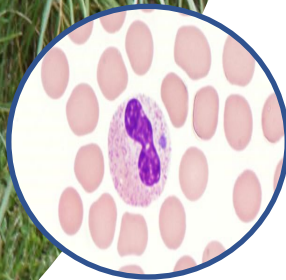




# Anaplasmosis Q&A



**For Healthcare  
Providers in  
Pennsylvania**





## Why is this important?

Anaplasmosis has been increasing in Pennsylvania over recent years. Anaplasmosis is the second most common tickborne disease (TBD) in Pennsylvania, following Lyme disease (LD). *Anaplasma phagocytophilum*, the bacteria that causes anaplasmosis, is carried by the *Ixodes scapularis* tick (deer tick, black-legged tick). This is the same tick that transmits the bacteria that causes Lyme disease. *I. scapularis* ticks are found in every county of Pennsylvania, even urban counties. Pennsylvanians are considered high risk for anaplasmosis.

Although rare, anaplasmosis among transfusion and transplant recipients in the United States is increasingly reported. Clinicians should be alert for these possible infections among transfusion and transplant recipients.

## Tick Information

### How common are ticks in Pennsylvania?

Very common! Ticks carrying the bacteria that causes anaplasmosis are present in every county in Pennsylvania, including in green spaces in Philadelphia and Pittsburgh and other Pennsylvania cities.

### Can any tick transmit anaplasmosis?

No. In Pennsylvania, only the *Ixodes scapularis* or deer tick (also called the black-legged tick) can transmit anaplasmosis. Deer ticks are the most common tick in Pennsylvania.

### How likely is it that any tick is carrying *Anaplasma phagocytophilum*, the bacteria that causes anaplasmosis?

According to surveillance studies conducted by the Pennsylvania Department of Environmental Protection (PA DEP), nymphal deer ticks, which are active in Pennsylvania from late May to late July, have a 6% chance of being infected with *A. phagocytophilum*. Adult ticks, active from late September to May of the following year have a 10-12% chance of being infected with *A. phagocytophilum*.

### If a patient is bitten by an infected tick, how likely is it that it will cause anaplasmosis?

This depends on how long the tick was attached. The tick must be attached for at least 12 hours to begin transmitting the bacteria that causes anaplasmosis and may be longer, up to 24 hours. If a patient can be sure the tick was only attached for a short period of time, there is no risk of anaplasmosis. However, other tickborne diseases may require shorter attachment times.

## Epidemiology

### Is anaplasmosis common in Pennsylvania?

Within the last five years, anaplasmosis has become more common in Pennsylvania. Prior to this time frame, most cases had been found in eastern counties, but within the last few years anaplasmosis has spread throughout Pennsylvania and counties all over the state have reported cases. Since anaplasmosis is a newer TBD in Pennsylvania, healthcare providers (HCPs) may not be aware of the disease which may mean persons are not tested, so case counts may be higher than the data currently suggest.



## Who is most at risk for anaplasmosis?

Everyone in Pennsylvania is considered at risk for anaplasmosis, even people who live in urban areas who may spend time in green spaces. Higher risk is associated with people who spend a lot of time outdoors, especially doing yard work and gardening. Hiking, camping, fishing on banks of rivers, streams and lakes, hunting, and outdoor sports can also be risk factors. People who own have pets that spend time outdoors are at higher risk than those who don't have any pets at all.

Anaplasmosis is most commonly reported in persons over 40 years of age. Anaplasmosis may not cause symptoms in younger persons, but older persons, especially those who may be immunocompromised may be more likely to present with severe symptoms.

## What time of year is riskiest for anaplasmosis?

Ticks may be out all year, including in the winter if it's above freezing. Ticks do not die over the winter. However, the riskiest time for anaplasmosis is the late spring and early summer. This is likely due to a couple of factors. People tend to spend more time outdoors in the warm months of May through August. This is also when nymphal deer ticks are prevalent in the environment. Nymphal ticks are very tiny, the size of a poppy seed, and can be very difficult to see if one does not do careful tick checks. Unlike LD which has one distinct peak in the summer, anaplasmosis has a second smaller peak in the fall. This is when adult deer ticks are out and seeking blood meals and they have a higher chance of carrying the bacteria that causes anaplasmosis and ticks do not need to be attached as long to transmit anaplasmosis as they do for LD.

