

THE DOG'S NOSE: HOW IT WORKS AND SKIN CONDITIONS

Paula Isenhart
June 20, 2013

Of all the five senses, a dog's sense of smell is the most advanced. The nose is how a dog explores its world. On a walk, the dog gathers information about the neighborhood by smelling the grass, the trees, and the bushes. This information allows the dog to discover who has been in his neighborhood, where they are headed, their sex, their stature, and other vital details. With so much emphasis placed on the nose and the sense of smell, it is only fitting that the health of the nose be of the utmost importance. So, if a dog's nose is warm and dry, does that mean they are ill? Over the course of the day, the nose can range from cool and wet to dry and warm, and all are normal. This paper will look into the intricacies of the dog's nose.

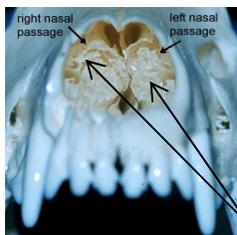
Anatomy of the Dog Nose

The dog's nose is an amazing organ specifically designed for detecting odors. An examination of the exterior and interior nose is necessary to fully understand and appreciate this remarkable structure.

The exterior nose of the dog dominates its face, extending from the stop to the tip of the nose. The rhinarium is the hairless, moist surface located around the nostrils (nares). The groove located down the center of the nose is the philtrum. The moist, hairless area of the nose displays a unique pattern of ridges and dimples. This area, along with the outline of the nostril openings, makes up the nose print. The nose print is thought to be unique and individual to each dog, similar to a human's fingerprint.

The two structures used for inhaling air and scents are the nostrils and the bony nasal cavity. The nasal cavity is divided into two chambers by the bony, cartilaginous nasal septum. The nasal cavities house the turbinate bones and paranasal sinuses.

The dog's nose is kept moist by lacrimal (tear) and nasal gland secretions. The moist nose allows the dog to inhale a larger number of scent molecules. Once the scent is captured, it is dissolved and transported to the olfactory (scent) region inside the nose. The olfactory receptor cells are located in this region. The number of cells present varies based on the length and size of the nose. For example, a Dachshund has 125 million scent cells while the German Shepherd & Beagle have 225 million. It is believed that the Bloodhound has the largest number of scent cells with about 300 million. Compared to dogs, humans have far less scent cells, only 5 million. In addition, dogs have fifteen times more cilia, hair like structures that capture scent, on their cells than humans.



Turbinate Bones

Within the nasal cavity, is a series of scroll-shaped bony plates called turbinates. The turbinates are lined with specialized mucous membranes which contain the scent-detecting cells and olfactory nerves. The surface area covered by this structure, if unfolded, could stretch to approximately sixty square inches. In humans, the olfactory area is much smaller, only about the size of a postage stamp. Once the odor molecules are trapped in the olfactory region of the nose, they are absorbed into the mucous layer and diffused. The interaction converts the odor to a nerve impulse and the olfactory nerves transmit the message to the smell center of the brain. The dog's brain has a well-developed olfactory area which is

dedicated to analyzing and interpreting odors. The dog's olfactory area in the brain is forty times larger than the area in the human brain.

Dogs have an additional olfactory cavity called the vomeronasal organ which is also lined with olfactory epithelium. This organ, known as Jacobson's organ, consists of two elongated fluid-filled sacs that open into the nasal cavity and oral cavity. Located in the bottom of the dog's nasal passage, Jacobson's organ detects pheromones. Pheromones are chemicals secreted in the urine by both sexes and are used to mark territory and provide information about mating readiness. The pheromone molecules detected by Jacobson's organ do not get mixed with the other odors and are analyzed by an area of the brain dedicated entirely to them.

Efficacy of the Dog's Nose

Over the years, humans have grown to realize the importance of the dog's highly developed sense of smell and have employed dogs for many important tasks. Nowadays, it is not uncommon to hear of specially trained dogs performing assignments in the areas of search and rescue, bomb-sniffing, drug-sniffing, weapons-sniffing, and detection of contraband food products. In addition, dogs have been used in homes to detect hazardous mold and locate termite infestations. Furthermore, researchers have discovered that dogs are able to detect some forms of cancer in humans, specifically, melanoma-types.

There are amazing true stories regarding the power of the dog's sense of smell. One drug-sniffing dog was able to detect marijuana in a plastic container which was submerged in a gas tank filled with gas. There is the two-year-old retriever that saved its nineteen-year-old human's life by detecting testicular cancer. The dog head butted its human in the groin causing serious swelling. When treated by a doctor, it was confirmed that he had stage two testicular cancer. There is also the story of the cancer-sniffing dog that insisted that a patient had melanoma, even after doctors stated they were cancer free. A second biopsy confirmed that a small amount of cells were melanoma cancer. There are several more stories like the ones above.

