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## Angiostrongyliasis (Rat Lungworm Disease) in an Alaskan who Traveled to Hawaii

### Background

Angiostrongyliasis, or rat lungworm disease, is caused by a parasitic nematode (worm) called *Angiostrongylus cantonensis*. Although primarily found in tropical environments, *A. cantonensis* has become endemic in wildlife in certain parts of the U.S.<sup>1</sup> It is not found in Alaska. Slugs and snails are intermediate hosts and rats are definitive hosts for *A. cantonensis*.<sup>2</sup> Humans become accidental hosts for *A. cantonensis* by ingesting raw/undercooked infected snails or slugs or pieces of snails and slugs inadvertently consumed with chopped vegetables.<sup>3</sup> It may also be possible for humans to become infected by ingesting the slime of infected snails/slugs or by eating undercooked transport hosts (e.g., freshwater shrimp, land crabs, or frogs).<sup>3</sup>

Once ingested by humans, larvae migrate to the central nervous system (CNS). Unable to mature into adult worms in humans, the larvae eventually die in the CNS tissue (usually the meninges), which can lead to eosinophilic meningitis.<sup>4</sup> Symptoms usually start 1–3 weeks after exposure to the parasite, but can range from 1 day to as long as 6 weeks after exposure. Eosinophilic meningitis is characterized by the cerebrospinal fluid (CSF) having >10 eosinophils/mm<sup>3</sup>.<sup>4</sup> Signs and symptoms of eosinophilic meningitis from angiostrongyliasis include stiff neck, headache, focal weakness, paresthesias, nausea, and vomiting. Diagnosis is confirmed with a polymerase chain reaction (PCR) test performed on a patient's CSF. In Alaska, specialized testing for *A. cantonensis* is referred to the Centers of Disease Control and Prevention (CDC) Laboratories in Atlanta, GA.

Treatment is typically supportive with the use of analgesics for pain and corticosteroids to limit the inflammatory reaction.<sup>5</sup> Anthelmintics might exacerbate neurological symptoms due to a systemic response to dying worms.<sup>5</sup> Infected patients typically continue to experience symptoms for 2–8 weeks.<sup>5</sup> Most people recover without incident. Prior infection with *A. cantonensis* does not protect a person from repeat infection from another exposure to *A. cantonensis*.

Angiostrongyliasis has been endemic in Hawaii for decades (the first case was reported in 1961);<sup>6</sup> Hawaii reported 18 laboratory-confirmed cases in 2017.<sup>7</sup> This *Bulletin* describes the first known case of angiostrongyliasis diagnosis in Alaska. Angiostrongyliasis is not an explicitly reportable condition in Alaska; however, it is implicitly reportable as an unusual condition of public health importance (7 AAC 27.005).

### Case Report

On January 28, 2019, the Section of Epidemiology (SOE) was notified of a suspected case of angiostrongyliasis in a middle-aged woman who presented to an Anchorage emergency department with a 4-week history of headache, low back pain, dry cough, and transient pruritic rash that started 1 week after a 10-day trip to Hawaii. A brief episode of left facial weakness and arm tingling prompted evaluation. She was afebrile with normal vital signs. The physical examination was normal. Labs revealed a white blood cell count of  $9.2 \times 10^3/\mu\text{L}$ ; of which, 18% were eosinophils. The comprehensive metabolic panel, erythrocyte sedimentation rate, and C-reactive protein levels were normal. A CT scan of the thorax revealed multiple small pulmonary nodules suggestive of a hematogenous infection. An MRI of the brain was normal. Given the patient's history of recent travel to Hawaii, the diagnosis of rat lungworm was entertained. A lumbar puncture was performed, revealing 589 nucleated cells/ $\mu\text{L}$ ; of which, 27% were eosinophils. The CSF glucose was depressed at 24 mg/dL and the protein was elevated at 355 mg/dL. SOE staff contacted CDC to arrange for

PCR testing of CSF, where the diagnosis was ultimately confirmed. Several weeks after her initial evaluation, the patient's symptoms had largely resolved without specific intervention.

### Public Health Investigation

SOE staff interviewed the patient on January 29, 2019. The patient reported that during her vacation in Hawaii in December 2018, she consumed a variety of raw produce while dining at restaurants and eating food prepared for her in a private home. She reported that she had not knowingly consumed any snails, crabs, shrimp, prawns, or other shellfish. All information gleaned during interviews with the patient was shared with Hawaii Department of Public Health staff, who performed a follow-up interview on February 19, 2019. Based on the information gathered, the case was determined to be sporadic and not part of a larger angiostrongyliasis outbreak.

### Discussion

Here we describe a case of angiostrongyliasis acquired by an Alaska resident while vacationing in Hawaii. This is the first case of angiostrongyliasis that has been reported to SOE. Although the source of infection was not identified, the patient likely became infected by eating raw produce that contained an infected snail or slug. Throughout the investigation, collaboration between Hawaii Department of Public Health and SOE assisted in characterizing this case.

### Recommendations

- Persons traveling to Hawaii or other destinations with known transmission of *A. cantonensis* should adhere to the following precautions:
  - avoid eating raw or undercooked snails or slugs;
  - only handle snails or slugs with gloves and wash hands afterwards;
  - thoroughly inspect and rinse produce (especially leafy greens) in potable water; and
  - boil snails, freshwater prawns, crabs, and frogs for at least 3–5 minutes prior to consumption.
- Clinicians should consider angiostrongyliasis in patients with eosinophilic meningitis and travel to endemic areas.
- Although not an explicitly reportable condition, clinicians are encouraged to report suspected cases to SOE.
- Laboratory testing via PCR on CSF should be coordinated with SOE.

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