## Treating Tick Bites

### A patient calls or presents to the office with a tick bite, what are the recommended next steps?

If the patient has not already done so, the tick should be removed as soon as possible. The tick should be grasped as close to the skin as possible with tweezers or a tick removal tool and should then be pulled straight up. Resistance may be encountered. Once the tick has been removed, the tick should be killed by placing it in tape or plastic bag to suffocate it. The area should then be cleansed with soap and water.


Advise against old wives' tales such as covering the tick with petroleum jelly, butter or using a match near the tick. These may cause harm to the person and it may cause the tick to be stressed and to regurgitate the contents of its stomach into the host.

A local reaction to the tick bite may occur. This may look like a mosquito bite with some discoloration and possibly some slight swelling. It may also itch. This is not a sign of a TBD.

### My patient has the tick, should it be tested?

Neither the Pennsylvania Department of Health (PA DOH) or the Centers for Disease Control and Prevention (CDC) recommend tick testing for clinical reasons for several reasons. Patients may pursue tick testing for informational purposes.

### Timeliness



Persons who submit ticks for testing may not get the results before they begin experiencing symptoms of a tickborne disease. Diagnosis and treatment should never be delayed while waiting for tick testing results. This is especially true of Rocky Mountain spotted fever (RMSF), a disease transmitted by dog ticks (*Dermacentor variabilis*) in Pennsylvania. RMSF can have severe outcomes, including death, if treatment is not begun quickly.

### Negative results

Negative tick testing results do not mean a pathogen has not been transmitted by another tick that bit the person and they did not find it. Studies have shown generally less than 1 in 5 LD cases recalled being bitten by a tick. An unpublished study by PA DOH found that only 17% of LD cases in Pennsylvania recalled a tick bite prior to onset of symptoms. Tick bite recollection associated with anaplasmosis has not been studied, but since it is also transmitted by the deer tick, it is likely that the recall rate would be low for anaplasmosis as well. Therefore, do not dismiss anaplasmosis as a potential diagnosis if the patient does not recall a tick bite.

### Positive results

Positive tick testing results do not mean a pathogen has been transmitted. Studies have shown deer ticks must be attached for 12-24 hours to transmit the bacteria that causes anaplasmosis, so ticks only being attached for a short amount of time minimizes the risk of TBD infection.

### Accuracy

Labs that conduct tick testing are not subject to the same regulations as labs which test human specimens; therefore, results may not be as accurate as human lab results.

### **How could tick testing affect patients?**


A positive test result in a tick that was not attached to the patient for a sufficient amount of time to transmit disease could result in the unnecessary use of antibiotics. Overuse of antibiotics may have negative consequences for the patient and for society.

Patients may have been bitten by more than one tick. Therefore, a negative test result for one tick does not mean that another infected tick was not present on the patient. Believing that they do not have a tickborne disease because of the negative tick test, the patient may ignore tickborne disease symptoms and assume they had the flu or some other illness, potentially delaying seeking medical care. It may also result in the HCP delaying diagnosis and treatment for a tickborne disease, incorrectly believing the patient was not infected due to the negative tick testing results.

### **What are my options for treating patients who have been bitten by a tick or have tick testing results?**

PA DOH recommends treating patients based on their symptoms and human lab testing results only. Tick testing may be used for research and informational purposes but should not be used to make a clinical diagnosis. Treat the patient, not the tick.

Although one dose of doxycycline may be given to patients presenting with a deer tick (*Ixodes scapularis* tick) bite that has been attached for at least 36 hours and they present within 72 hours in an area where deer ticks are likely to be infected with *Borrelia burgdorferi* (the bacteria that causes LD), prophylaxis has not been shown to be effective for any diseases other than LD.



