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File:

July 15, 2025

MEDICAL ADVISORY: MORE SENSITIVE LABORATORY TEST AVAILABLE TO DIAGNOSE NEUROANGIOSTRONGYLIASIS (RAT LUNGWORM DISEASE)

- A more sensitive RT-PCR assay to diagnose neuroangiostrongyliasis is now available at the Hawaii SLD.
- The assay can be performed on CSF; there is no minimum CSF eosinophil threshold requirement to order this test.
- Approval for testing must be requested by contacting the Disease Investigation Branch Disease Reporting Line at (808) 586-4586.
- Providers should not wait for *Angiostrongylus cantonensis* RT-PCR testing to consider the diagnosis of or empiric treatment for neuroangiostrongyliasis.

Dear Healthcare Provider:

A more sensitive Real-Time Polymerase Chain Reaction (RT-PCR) assay to diagnose neuroangiostrongyliasis (Rat Lungworm Disease) is now available at the Hawaii State Laboratories Division (SLD) of the Hawaii State Department of Health (HDOH). This RT-PCR test detects *Angiostrongylus cantonensis* DNA in cerebrospinal fluid (CSF) and is anticipated to enable earlier diagnosis of and help guide the management of suspected neuroangiostrongyliasis cases. Previously, testing was only approved for CSF samples with 10% or greater eosinophils because of the low sensitivity of the old test in the absence of CSF eosinophilia. With the new assay, there is no minimum eosinophil threshold for testing.

Background
Neuroangiostrongyliasis is a parasitic disease transmitted through ingesting food contaminated by the larval stages of *A. cantonensis* worms. In Hawaii, these larval worms can be found in raw or undercooked snails or slugs. Sometimes people can become infected by eating raw produce that contains a small, infected snail or slug, or part of one. It is not known for certain whether the slime left by infected snails and slugs is able to cause infection. Neuroangiostrongyliasis is not spread person-to-person. Worldwide, *A. cantonensis* is the most common cause of eosinophilic meningitis, a rare type of human meningitis.

Local Epidemiology
The parasite is considered endemic in Hawaii. Between 2014 and 2023, 80 laboratory-confirmed cases of neuroangiostrongyliasis were reported in Hawaii. The actual burden of disease is likely higher, given the challenges of diagnosis and a broad spectrum of clinical presentations, ranging from mild, self-limited illness to severe disease-causing persistent disability. Most cases of neuroangiostrongyliasis that are reported in Hawaii occur on the Big Island (77%), but cases and infected intermediate hosts (snails and slugs) have been identified on all the major islands. For cases reported to HDOH from 2012 to 2024, during which criteria for testing at SLD were more stringent, 81% were hospitalized, and 2% died.

Risk Factors
Providers should consider neuroangiostrongyliasis in persons with clinically compatible symptoms and an exposure history in an endemic region, particularly in the endemic area of eosinophilic meningitis. The exposure history in suspect cases could include:[4]

- Ingestion of raw or undercooked snails or slugs.
- Eating uncooked, unwashed or inadequately washed vegetables or fruits.
- Eating raw or undercooked freshwater prawns/shrimp, crayfish, crabs, fish, frogs, etc.
- Consumption of potentially contaminated beverages (raw, blended vegetable juice).
- Contact with snails or slugs.
- Residence in an endemic area (including anywhere in the state of Hawaii).
- Recent travel to an endemic area.

Symptoms and Signs
Symptoms can initially be non-specific and may evolve to become more specific. Infected persons may experience nausea, vomiting, and abdominal pain a few hours to a few days after ingestion of the parasite and can progress to other symptoms. Non-specific symptoms include fever, light sensitivity, muscle pain, fatigue, and insomnia. More specific symptoms may include constant headache, neck stiffness and pain, tingling or burning of the skin, double vision, bowel or bladder difficulties, and seizures. Children may experience fever, irritability, somnolence, lethargy, gastrointestinal symptoms, muscle twitching, convulsions, and extremity weakness. In addition, individuals may experience a few days to weeks of no symptoms followed by neurologic symptoms. Symptoms usually last between 2–8 weeks but have also been reported to last for longer periods of time. The understanding of the prognosis for persons with neuroangiostrongyliasis continues to evolve and should improve with more sensitive testing.

Peripheral blood and/or CSF eosinophilia in a person who resides in or traveled to an endemic area should prompt consideration of a diagnosis of neuroangiostrongyliasis and further testing. However, eosinophilia may be absent or appear later in the disease course.

Testing
A. cantonensis RT-PCR of CSF can be performed at SLD for any patient suspected of having neuroangiostrongyliasis. The assay has only been validated on CSF; peripheral blood testing for *A.*

cantonensis is not currently available at SLD. Arrange for testing by contacting the Disease Investigation Branch (DIB) Disease Reporting Line as detailed below. Although clinical suspicion is sufficient for testing, pre-authorization of testing is required to facilitate collection of relevant epidemiologic information for investigation and surveillance.

Commercial microbial cell-free DNA next-generation sequencing (mcfDNA NGS) testing (Karius®, Redwood City, CA) of plasma has also been used successfully to aid in diagnosis of *A. cantonensis*[5].

Clinical Management

Treatment of neuroangiostrongyliasis may include high dose corticosteroids, serial lumbar punctures for symptomatic relief of headaches, and anthelminthic therapy with agents such as albendazole. Published clinical guidelines can help guide medical management. Given that lumbar puncture may not be performed in all suspected cases and that establishing a definitive diagnosis can be challenging, healthcare providers should not delay clinical decision-making while awaiting laboratory test results. Empiric treatment may be warranted in cases with strong clinical suspicion of neuroangiostrongyliasis.

Neuroangiostrongyliasis is a reportable disease. Report any clinically suspected case of Neuroangiostrongyliasis to the DOH Disease Investigation Branch:

Reporting Office	Hours of Operation	Phone Number
O‘ahu (Disease Reporting Line)	Monday – Friday between 7:45 AM – 4:30 PM	(808) 586-4586
Maui District Health Office		(808) 984-8213
Kaua‘i District Health Office		(808) 241-3563
Hawai‘i Island District Health Office (Hilo)		(808) 933-0912
Hawai‘i Island District Health Office (Kona)		(808) 322-4877
After hours on O‘ahu	Monday – Friday between 4:30 PM – 7:45 AM, and weekends	(808) 600-3625
After hours on neighbor islands		(800) 360-2575

We appreciate your vigilance and assistance in protecting the health of our communities.

Sincerely,

Sarah Kemble

Sarah K. Kemble, M.D.
State Epidemiologist

References:

1. Specimen Requirements for State Laboratory Division *Angiostrongylus cantonensis* testing: https://health.hawaii.gov/statelab/files/2022/08/sld-brs-sr-angio4.pdf
2. Hawaii Department of Health Disease Outbreak Control Division: https://health.hawaii.gov/docd/disease_listing/rat-lungworm-neuroangiostrongyliasis
3. Centers for Disease Control Division of Parasitic Diseases and Malaria: https://www.cdc.gov/dpdx/neuroangiostrongyliasis_can/index.html
4. Ansdell V et al (2021). Guidelines for the diagnosis and treatment of neuroneuroangiostrongyliasis: updated recommendations. Parasitology 148, 227–233. https://doi.org/10.1017/S0031182020001262
5. Chance, M et al (2024). *Angiostrongylus cantonensis* Meningoencephalitis in three pediatric patients in Florida, USA. Journal of the Pediatric Infectious Diseases Society, 13:12, 639–642. https://doi.org/10.1093/jpids/piae113