

# What's Eating You? Canine Scabies

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*Infestation with *Sarcoptes scabiei* var *canis*, the causative strain of canine scabies, can produce a pruritic rash in humans. The rash generally manifests within 24 to 96 hours of contact with the affected pet. Scrapings are generally negative, and the correct diagnosis requires a high index of suspicion.*

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## Epidemiology

Although the incidence of human involvement by canine scabies is unknown, it is probably not rare. Most cases are likely to go undiagnosed, with the patient tolerating the itch.<sup>1</sup> Many cases are simply diagnosed as insect bites or papular urticaria. A more accurate diagnosis can lead to appropriate treatment of the pet by a qualified veterinarian.

The prevalence of canine scabies varies with different cultural habits regarding canine companions. Australian aborigines, who tend to live in close association with their dogs, demonstrate a high prevalence, with anti-*Sarcoptes scabiei* var *canis* antibodies present in 25% of the population.<sup>2</sup> A study of US Air Force bases revealed that *S scabiei* var *canis* is among the 5 most common zoonotic threats to humans.<sup>3</sup> Epidemiological studies suggest that *S scabiei* mites probably infected man originally, were then transmitted from primate to canine, and later slightly

varied strains were transmitted to 39 different species of wild animals.<sup>4,5</sup> It should not be surprising, therefore, to find that the strain that has evolved on canines is capable of reinfesting humans.

With the exception of the successful transfer of canine scabies to rabbits, most cross-species scabies infestations are self-limited. In the majority of animal models, including humans, infestation lasts only 5 to 13 weeks. The first documented report of self-limited transmission of *S scabiei* var *canis* to humans was published in the late 1700s, with the first epidemic reported about 100 years later.<sup>1</sup>

## Clinical Manifestation

*S scabiei* var *canis* presents in its natural host with patches of hair loss and/or scratching, commonly in dogs that appear ill. Human manifestations are variable, and the disorder often manifests to varying degrees in members of the same family. The most helpful historical feature of canine scabies in humans is a history of recent close contact with pets or treatment of a dog recently diagnosed with scabies.<sup>6,7</sup>

The most characteristic eruption resulting from canine scabies infestation is an intensely pruritic papulovesicular rash that lasts several weeks.<sup>7,8</sup> Infestation generally manifests in humans on areas of contact with the affected pet, such as the forearms, thighs, chest, and abdomen. For reasons that are not clear, distribution in children is similar to the var *hominis* distribution pattern, which involves the palms, webs of fingers, head, and neck.<sup>1,5,7,9</sup>

The length of time from infestation to onset of pruritus and papule formation varies according to the infesting strain. Human infection by the var *canis* strain may manifest within 24 to 96 hours of contact with the affected pet. By contrast, infestation with the var *hominis* strain generally presents with a delayed type IV hypersensitivity reaction approximately 4 to 6 weeks following transmission. This difference may be related to repeated exposure to canine scabies, resulting in prior sensitization to the ectoparasite. Occasionally, reaction to *S scabiei*

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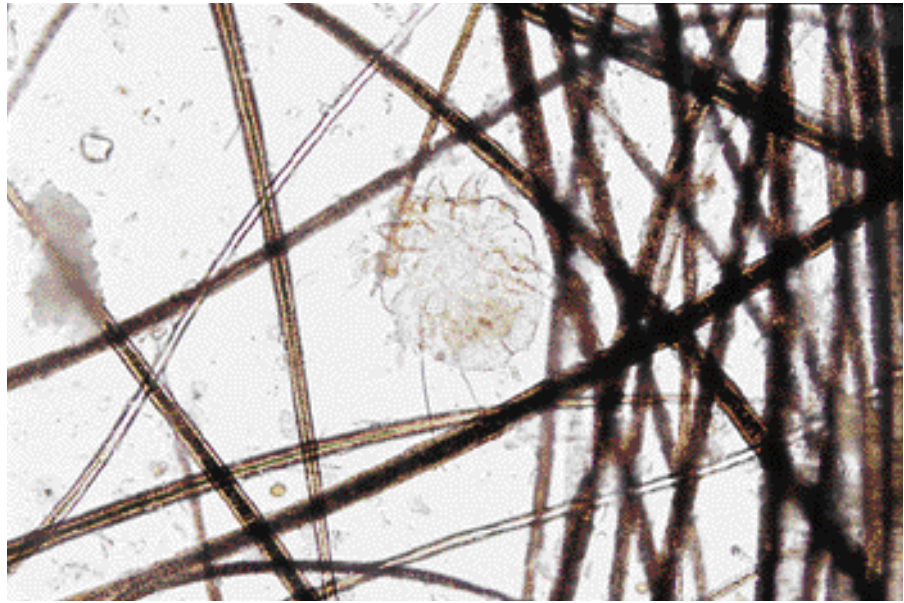
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Canine scabies mite (original magnification  $\times 40$ ).