Therefore, prophylaxis should not be used specifically for anaplasmosis; however, due to the high risk of LD in Pennsylvania, prophylaxis is generally recommended for tick bites meeting the above criteria.

Treating patients with a full course of antibiotics due to a tick bite in the absence of symptoms has not been shown to avert anaplasmosis infection, but studies indicate it only delays symptom onset of anaplasmosis.

## Diagnosis

### What are the symptoms of anaplasmosis?

Early in the course of anaplasmosis, symptoms are non-specific and may resemble the flu. Since most anaplasmosis cases are in the late spring and summer months, when flu is not circulating, a HCP should have a high index of suspicion for anaplasmosis and other TBDs in patients presenting with flu-like symptoms in the late spring and summer months. The early symptoms of anaplasmosis may include:

- Fever, chills, rigors
- Severe headache
- Malaise
- Myalgia
- Gastrointestinal symptoms including nausea, vomiting, diarrhea and anorexia.

Rarely, the following signs and symptoms may present in the early stages of anaplasmosis.

- Rash
- Nervous system symptoms like meningoencephalitis and focal paralysis

If treatment is delayed, symptoms may progress and become severe. These symptoms may include:

- Renal or respiratory failure
- Peripheral neuropathies
- Disseminated intravascular coagulation (DIC)-like coagulopathies
- Rhabdomyolysis
- Hemorrhage

Some persons may be more at risk of developing severe disease. Persons with delayed treatment, older adults, and persons with immunocompromising conditions are at higher risk of severe anaplasmosis. Serious and fatal opportunistic viral and fungal infections have occurred during the course of anaplasmosis. The case-fatality rate for anaplasmosis is <1%.

Anaplasmosis may also affect blood markers. The following may be found in an anaplasmosis patient's bloodwork:

- Anemia

- Thrombocytopenia
- Leukopenia
- Elevated hepatic transaminases

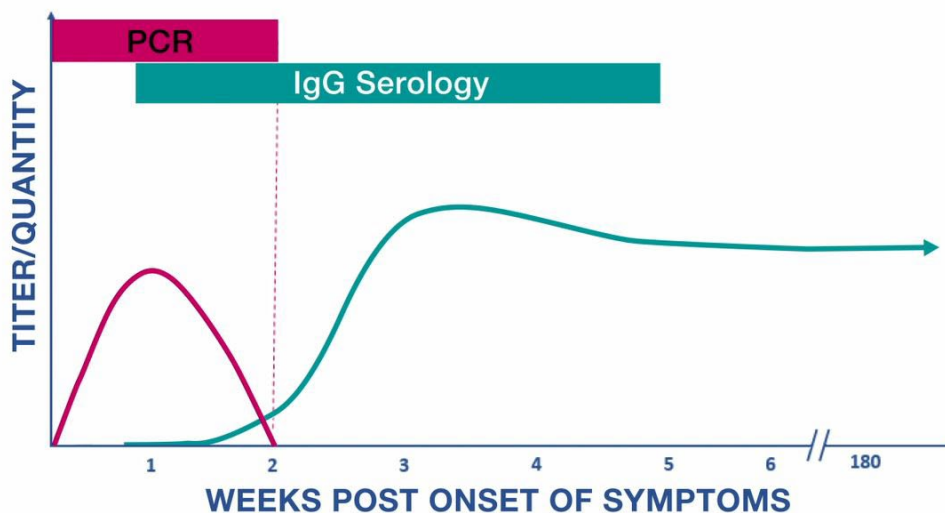
### Should I test my patient for anaplasmosis who just removed an attached tick?

Testing immediately after the removal of a tick will almost always be negative for anaplasmosis so testing should be delayed until a patient has symptoms. A positive antibody result likely indicates a prior exposure, not necessarily a current infection. Testing should not be conducted until or unless the patient is exhibiting symptoms.

Additionally, treatment of asymptomatic persons seropositive for tickborne rickettsial disease is not recommended, regardless of past treatment status, because antibodies can persist for months to years after infection.

