Situation Assessment Report

[2021-0003] Anaplasmosis in Canada

* This assessment focuses on *Anaplasma phagocytophilum* in humans and animals. This is an initial assessment based on limited preliminary information. As more information becomes available, classifications of risk and confidence levels may be updated.

Situation Overview

Increases in cases of anaplasmosis in humans and other animals have been reported in Québec and Ontario this year.

On July 27, 2021, Estrie Public Health Department in Québec posted a Public Health Alert regarding an increase in incidence of anaplasmosis in the region (CNPHI Public Health Alert - ZA-004833). Since June 2021, 10 human cases of anaplasmosis have been confirmed by Estrie public health authorities,[1] in comparison to only 4 cases of anaplasmosis reported in the entire province in 2020 (annual range 2015 to 2020: 0-14).[2-7] Four of the 10 recent cases were hospitalized, including one who required intensive care. Fortunately, none of the cases were fatal. Most cases either live in, or have recently visited, the municipality of Bromont or the Réseau local de services (RLS) of Haute-Yamaska or RLS of Pommeraie in Estrie. Estrie Public Health has issued a notice to the public advising on clinical signs and symptoms of anaplasmosis and how to prevent exposure to infected ticks.[1]

In Ontario, media reports have noted an increase in human cases of anaplasmosis this year in the Kingston region.[8] Ontario has not formally addressed these reports.

Background

Pathogen and transmission

Anaplasmosis (also known as human granulocytic anaplasmosis or HGA) is a tick-borne disease caused by the bacterium *Anaplasma phagocytophilum*.[9] There are several strains of *A. phagocytophilum*, however, it is believed that only one strain (Ap-ha) is pathogenic to humans.[10] The main tick vectors of *A. phagocytophilum* in Canada are the blacklegged tick (*Ixodes scapularis*) and the western blacklegged tick (*Ixodes pacificus*); these same ticks transmit the agent of Lyme disease. Transmission via blood transfusion is occasionally reported.[9] *Anaplasma phagocytophilum* can also cause clinical disease in companion animals, including dogs and horses.[11]

Disease and treatment

Illness onset occurs 5-21 days after the bite from an infected tick. Symptoms include headaches, fever, chills, muscle aches, nausea, vomiting, diarrhea and a loss of appetite. Although symptoms can often be mild or self-limiting, approximately 5 to 7 percent of patients require intensive care. If untreated, the disease can cause severe illness including prolonged fever, shock, confusion, seizures, pneumonitis, renal failure, hemorrhages, and in rare instances, death.[9] More severe illness and complications can develop in older or immunocompromised populations.[12] The case fatality rate has been estimated at 0.6%.[13] Recommended treatment consists of a course of intravenous or oral antimicrobials. Treatment is more

likely to be effective if started early in the course of disease. There is no clinical evidence that suggests that untreated anaplasmosis will evolve into chronic illness in humans.[14]

Canadian context

In Canada, the first human case of anaplasmosis was diagnosed in 2009 in Alberta.[15] It is not a nationally notifiable disease in humans but has been reportable in Manitoba since 2015,[16] and Québec since 2019 for laboratories, not clinicians.[17] Table 1 shows the reported human cases of anaplasmosis by province and region, and the infection prevalence of all strains of *A. phagocytophilum* in blacklegged ticks collected through passive tick surveillance.

The spatial distribution of *A. phagocytophilum* in Canada is similar, but more restricted, to the geographical distribution of established blacklegged tick populations that correspond to Lyme disease risk areas (see map in Annex A). The annual infection prevalence in ticks tested in Canada from 2003-2020 is low (1.4%; range 0.62-2.07%) but increasing. In 2020, four provinces reported ticks infected with *A. phagocytophilum*: Manitoba, Ontario, Québec and New Brunswick. Blacklegged tick populations continue to increase in number and their geographic distribution is expanding in some parts of Canada, which may increase the risk of infection from associated pathogens such as *A. phagocytophilum*.[12, 18]

Media reports from Pennsylvania[19] and New York,[20] which are in close proximity to Canada, have reported an increase in human cases of anaplasmosis to date this year. The Northeastern and upper Midwestern states, including Vermont, Maine, Rhode Island, Minnesota, Massachusetts, Wisconsin, New Hampshire, and New York account for nearly 90% of all reported cases of anaplasmosis in the United States.[9]

Table 1. Reported human cases of anaplasmosis and infection prevalence of *A. phagocytophilum* in *I. scapularis* ticks collected through passive surveillance, 2010-2020

