



What is *Capnocytophaga*?

- *Capnocytophaga* is the name of a group of Gram-negative bacteria that live in the mouth of some animals and humans. The word element “capno” in the bacterium’s name refers to its ability to survive in high levels of carbon dioxide.
- *Capnocytophaga canimorsus* is the species most commonly involved in zoonotic infections. It can be transmitted from pets to people via bites or contact of saliva with broken skin, but infection is rare. Immunocompromised individuals are at much higher risk. When infection does occur, it can be very serious, typically causing infection of the bloodstream (also called **dog bite septicemia**).



How common is *Capnocytophaga*?

Humans

- Since 1976, when *C. canimorsus* was first described, approximately 200 cases of human infection have been reported worldwide, but this is likely just the “tip of the iceberg.” Because infection is not reportable, it is hard to estimate how many cases truly occur.
- Infection with *C. canimorsus* is more common in individuals who have a compromised immune system, particularly those without a functional spleen (33% of cases) or those with a history of alcohol abuse (24% of cases); however, approximately 40% of patients with *C. canimorsus* septicemia are otherwise healthy individuals with normal immune systems. Diabetes, being male and being over the age of 50 have also been identified as risk factors.



- Another species of *Capnocytophaga*, *C. cynodegmi*, can also be transmitted from animals. Infection with this species is even less commonly reported, and is typically much less severe than that caused by *C. canimorsus*.

There are several other species of *Capnocytophaga* that can live in the mouths of humans. These also occasionally cause a variety of infections, particularly in people who are immunocompromised and have significant oral or dental disease (which may allow the bacterium to reach their bloodstream). Only *C. canimorsus* and *C. cynodegmi* are associated with transmission from animals.

Animals

- *Capnocytophaga* very commonly lives in the mouths of healthy dogs and cats (and possibly other animal species).
 - ▶ Between 26-74% of dogs and 18-57% of cats may carry *C. canimorsus* in their mouths. The bacterium rarely causes illness in pets, even if they are bitten by another animal.
 - ▶ Up to 86% of dogs and 84% of cats may carry *C. cynodegmi* in their mouths. There are a very small number of reports of this bacterium causing respiratory disease in pets, but the vast majority of the time it causes no problems for the animal.
- It is possible that *Capnocytophaga* spp. infections occur more commonly in animals than it is realized, because these bacteria require special culture methods to be detected, so they may be missed using routine testing.

How do people become infected with *Capnocytophaga*?

- Most *C. canimorsus* infections are associated with dogs. Infection is less commonly associated with cats and rarely has been associated with exposure to a rabbit.
- The primary mode of transmission of *C. canimorsus* is through contact of animal saliva with broken skin. It has been estimated that in 54% of human cases transmission was via a bite and 8.5% via a scratch. However, in 27% of cases patients simply reported exposure to an animal (i.e. close contact).
- Transmission can also occur via animals licking wounds or sores (e.g. diabetic skin ulcers) or cats chewing on dialysis tubing.
- There are also two reported cases of veterinarians developing eye infections with *C. canimorsus* after being hit by fragments of teeth during dental procedures.

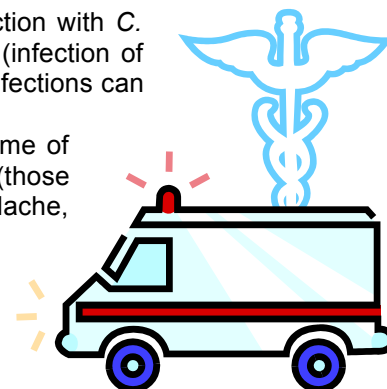




What happens if a person gets infected with *Capnocytophaga*? What are the signs of infection?

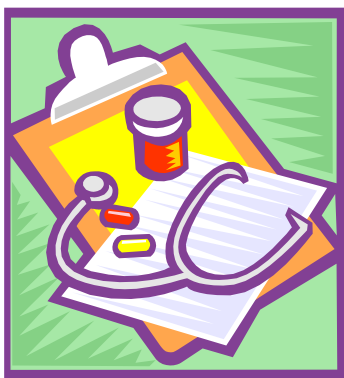
➔ **Remember:** People are exposed to *Capnocytophaga* all the time, yet infection is rare - but when infection does occur it can be extremely serious, which is why it is such a concern.