The following chart shows the timing of assays for rickettsial diseases including anaplasmosis.

## Timing of diagnostic assays




### What are the testing options for anaplasmosis?

#### PCR Testing

Polymerase chain reaction (PCR) testing has been showing to be most useful in the first week of illness. After that, negative results in persons who do have anaplasmosis are likely. Similarly, in persons who have been on antibiotics for at least 24-48 hours, results are likely to be negative. A negative PCR result does not necessarily rule out anaplasmosis infection.

#### Antibody Testing

The standard serologic test for diagnosis of anaplasmosis is the indirect immunofluorescence antibody (IFA) assay for immunoglobulin G (IgG) using *A. phagocytophilum* antigen. Testing may be negative in the early weeks of illness, as it may take some time for detectable levels of



antibodies to be present. It is recommended that paired IgG IFA assays be performed on acute and convalescent serum samples collected 2-4 weeks apart to demonstrate a four-fold increase in titers.

IgM titers may be elevated in patients who do not have anaplasmosis as IgM may be less specific; therefore, IgM testing alone is not recommended.

Antibody titers to *A. phagocytophilum* may remain elevated for many months after infection and positive antibody results in persons not currently exhibiting symptoms may be due to a prior exposure to *A. phagocytophilum*. Demonstrating a four-fold increase in titers along with compatible symptoms are the best evidence of infection.

#### Culture and Immunohistochemical Assay

Most laboratories are unable to perform culture and immunohistochemical assays for anaplasmosis. These tests may be used on autopsy tissue and are typically only available at specialized laboratories.

#### Blood-smear Microscopy

Examination of peripheral blood for morulae (microcolonies of anaplasmae) in the cytoplasm of granulocytes may be conducted and positive findings indicate disease. However, these are found in the first week of illness, so negative findings do not necessarily indicate no disease.

Additional information on testing practices for anaplasmosis can be found here: [Diagnosis and Management of Tickborne Rickettsial Diseases: Rocky Mountain Spotted Fever and Other Spotted Fever Group Rickettsioses, Ehrlichioses, and Anaplasmosis — United States: A Practical Guide for Health Care and Public Health Professionals \(2016\) pdf icon](#)[PDF – 48 pages]

#### **Should I wait for anaplasmosis test results before beginning treatment?**

The diagnosis of anaplasmosis can be made on the basis of signs and symptoms, especially in a state like Pennsylvania where anaplasmosis cases have been reported in all counties. Lab testing may confirm the diagnosis, but treatment should not be delayed while awaiting lab results. If lab results are negative but a clinical diagnosis of anaplasmosis appears most likely, consider that the timing of the diagnostic test may not have been appropriate and this may have caused the negative result. If the HCP's assessment of the patient's signs and symptoms is consistent with anaplasmosis, treatment should not be contingent on a test result.

## **Treatment**

#### **If I have a patient who has anaplasmosis, what is the best treatment?**

Doxycycline is the recommended treatment for all rickettsial diseases, including anaplasmosis. Improvement in symptoms should be seen within 24-48 hours, including fever subsiding. If symptoms do not begin to improve, this may be a sign that the patient does not have anaplasmosis, or that they patient has coinfection with another TBD that does not respond to doxycycline (e.g., babesiosis).

### *Recommended Treatment and Dosage for Anaplasmosis*

*Doxycycline is the first-line treatment for adults and children of all ages:*

- *Adults: 100 mg every 12 hours*
- *Children under 45 kg (100 lbs): 2.2 mg/kg body weight given twice a day*

*Patients with suspected anaplasmosis should be treated with doxycycline for 10-14 days to provide appropriate length of therapy for possible concurrent Lyme disease infection.*

### **Is it preferable to treat children with another antibiotic than doxycycline to not damage their teeth?**

Doxycycline is the drug of choice for treatment of all tickborne rickettsial disease in children and adults; empiric therapy should be initiated promptly in patients with a clinical presentation suggestive of a rickettsial disease. Studies have shown that short courses of doxycycline are safe and effective for children and do not result in tooth staining or damage to the tooth enamel. Delay in treatment of tickborne rickettsial diseases can lead to severe disease and death.

