.

Selective breeding of dogs, following domestication from wild dogs and wolves, has resulted in the evolution of specific dog breeds, like the West Highland White Terrier. The genome of one Westie is likely to be very similar to other Westies, because selective breeding over several hundreds of years has focused the genome on certain desirable characteristics that make them Westies. For example, the pale and white coat color of Westies, the shape of the body, and even things like their

lifespan are encoded in their genome. Interesting, Westies tend to live longer than Great Danes!

It is very likely that the differences between the genome of Westies and those of other dog breeds are small and caused by the variable expression of certain key genes. These variations in gene expression are termed “polymorphisms” or “mutations” by genomic scientists. Many such variations in the genome are beneficial, conferring selective advantages in appearance, performance and health. On the other hand, some variations are not advantageous for dogs. It is well known that cancer, for example, is the result of mutation in certain specific genes that control cell growth, cell division, and cell lifespan.

How does this relate to Westies?

There are some diseases that occur more commonly in Westies than in other breeds. The reason for this is undoubtedly tied up in the genome of the breed. Selective breeding over hundreds, if not thousands of years, has developed the Westie with certain characteristics such as size, stature, coloration and even personality. At the same time that these desirable characteristics were selected by careful breeding, other less desirable characteristics also developed. Some of these less desirable mutations were linked (literally, in the DNA and chromosomes) to more desirable breed characteristics – sort of ‘hitching a ride’ in the Westie genomic pattern. Because of these linked mutations, Westies are predisposed to the development of some diseases, just like Golden Retrievers are predisposed to develop malignant lymphoma and Bulldogs get more brain tumors. We know that while dogs may be predisposed genetically to developing some diseases, there are also many identified and unidentified environmental influences on disease development, expression and severity. This complex interplay between genome and environment is an area of intense scientific study.