Nasal Skin Conditions

It is often said that a warm dry nose is a sign of illness; however, this is not always the case. If a dog exhibits other symptoms, such as changes in color (pigment loss) or changes in texture (flaky, cracked, lesions) the nose should be examined by a traditional or holistic veterinarian. There are several conditions that affect the skin on the nose of dogs. The area most frequently involved is the hairless, cobblestoned tip of the nose. An overview of the skin disorders follows.



Nasal Hyperkeratosis

With nasal hyperkeratosis, the outer layer of skin on the edges of the nose becomes thickened. The moist, soft surface of the nose gives way to a rough, hard, and dry surface, especially on the top of the nose. The nose may also become painful from the development of cracks, sores and erosions. Bacterial and yeast infections may develop in the cracks. Like many other nose related irritations, there is no known cause for nasal hyperkeratosis. However, it is most prevalent in older dogs, especially the American Cocker Spaniel, Basset Hound, Beagle, and English Springer Spaniel. The typical treatment consists of a topical application of corticosteroids and for the inflammation and infection antibiotics. Additional treatments

involve carefully cutting and shaving away the excess keratin. Also, an application of topical salves and wet dressings may be utilized.



Nasal Solar Dermatitis

Nasal solar dermatitis or Collie nose is most common in sunny regions such as California, Florida, and the mountains of the West. It is caused by a lack of pigment on the nose and prolonged exposure to ultraviolet rays. Initially, the skin of the nose appears normal except for the lack of black pigment. When exposed to sunlight, the skin on the border of the nose becomes aggravated. As sun exposure continues, the skin becomes weepy and crusty and the hair begins to fall out. In severe cases, the entire region of the nose becomes inflamed with open sores. The breeds normally affected are the Australian Shepherd, Collie, Shetland Sheepdog, and related breeds.

For treatment of nasal solar dermatitis, it is recommended to limit the dog's sun exposure between the peak hours of 9 a.m. and 3 p.m. It is also suggested that a sunscreen designed specifically for dogs (such as Doggles Pet Sunscreen and Epi-Pet Sun Protector Spray), with SPF 15 or greater, be used during outdoor activities. It should be applied 30 to 60 minutes before sun exposure and throughout the day. For nose irritation, an application of 0.5 to 1.0 percent hydrocortisone is advised.



Nasal Depigmentation

With nasal depigmentation or Dudley nose, the dark pigmentation on the nose is normal at birth, but gradually fades from black to brown. In some cases, the nose loses all pigmentation and becomes pinkish white. There is no known cause for nasal depigmentation, but is possibly a form of vitiligo. It tends to occur most often in the following breeds - Afghan Hound, Doberman Pinscher, German Shepherd (white), Irish Setter, Pointer, Poodle, and Samoyed. Treatment for pigment loss is not necessary, since it is considered a cosmetic issue. However, the use of sunscreen, as discussed under nasal solar dermatitis, is recommended to protect the nose from exposure to ultraviolet rays.

A seasonal version of pigmentation loss, called snow nose, occurs in the winter months. The nose's dark color fades during winter and then darkens again in the spring and summer months. There is no known cause for snow nose, but two theories exist. One theory attributes the pigment loss to cold winter temperatures, while the second theory believes the increase in sun reflection from the snow is the culprit. Whatever the cause, the breeds typically affected by snow nose include the Bernese Mountain Dog, Golden Retriever, Labrador Retriever, and Siberian Huskie. The use of sunscreen is suggested to protect the nose from ultraviolet rays.

Another type of dermatitis that causes pigment interruption on the nose is plastic dish nasal dermatitis. Plastic dish nasal dermatitis is triggered from a chemical sensitivity to p-benzyl hydroquinone. As a dog eats from a plastic or rubber bowl, this chemical is adsorbed through the skin and disrupts the production of melanin. This causes dark pigment in the skin. Additionally, the skin of the nose may become irritated

and inflamed. Changing the water and food bowl to ceramic, stainless steel, or glass will alleviate the problem.

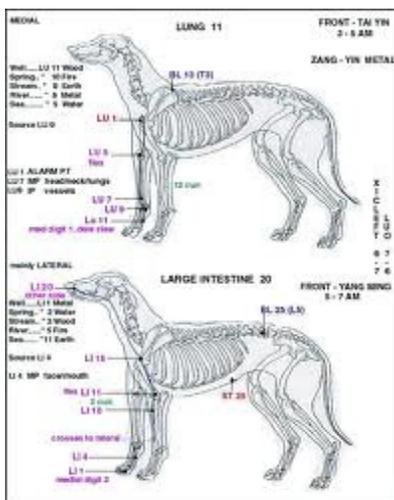
Discoid lupus erythematosus is a relatively common autoimmune skin disease in dogs. The nose experiences pigment loss and sometimes texture loss. Following the pigment loss, inflammation, sores and crustiness may appear. The breeds most often affected by lupus erythematosus are the Collie German Shepherd, German Shorthaired Pointer, Shetland Sheepdog, Siberian Huskie, and also crossbreeds.