Province [a]	**Reported Cases** [b] Total (years)	**Infection Prevalence** No. positive ticks/ No. ticks tested (%) [c]
Alberta	2 (2009, 2017)	13/211 (6.2)
Saskatchewan	N/A	4/27 (14.8)
Manitoba	37 (2015-2019)	170/2,566 (6.6)
Ontario	1 (2018)	232/37,399 (0.6)
Québec	38 (2015-2020)	391/22,992 (1.7)
Atlantic [d]	2 (2017-2018)	183/9,566 (1.9)
Total	80 (2009-2020)[e]	993/72,761 (1.4)

a. The province of Nova Scotia and several regions in Ontario and Québec discontinued passive tick surveillance during this time frame. No ticks were tested for *A. phagocytophilum* in British Columbia, Yukon, Northwest Territories or Nunavut during this time. Additionally, no cases have been reported in British Columbia, Yukon, Northwest Territories or Nunavut.

b. Anaplasmosis is not a nationally notifiable disease, but is reported in Manitoba and Québec. Reported cases were those reported by provinces or found in scientific literature in Alberta,[15, 21] Manitoba,[16] Ontario,[12] Québec,[2-7] and Atlantic provinces.[22]

c. The reported prevalence is representative of regions that have passive tick surveillance programs in place, and may not accurately depict the true prevalence of *A. phagocytophilum* in ticks in a region. Infection refers to all strains of *A. phagocytophilum* and non-pathogenic strains usually are responsible for about 50% of the total.

d. Atlantic provinces include Newfoundland and Labrador, New Brunswick, Nova Scotia and Prince Edward Island. Cases were only reported in Nova Scotia.[22]

e. Total cases reported in publically available information.

Regional context: Estrie, Québec

The Estrie region in Québec has established blacklegged tick populations, since several municipalities within the region, including Bromont, have been classified as endemic areas at significant risk for Lyme disease.[23] Anaplasmosis has been detected this year in companion animals, humans and ticks:

- In May 2021, anaplasmosis cases were identified in non-humans (horses and dogs) in the region.
- In July 2021, retrospective testing was conducted on 466 nymphal blacklegged ticks sampled in Bromont in 2019 and 2020 from 10 sites to determine the prevalence and strain of *A. phagocytophilum* in blacklegged ticks (Pelletier et al. unpublished data):
    - Over the two-year period, 16 ticks (3.4%) were positive for *A. phagocytophilum*.
        - 10 (62.5%) were infected with the human pathogenic strain of *A. phagocytophilum*.
    - There was also an increase in the proportion of ticks infected with the human pathogenic strain of *A. phagocytophilum* between 2019 and 2020, from 0.7% (2/274 ticks) to 4.2% (8/192 ticks).

- Preliminary data for 2021 from Bromont indicates an increase in overall prevalence *of A. phagocytophilum* in nymphal blacklegged ticks, and a greater proportion of the pathogenic strain of *A. phagocytophilum* in these infected ticks.

What is the risk to Canadians?

The overall risk to Canadians from anaplasmosis ranges from minimal to low. This assessment is based on the range in likelihood of acquiring anaplasmosis in different areas, which ranges from minimal to low (detailed below). Impact is minimal for the general population, but slightly elevated for older or immunocompromised individuals. Anaplasmosis can be treated successfully if diagnosed early, as the antibiotic treatment (e.g. doxycycline) is commonly available in Canada.

- **Low** likelihood of acquiring anaplasmosis exists in areas with established tick populations (see Annex A). The Bromont, Québec region has a slightly elevated likelihood based on the increasing infection prevalence of *A. phagocytophilum* within established blacklegged tick populations in the region. There is potential for other regions in Canada to be at an elevated likelihood, but current data prevents accurate discrimination of these regions (see Limitations below).
- **Minimal** likelihood of acquiring anaplasmosis exists in the rest of Canada where blacklegged ticks are not established; however, *A. phagocytophilum*-infected blacklegged ticks are carried into widely separated areas of Canada by migratory birds and other animals.

Limitations

This assessment is undertaken based on data and information available to PHAC at the time this document was written.

Currently, only limited data are available on human cases in Canada as anaplasmosis is not federally notifiable or provincially reportable in most jurisdictions. Based on passive tick surveillance, we know that *A. phagocytophilum* is relatively rare in most populations of blacklegged ticks. However, there are gaps in our knowledge about the prevalence of *A. phagocytophilum* in selected blacklegged tick populations in Canada. Passive tick surveillance has been discontinued in several regions where *B. burgdorferi*-infected blacklegged tick populations are established and will be discontinued in much of Canada in the fall of 2021. As a result, active tick surveillance and testing will need to be conducted in these regions in order to monitor for emerging tick-borne pathogens (including *A. phagocytophilum)* that share the same tick vector.