var hominis may occur within a matter of hours, suggesting that the individual has been previously sensitized.<sup>8</sup> Cross-reactivity between the different strains may account for some sensitization. The various strains of *S scabiei* produce some antigenically identical proteins in addition to several antigenically distinct proteins.<sup>10</sup> Enzyme-linked immunosorbent assays for anti-*Sarcoptes* antibodies suggest that constant exposure to *S scabiei* var canis can both sensitize the individual and confer some degree of protective immunity to the var hominis strain.<sup>3</sup> Similarly, antigens of house dust mites (*Dermatophagoides*) are a source of cross-reactivity with both var canis and var hominis forms of *S scabiei*.<sup>11,12</sup> This phenomenon of cross-reactivity may explain some cases of early onset of var hominis symptoms in less time than would be expected of a standard hypersensitivity reaction.<sup>11</sup>

Left untreated, canine scabies lasts only a few weeks in humans; however, human scabies may last several years if untreated.<sup>7</sup> Some studies indicate a direct correlation between the severity of symptoms and the degree of contact with the affected animal.<sup>1</sup> In more severe canine scabies infestations, secondary bacterial infection, fever, and lymphadenopathy may occur. To our knowledge, widespread involvement resembling crusted Norwegian scabies has been reported in only one case of severe human infestation by *S scabiei* var canis.<sup>13</sup>

### Diagnosis

The diagnosis of scabies can be made by light microscope observation of skin scrapings revealing the mite, egg, or eggshells.<sup>8,14</sup> Because a relatively small

number of organisms is required to establish symptoms, the yield may be less than 33%. Chitin is fluorescent, and fluorescence microscopy has proved useful in detecting eggs and eggshells in specimens in which mites are not observed.<sup>14</sup> Morphologic features of the mite are of little use in distinguishing canine from human variants.

In diagnosing scabies, the burrow ink test is useful. India ink or gentian violet is applied to the skin then removed with alcohol. Residual ink highlights the burrow. Epiluminescence has recently been suggested to exhibit 93% sensitivity in detecting the var hominis strain. Epiluminescence stereomicroscopy distinguishes the presence of scabies based on the presence of a “jet-with-contrail” image or air bubbles that are believed to represent the mite and its burrow.<sup>15</sup> It remains to be established whether either technique would be useful in detecting or differentiating the var canis burrow as it infects humans. Serodiagnosis for circulating IgE or an intracutaneous test using allergen extracts may be useful to confirm diagnosis but are not widely available.

The “scratch reflex” is a method that has been used to make a presumptive diagnosis of canine scabies. The tip of the dog’s ear is rolled between the thumb and forefinger, which hastens scratching at one of the most common sites of infection.<sup>1</sup> The diagnosis and treatment of scabies in an infected pet is best left to a qualified veterinarian.

### Treatment of Humans

Because human infestations with *S scabiei* var canis are generally self-limited, treatment of the affected dog may be all that is required. However, few

patients are willing to wait for the disease to run its course. In our experience, patients request topical treatment with a scabicide, as well as symptomatic treatment. In published reports, lindane 1% lotion or cream or crotamiton 10% lotion or cream have been prescribed for patients infested with canine scabies.<sup>7</sup> In a 1967 study of 22 cases, symptoms resolved in patients treated with scabicides in an average of 4 days; left untreated, symptoms lasted an average of 18 days.<sup>1</sup> Currently, we recommend topical 5% permethrin. In refractory cases, a single dose of ivermectin 200 mcg/kg could be considered. It is unclear if a second dose of ivermectin is beneficial to treat hatching ova. Symptomatic treatments include topical corticosteroids and camphor/menthol preparations. Because of the cross-reactivity of house dust mite antigens with those of *S scabiei*, eradication of dust and storage mites has been suggested for patients with persistent symptoms.<sup>16</sup>

### Treatment of the Pet

Treatment of the human is never a substitute for appropriate evaluation and treatment of the pet by a qualified veterinarian. Ivermectin has been used in this setting but is toxic to collies.

### Identifying Characteristics

The *S scabiei* var *canis* life cycle consists of the egg, a 6-legged larva, and an 8-legged nymph that molts into an adult. Egg incubation requires approximately 2 days. Larvae and nymph stages are approximately 4 and 6 days, respectively, totaling 10 to 13 days to reach adulthood. At each stage of the life cycle, the var *canis* strain is capable of leaving its burrow and coming into contact with humans.<sup>17</sup>

*S scabiei* var *hominis* and var *canis* adults reach 2 to 4 mm in length. Both strains are transparent, except for anterior portions, and include the pigmented mouth and anterior legs (Figure).<sup>15</sup> Most strains have transverse dorsal ridges with many toothlike spines. The human scabies mite has a bare dorsal area and lacks ventrolateral spines. It is not known if this influences its host specificity.<sup>1</sup> Salivary secretions of *S scabiei* likely contribute to burrowing and also may aid in egg adhesion to the burrow, which may influence both host specificity and clinical presentation.<sup>18</sup>

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