Holistic Therapies

Besides traditional treatments, holistic therapies can also provide relief to the above mentioned nasal conditions. For example, Bach Flower Essences can be used to help speed up the healing process and also assist with any emotional issues associated with the nasal condition. For skin eruptions, bathing the affected area with Crab Apple or Rescue Remedy can help alleviate the sores. In addition, Rescue Remedy Cream can be applied directly to the area to soothe and heal. Other natural creams and oils that can prove effective for soothing a dry cracked nose are vitamin E oil, shea butter, kukui nut oil, lanolin, and coconut oil.

Herbal remedies may also provide relief to a dog nose that is dry and cracked, cracked and ulcerated, or inflamed. Creams like Calendula ointment - with its anti-inflammatory, anti-bacterial, and anti-fungal properties - can be used to inhibit inflammation, prevent the spread of inflammation, lessen pain, soften crusty areas, and moisten and soothe the dry, cracked nose skin. Astragalus also has anti-inflammatory and anti-bacterial properties so it can be used as an ointment or a wash for the affected dog nose. In addition, Astragalus and Echinacea both contain immune boosting properties which strengthen the dog's resistance to infection and inflammation which is important for getting the dog balanced and back to health.

Acupuncture and acupressure are important holistic treatments that can be utilized to strengthen the dog's immune function. In traditional Chinese medicine (TCM), the nose, throat, and vocal cords are closely connected to the lungs. Therefore, many disorders of the dog's nose are treated through the Lung Meridian (LU 1-LU 11). This Meridian is located at the forward point of the shoulder and continues down the foreleg to the medial side of the dewclaw (digit 1) of the front paw (see below).



Lung and Large Intestine Meridian Acupoints

Large Intestine (LI) 4 and Large Intestine (LI) 11 are both responsible for clearing toxins from the body and increasing the production of white blood cells. These two immune balancing points (LI 4 and LI 11)

are also located on the foreleg. Hence, massaging the dog's forelegs from the shoulder to the toes will stimulate all the Lung points and the two Large Intestine points.

For specific conditions, a holistic veterinarian may recommend any combination of acupuncture, herbal pills and tinctures, topical creams and teas, nutritional supplements, and dietary changes. Each is used to treat a certain aspect of the condition.

Massage is also of great value to the dog. However, direct massage on the area of the nose with open sores, eruptions, or blisters should be avoided. Regular massage to the other areas of the body increase blood and lymph circulation which aids waste removal and supplies necessary nutrients to the tissues. The massage will also help release tension, reduce pain, and allow for relaxation. Further, it restores balance to the dog and enhances their overall well-being.

The dog's nose is its greatest asset. Throughout the day the nose partakes in many activities, from sniffing, to breathing, to digging and nudging. It is not surprising that the skin of the nose can become dry, cracked, and irritated. Fortunately, this condition is rarely serious and can be treated naturally. Best of all, the functional capability of the nose is not impacted.

REFERENCES

Allegretti, Jan and Katy Sommers. (2003). *The Complete Holistic Dog Book*. Berkeley: Celestial Arts.

Coren, Stanley. (2004). *How Dogs Think: Understanding the Canine Mind*. New York: Free Press.

Coren, Stanley and Sarah Hodgson. (2007). *Understanding Your Dog for Dummies*. Hoboken: Wiley Publishing, Inc.

Eldredge, Debra M., Liisa D. Carlson, Delbert G. Carlson, and James M. Giffin. (2007). *Dog Owner's Home Veterinary Handbook*. Hoboken: Wiley Publishing, Inc.

Gerstenfeld, Sheldon L. and Jacque Lynn Schultz. (1999). *ASPCA: Complete Guide to Dogs*. San Francisco: Chronicle Books.

Kidd, Randy. (2004, November). The Canine Sense of Smell. *The Whole Dog Journal*. Retrieved from http://www.whole-dog-journal.com/issues/7_11/features/Canine-Sense-of-Smell_15668-1.html

Mielke, Kerstin. (2010). *Anatomy of the Dog*. Great Britain: Cadmos Books.

Schwartz, Cheryl. (1996). *Four Paws Five Directions: A Guide to Chinese Medicine for Cats and Dogs*. Berkeley: Celestial Arts.

Tyson, Peter. (2012, November 4). Dogs' Dazzling Sense of Smell. Nova scienceNOW. Retrieved from <http://www.pbs.org/wgbh/nova/nature/dogs-sense-of-smell.html>