

MICROSPORIDIAN PARASITIC MYOSITIS IN NEON TETRA FISH

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Introduction

The neon tetra (*Paracheirodon innesi*) is famous ornamental freshwater fish. The fish belongs to the characin family (family Characidae) of order Characiformes. They are originally found at South America, but now they are widely distributed all over the world. Neon tetras are easy to keep in a community aquarium mixed with other fishes. Many public aquariums including zoo aquarium display this fish. Along with the increased of fish international travel, the importance of fish health protection must also be considered.

This paper reports a case of microsporidian parasite infection presenting as a progressive severe myositis in neon tetra fish. The microsporidia have been documented as waterborne outbreak disease and also as a zoonotic agent especially to immunocompromised human. It is important that pathologists and microbiologists become acquainted with the spectrum of this emerging protozoal infection, ensuring timely diagnosis and subsequent treatment

Materials and Methods

Five neon tetra fishes were submitted to our laboratory for histopathological observations. The 2-3 cm long fishes were raised in the breeding facility. The fishes were grossly pallor in color. The whole body of the fishes were fixed in 10% buffered-formalin. The samples were processed routinely for histopathology slide preparation. Sections were cut at 4 μ m with microtome and stained with hematoxylin and eosin (HE), Gram, acid-fast, periodic acid-Schiff, and Giemsa. Histopathological examinations were done using a light microscope (Olympus, BH-I, Japan).

Results

The histopathology examination revealed necrotizing and sclerosing muscular microsporidiosis. There were multiple cysts formation containing minute spores within a cell in the musculature of the fish and forms a

"sporoblast". Each sporoblast, measured as 2 to 10 μ m across. The various developmental stages of microsporidium in the fish muscle was observed within the tissue section (Fig. 1). Ruptured sporoblast evoke granulomatous inflammatory reaction of the surrounding tissue. With Hematoxylin Eosin staining, the spores appear blue, while with the Gram, acid-fast, periodic acid-Schiff, and Giemsa stains, the spores colored magenta. These stains could differentiate the organisms in the tissue sections easily. The presence of diverse parasitic stages in the muscle (Canning and Nicholas 1980) that has been made obvious by different staining method, suggested that the microsporidian infestation in this case is *Pleistophora* sp.



Figure 1. Necrotizing myositis (arrow heads) due to various stage of development of the microsporidium (asteriks), HE Stain, Bar = 5 μ m

Discussion

Pleistophora hypheobryconis is a sporozoid and is a causa of serious muscle parasitic disease of fishes. The parasites form cysts in the muscles and internal organs of the fish in which they are multiplied. (Canning and Lam 1986, Lam and Dykova 1992). The effect of microsporidian infection on the piscine host is variable.

The disease cycle begins when parasitic spores enter the fish after consuming infected material, such as the bodies of dead

fish, or live food such as tubifex and glass worm, or also insects which may serve as intermediate hosts. Within the fish's gut, the spore releases, and the amoeba-like spore burrows the intestinal wall to reach blood or lymph fluid to find a suitable place in a muscle cell. Muscles bearing the cysts begin to die, and the necrotic tissue becomes pale, eventually turning white in color. The infective spores are not freed until the host dies and its musculature softens with decomposition, or until the carcass scavenged by another fish. The microsporidian can infect fish eggs, and transmit the disease to the offspring. The presence of cyst within hematopoietic cells of the kidney could associate with anemia. While cysts formed at the swimbladder walls can make the walls become thick and white, which then responsible for erratic swim behavior. Cyst at the spines may cause vertebrae deformation (Shaddock and Orenstein 1993 ; Stoskopf 1993; Noga 2000).

This disease can occur in several species, which commonly became tank mate of Tetras, such as Dwarf Gouramy, Danios, Rasboras, Barb, Rainbowfish, Discus, Angelfish, Guppies, Platies, Mollies, Swordtails, Plecos, Small Scavenger Catfish. Due to neon tetra's small size, any larger fish might mistake them for food. Fishes such as Angels are naturally predators of neon tetras in the wild (tom and Dykova 1992). Marine fish also susceptible to this disease (Nilsen and Bristow 1994 ; Ruehl-Fehlert 2005)

There are reports of *Pleistophora* sp infections in human skeletal muscle (Chupp et al. 1993 ; Schwartz et al. 2006). In human, *Pleistophora* may be acquired from raw or lightly cooked fish or crustaceans and the immunocompromised condition is predisposition of the disease.

As the diversification of aquaculture continues, it becomes more likely that *Pleistophora* sp will encounter other species

and induce of serious outbreaks of the disease. The infection may develop into serious diseases in the infected fish, and the fish may act as a point source of infection for other species. Both of these scenarios may create critical environment in which a pathogen may jump between species, allowing the emergence of a new disease etiology (Slifko et al. 2000 ; Weiss 2001 ; Mathis et al. 2005).

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