- ▶ Septicemia (infection of the bloodstream) is the most common form of infection with *C. canimorsus*, but meningitis, arthritis, osteomyelitis (bone infection), pleuritis (infection of the lining of the chest), endocarditis (infection of the heart valves), and eye infections can also occur.
- ▶ The onset of clinical signs of infection is typically around 5 days from the time of exposure (e.g. bite), but may be shorter, particularly in asplenic individuals (those without a spleen). Signs may range from mild flu-like illness to fever, headache, muscle pain, trouble breathing, abdominal pain and skin rash.
- ▶ Septicemia commonly leads to severe skin lesions or even gangrene due to the formation of blood clots in small vessels. Treatment of gangrene in some cases may necessitate amputation of fingers, toes, or even the entire lower arm or leg.
- ▶ Signs can progress from mild to severe very rapidly (within 24 hours).
- ▶ Approximately 30% of patients with *C. canimorsus* septicemia die from the infection.



How is *Capnocytophaga* infection diagnosed?

- Infection is usually diagnosed by culture of the infected tissue (e.g. blood culture in the case of septicemia). However, *Capnocytophaga* spp. require special conditions to grow in the laboratory, including higher iron and carbon dioxide levels, and therefore they may not be detected unless specific testing is requested, typically based on the patient's risk factors and a history of animal exposure.
 - ▶ Treatment for infection in severe cases needs to be started before there is time to confirm the diagnosis, and this is also based on the physician knowing the patient is at risk for *Capnocytophaga* infection (for example, and asplenic patient who had recent contact with a pet).
- Sometimes, especially with severe infections, Gram-negative rods may be seen on blood smears. Although this test is not specific for *Capnocytophaga*, it is much faster than culture and greatly increases the index of suspicion in high-risk patients.
- Molecular tests such as PCR for *Capnocytophaga* are not yet commonly available, but in the future may permit a definitive diagnosis of *Capnocytophaga* infection to be made much faster.



How is *Capnocytophaga* infection treated?

These bacteria are typically quite susceptible to a variety of antimicrobials. The key to successful treatment is therefore two-fold:

1. Knowing that there has been recent exposure to a dog or cat, particularly if a bite or scratch occurred, or if the animal was licking an area of broken skin. It is always important to let your physician know about any such contacts if you are sick (even if they forget to ask!)
2. Ensuring antimicrobial therapy that will be effective against *Capnocytophaga* spp. is started as soon as possible, before complications arise. This needs to be done before there is time to culture the bacterium to confirm the presence of *Capnocytophaga* spp., as culture in the lab can take up to a week.

Should I have my pet tested for *Capnocytophaga*?

- **Normal, healthy dogs and cats should not be tested or treated for *Capnocytophaga*.** Most pets are expected to be carrying this bacterium, yet transmission of *Capnocytophaga* from a pet to a human in a household is very unlikely, especially if appropriate precautions (as described below) are observed.
- Even if there are high-risk individuals in the household, diligent attention to infection control measures will minimize the risk of transmission. Given the well-described benefits of pet ownership, **removal of the pet is not indicated**, unless extenuating circumstances exist that prevent proper infection control measures from being implemented. In these cases, the **pet may be temporarily removed** until such circumstances are resolved, but this would very rarely be warranted.
- **Healthy dogs and cats that are carrying *Capnocytophaga* do not require treatment.**



Why are pets carrying *Capnocytophaga* NOT treated?

Bacteria that are part of an animal's normal microbial "flora," such as *Capnocytophaga*, are typically very difficult to eliminate by any means. There is no evidence that antimicrobial therapy would be effective for eliminating *Capnocytophaga* from the mouth of a healthy dog or cat, or that this would help reduce the risk of transmission. Other measures such as bite and scratch prevention are far more important for preventing transmission.

How can I help protect myself and my family from infection with *Capnocytophaga*?

→ Bite and scratch avoidance:

- ▶ Training your pet properly is one of the most important aspects of avoiding bites and scratches. Training should begin from the moment you bring your pet home, but it is never too late to start. If you need advice on training your pet, talk to your veterinarian or consult a reputable dog trainer.
- ▶ Know how to handle your pet properly. Many bites and scratches occur because a pet feels threatened or insecure from being handled in a rough manner or otherwise incorrectly.
 - It is particularly important to teach children to be gentle and quiet around pets, and never to approach any animal they don't know.
 - Always supervise young children when they are around pets.
- ▶ Have your pet examined regularly by a veterinarian. This will help to identify problems earlier that could increase the risk of bites and scratches, such as painful physical conditions or behavioural problems

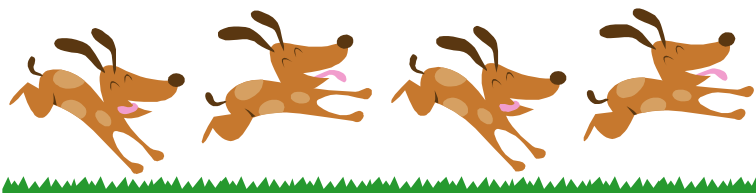


→ If a bite or scratch does occur:

- ▶ Immediately wash the wound thoroughly with lots of soap and warm water.
- ▶ If the wound is a bite over a hand, joint, wrist, ankle, implant or genital area, or if the wound is severe (e.g. very deep, torn flesh), consult a physician regarding the need for antimicrobials or other treatment.
- ▶ Consult a physician for any bite or scratch if you have any of the following:
 - Compromised immune system (e.g. HIV/AIDS, transplant or chemotherapy patients)
 - Chronic swelling (edema) in the area that was bitten
 - If you have had your spleen removed
 - Liver disease, diabetes, lupus or similar chronic diseases



- **Do not allow pets to lick your face or any areas of broken skin.** If possible, keep broken skin covered by clothing or a bandage when handling an animal. This also applies to any indwelling medical devices such as intravenous (IV) or peritoneal (abdominal) catheters.



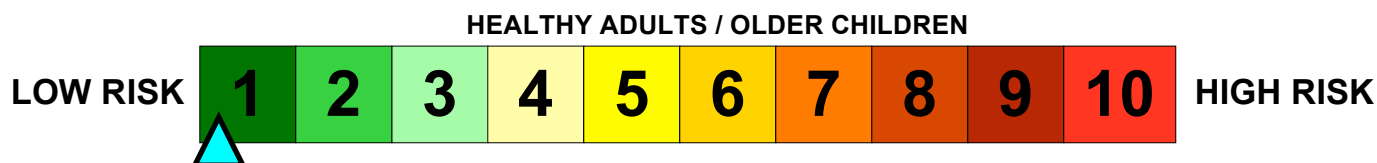
Therapy Animals

Guidelines have been developed to reduce the risk of pets involved in animal visitation programs acquiring or transmitting infectious diseases. Owners involved in these programs should ensure that they follow these guidelines. Pets that visit healthcare facilities or are part of other animal visitation programs may come in contact with individuals with compromised immune systems who are more susceptible to infection with zoonotic pathogens. Routine screening of these animals for specific pathogens, including *Capnocytophaga*, is not recommended, but pet owners need to be aware of the kinds of contacts that may increase the risk of pathogen transmission and how to avoid them.



What Is The Risk?

The risk of disease to the general population posed by *Capnocytophaga* in pets is:

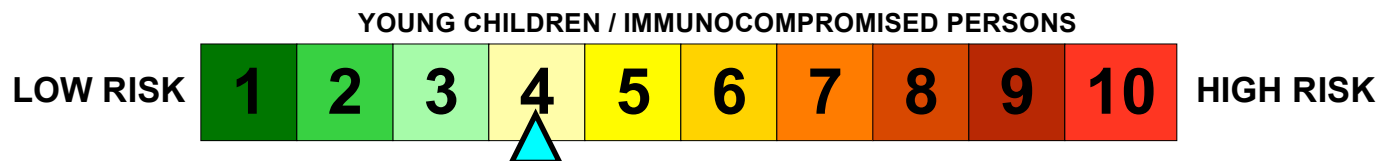


Individuals with compromised immune systems (e.g. HIV/AIDS, transplant and cancer patients) are more susceptible to many kinds of infections, including those that may be transmitted by pets. In the case of *Capnocytophaga*, individuals who do not have a functional spleen are particularly at risk. While these individuals are not advised to get rid of their pets, precautions should be taken to reduce the frequency of contacts that could result in pathogen transmission (e.g. avoiding bites and scratches, not allowing animals to lick broken skin or medical devices such as catheters).

Infants and young children (less than 5 years old) are more likely than adults to extensively handle animals if given the opportunity, and may be less likely to properly clean and care for cuts, scrapes or other areas of broken skin, all of which may increase the potential for disease transmission.

- Young children should be supervised when playing with animals, and an adult should ensure that they wash their hands afterwards. Pets should not be allowed to lick broken skin, and bites and scratches should be immediately and thoroughly cleaned, even if they appear minor. Older children should be taught to do the same.

For these groups, the risk of disease posed by *Capnocytophaga* in pets is likely:



Additional reading:

- European Advisory Board on Cat Diseases - Information page on *Capnocytophaga canimorsus*
<http://www.abcd-vets.org/Guidelines/Pages/EN/Other/Zoonoses/Capnocytophaga/canimorsus.aspx>
- Guidelines for animal-assisted interventions in health care facilities (Lefebvre et al. 2008, Am J Infect Control)
Access via <http://www.wormsandgermsblog.com/2008/05/articles/animals/dogs/prescription-pets/>

