Myxobolus neurotropus

I. Causative Agent and Disease

Myxobolus neurotropus is a metazoan in the class Myxosporea in the phylum Cnidaria (anemones, jellyfish, corals) based on molecular studies and the feature of discharging cells (cnidocytes) known as polar capsules. This species was found in the brain and spinal cord tissues of a wild rainbow trout in Alaska which was a new geographic record. Currently there are at least eight *Myxobolus* species that infect neural tissue of salmonids, but some may represent more than one species or may ultimately be identified as synonyms. The affected trout exhibited a deformed spine and circular swimming behavior similar to signs of Whirling Disease caused by another *Myxobolus* species, *M. cerebralis.* However, the latter parasite infects the cartilage of the head rather than the soft nervous tissues. Also, it has never been visually observed, caused disease nor has been confirmed in Alaska despite marginally positive PCR results of one study from rainbow trout in 2005-2006.

II. Host Species

This is a recently discovered parasite reported in rainbow, cutthroat and bull trout, Chinook and sockeye salmon from Idaho, Washington, Utah, Oregon, California, and now in rainbow trout from the Alaska Peninsula. The distribution in Alaska is unknown but could be an emerging parasite more widespread than suggested from this single case due to improved detection by PCR.

III. Clinical Signs

M. neurotropus is not associated with tissue changes and is likely apathogenic so infected fish have few or no clinical signs unless parasite intensities are high. In such cases, signs could potentially include spinal deformities, darkened body color and circular swimming behavior.

IV. Transmission

Like most myxozoans, transmission likely requires a benthic invertebrate as an alternate host, in this case occurring in freshwater. After infection of the fish host, the parasites reach the central nervous tissues via the circulatory system passing through several developmental stages that eventually become spores enclosed in sporocysts within the host brain and spinal cord. When the fish host dies and decomposes, the spores are released into the water where they are ingested by the invertebrate host, likely a tubificid oligochaete worm. Infectious stages (triactinomyxons) for fish develop in the invertebrate host and are released into the water column.

V. Diagnosis

Brain or spinal cord tissues are examined in stained smears for typical round to oval spores 11-13 um in length x 10-12 um in width with polar capsules 4 x 6 um in width and length containing coiled filaments with 6-8 turns. Species identification is determined by further spore morphology and PCR.

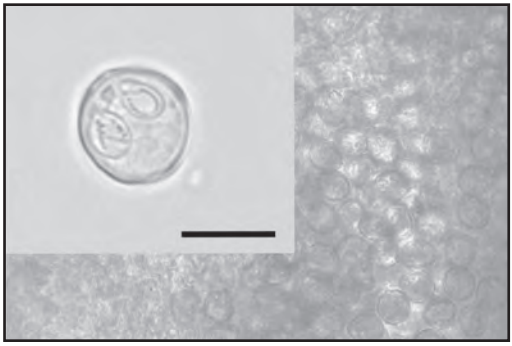
VI. Prognosis for Host

Parasitisms by many species of myxosporeans are well tolerated by fish hosts unless infections cause dysfunction of major organs and tissues. Infection of the brain and spinal cord by *M. neurotropus* has potential to cause neurological dysfunction and fish mortality if infection intensity is high.

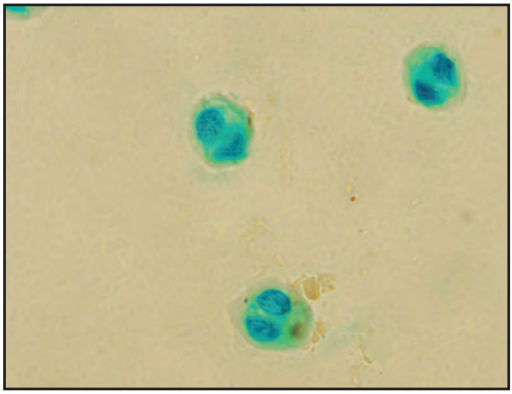
VII. Human Health Significance

There are no human health concerns associated with *M. neurotropus.*

Rainbow trout infected with *Myxobolus neurotropus* from Margo Creek on the Alaska Peninsula - darkened body coloration and spinal deformity.



Wet mount of *M. neurotropus* unstained spores from the spinal cord of the rainbow trout above, X 200. **Inset** scale bar = 10 um (from Bentz et al. 2012).



Malachite green-stained smear of *M. neurotropus* spores with oviform polar capsules of nearly equal size, X 1000.