### **My patient has a life-threatening allergy to doxycycline, what are my treatment options?**

If the patient has a severe doxycycline allergy or severe doxycycline intolerance, rifampin may be considered. Studies on pregnant women and in children have shown rifampin is effective in treating *A. phagocytophilum* infection. Rifampin has not been shown to be effective in treating other TBDs, so be cautious when considering alternatives to doxycycline.

### **Is it possible my patient has a co-infection of Lyme disease and anaplasmosis and how would I treat this?**

Yes. Co-infections with LD and anaplasmosis are possible since the bacteria that causes both are transmitted by the same tick. DEP has identified ticks carrying both *B. burgdorferi* and *A. phagocytophilum*. The recommended treatment for both LD and anaplasmosis is generally 10-14 days of doxycycline, so one treatment of doxycycline would treat both infections. However, some manifestations of LD require a longer treatment time, so consider those manifestations when determining treatment duration for patients who may have a co-infection.

In addition, other antibiotics have been shown to be effective in treating LD, but not in treating anaplasmosis. For example, nearly half of children with LD in Pennsylvania are treated with amoxicillin, possibly due to concerns about teeth staining with doxycycline. However, amoxicillin has not been shown to be an effective treatment for anaplasmosis. Studies have shown short courses of doxycycline do not increase the likelihood of teeth staining in children, so doxycycline should be the primary treatment for all bacterial TBDs.

Additional information on treatment of anaplasmosis and other rickettsial diseases can be found here: [Diagnosis and Management of Tickborne Rickettsial Diseases: Rocky Mountain Spotted Fever and Other Spotted Fever Group Rickettsioses, Ehrlichioses, and Anaplasmosis — United States: A Practical Guide for Health Care and Public Health Professionals \(2016\) pdf icon](#)[PDF – 48 pages]

## **Follow Up and Prevention**

### **Can a person get anaplasmosis more than once?**





Yes. An infection does not confer lifelong immunity. Reinfection may occur.

### **What is the best way to prevent anaplasmosis?**

The best way to prevent anaplasmosis is to prevent tick bites. The following strategies are recommended for preventing tick bites.

#### Permethrin

Permethrin is an insecticide that can be applied to shoes, clothing and gear and kills ticks on contact. PA DOH recommends applying permethrin to shoes and clothes that you will be wearing outside to garden, do yard work or to engage in other outdoor activities. You may also purchase pretreated clothing. Permethrin can be found at department stores like WalMart and Target and sporting goods stores like Dick's and Bass Pro Shop as well as online.

#### Insect Repellent

PA DOH recommends using an EPA approved insect repellent when spending time outdoors. Products containing DEET, picaridin or oil of lemon eucalyptus are all effective at preventing tick bites.

#### Tick Checks

PA DOH recommends conducting tick checks regularly when spending time outdoors. Once inside, conduct a thorough tick check. Small children and older adults may need help with tick checks. A shower is also recommended to remove any ticks that may be crawling on skin and not yet attached.

#### Pet Tick Prevention

Discuss tick prevention for pets with the pets' veterinarians. Dogs can become ill with anaplasmosis and any pets that spend time outdoors may bring ticks into their homes on their fur. Cats may also become ill from anaplasmosis. Cat owners should be sure to use tick prevention products specifically labeled for cats.

#### Preventing Ticks in the Yard

Keeping grass short and neat, tidying wood piles and moving them to the edges of the yard, trimming shrubs and cutting tall grasses and weeds, and placing mulch borders between the woods and the lawn will help reduce the number of ticks in the yard.

### **More Information**

For more information on vectorborne diseases and educational materials, please visit the Pennsylvania Department of Health Vectorborne Disease website.



<https://www.health.pa.gov/topics/disease/Vectorborne%20Diseases/Pages/Vectorbome%20Diseases.aspx>