Key information that will improve the understanding and characterisation of the risk posed by anaplasmosis in Canada includes:

- Further surveillance to monitor trends in the prevalence of *A. phagocytophilum* in tick populations in various geographical locations and also to characterise the strains of *A. phagocytophilum* circulating in these populations.
- Enhanced surveillance for human cases of anaplasmosis, which can be achieved by establishing a national case definition and by classifying anaplasmosis as a nationally notifiable disease.
- Further collaboration with federal and provincial partners to better understand the reservoir and sentinel animal species for the different strains of *A. phagocytophilum*.

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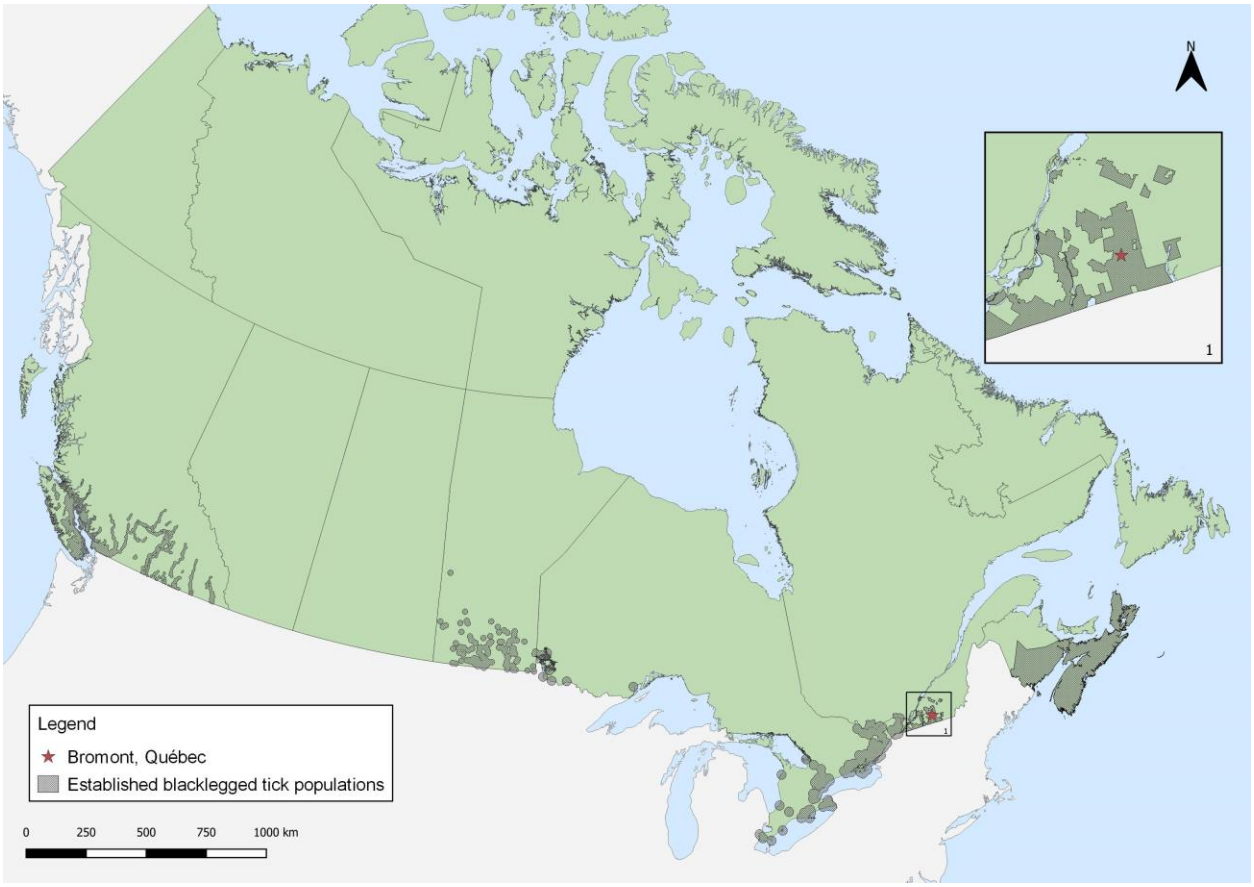
Annex A – Established blacklegged tick population areas



Established blacklegged tick populations are approximated by Lyme disease endemic areas. Anaplasmosis and the causative agent of Lyme disease, *Borrelia burgdorferi*, are both transmitted through the same tick vectors, *Ixodes scapularis* and *Ixodes pacificus*. Active and passive surveillance for ticks inform Lyme disease endemic areas, of which one of the requirements is the presence of established tick populations.