



# Chihuahua

## Update

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## Understanding the Genetic Factors of Demodectic Mange

**M**ange in dogs is generally associated with itchiness and hair loss, but mange can also be associated with an impaired or poorly developed immune system. Demodectic mange — the type associated with suppressed immune function — is believed to be an inherited condition, according to veterinary experts.

"All dogs have a small population of mites," says Paul Caciolo, D.V.M., DACVD, owner of the Animal Skin Clinic in St. Louis. "But for some dogs, there is an immune incompetency that allows the mites to overproliferate, causing hair loss and inflammation and often leading to secondary staphylococcal bacterial infections."

Demodectic mange, also known as red or follicular mange, occurs when demodex mites proliferate uncontrollably. Environmental factors, such as stress from a poor diet or living conditions, are thought to influence the disorder.

Demodex mites are tiny, eight-legged creatures that live in the hair follicle, consuming cellular debris. All dogs have demodex mites, so their presence alone does not constitute having demodectic mange. "If you look hard and aggressively on normal

dogs, you will find demodectic mites," says Richard Meadows, D.V.M., DABVP, clinical assistant professor at the University of Missouri College of Veterinary Medicine.

**MANGE IN DOGS IS GENERALLY ASSOCIATED WITH ITCHINESS AND HAIR LOSS, BUT MANGE CAN ALSO BE ASSOCIATED WITH AN IMPAIRED OR POORLY DEVELOPED IMMUNE SYSTEM. DEMODECTIC MANGE — THE TYPE ASSOCIATED WITH SUPPRESSED IMMUNE FUNCTION — IS BELIEVED TO BE AN INHERITED CONDITION, SAY VETERINARY EXPERTS.**

Demodex mites in clinically affected dogs are easy to find, especially compared to sarcoptic mange or scabies, a type of nonheritable mange that involves the superficial layer of skin and is transmitted by

contact with infested animals, Meadows says. Mites can become a problem when they reproduce unchecked and occur in unnaturally high numbers.

### Determining Demodectic Mange

"Examination under a microscope of deep skin scrapings and plucked hair from within the site reveals the multitude and type of infestation," Meadows says. "A physical examination and medical history of a dog help to confirm the diagnosis, and blood tests may be taken to check for underlying causes."

Typically demodectic mange is found in puppies under 1½ years old and is thought to occur because they have a genetically predisposed immune system. The mites can be passed through nursing in the first days of a puppy's life. Once the puppy ingests the mites, the mites migrate from their stomach to their lymphatic system and gather in the lymph nodes. Two to three months later, they reach the hair follicles, Meadows says.

In most dogs, the mite population does not proliferate because their healthy immune system helps to keep the mites in check. However, in puppies with impaired immune systems,

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### Demodectic Mange

- Demodectic mange is also known as red or follicular mange.
- Demodex mange mites (at right) are tiny, eight-legged creatures that live in the hair follicle. They can be found on most dogs and generally do not cause a problem, unless they occur in unnaturally high numbers.
- Demodectic mange is not contagious to dogs or people. Healthy dogs do not develop demodectic mange by being exposed to it.
- Demodectic mange is often found in puppies under 1½ years old that are believed to have an inherited condition causing an impaired



- immune system or in older dogs whose immune systems have been compromised due to illness.
- In the localized form, demodectic mange causes hair loss but generally clears up in six to eight weeks. In the generalized form, a large percentage of the body is involved with widespread hair loss, pustules and a scaly, often darkened appearance, which requires veterinary treatment.

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## Demodectic Mange

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the mites spread. The exact reason a dog develops demodectic mange is not fully understood, but veterinarians suspect that genes and immune suppression both play a role. Breeders generally are encouraged to not breed affected dogs because of the risk of passing the condition on to future generations.

"While demodectic mange itself is not inherited, the vulnerable immune system that allows puppies to be susceptible to mites can be," Meadows says. "The flaw then can be passed on genetically through generations. The immune system deficits involved in demodectic mange are very complex."

Meadows cites research at Cornell University that showed the involvement of interleukin 2 (IL-2), a biological response modifier, and its receptors. In dogs with normal immune systems, IL-2 is produced and secreted by a specific type of immune cell, such as

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a lymphocyte. The IL-2 can then insert into the receptor on the surface of a nearby immune system cell of a different class and turn on the immune system. The Cornell research showed that in dogs with demodectic mange, there appears to be a problem with normal functioning of IL-2 and/or its receptors. Additionally, once the mites have spread, they secrete an immune suppressing factor of their own, Meadows says.

"Demodectic mange is not considered to be contagious to other dogs," Meadows says. "Dogs with demodectic mange do not have to be isolated from unaffected healthy dogs since the demodex mite is a normal inhabitant on most canine coats. A healthy dog will not develop demodectic mange by being exposed to it. This type of mange also is not contagious to people."

### Two Forms of Demodectic Mange

Demodectic mange occurs in two forms: localized and generalized. Dogs with localized mange and those in the early stages of generalized mange

may experience hair loss around the head. "It's not itchy or inflamed," Meadows says. "When owners bring in affected dogs to find out what is happening, veterinarians typically perform deep skin scrapings and pluck the hair to look for mites under the microscope. Biopsies also may be taken."

"In the localized form, the dog usually has a few bald, red scaly patches most commonly on the face and front legs," Caciolo says. "About 90 percent of those will spontaneously clear up in six to eight weeks, waxing and waning for a couple of months before the condition disappears. At times owners treating with over-the-counter products may think they're helping, but it's actually the dog's immune system maturing that is responsible for eliminating the mites."

Some veterinarians may treat mange with benzoyl peroxide shampoo, Meadows says, because it is an antibacterial formula and can help to ease any secondary bacterial infections. The shampoo also works as a follicular flushing agent causing the follicles to contract and the mites to be washed away, thus providing a nonparasitological way of eliminating them.

When the localized form occurs in young dogs, veterinarians may allow the mange to progress untreated to give the dogs' immune system time to develop and take control. By allowing nature to take its course, medications are not used unnecessarily and thus mites are not given a chance to become resistant to medications, Meadows says. The best thing to do is to let the condition resolve, as many of them will, he says.

Young dogs that have immune systems unable to suppress mites may progress to the generalized form of demodectic mange. This form also can be seen in older dogs if their immune system has been compromised secondary to some other underlying problem. In these cases, the mites have been living on the older dog for years but have only become a problem because of other factors that have suppressed the immune system, Caciolo says.

"In older dogs, it sometimes is a tip-off indicating the onset of health problems such as hypothyroidism or Cushing's disease," Caciolo says. "I've also seen it in dogs that have been on long-term steroids used to treat various allergies, which ultimately led to a suppressed immune system."

"In the generalized form, a large percentage of the body is involved with widespread hair loss, pustules and a scaly and often darkened appearance," Caciolo says. "The head and feet are most commonly involved. With the large number of mites, there is enough damage to the hair follicles that the normal skin barrier is breached and ever-present bacteria

and yeast become complicating factors, causing a secondary infection. If secondary infections are deep enough, they can cause bacteria to enter the bloodstream. Without treatment, generalized demodectic mange can be fatal."

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Proper treatment is important in managing demodectic mange. Treatment should take into account concurrent health conditions, nutrition, stress and living conditions. Though most dogs are eventually cured, some may experience a recurrence. In rare cases, some dogs have immune systems that can never control the mites and resulting infections. ■

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