UNIVERSITY OF FLORIDA
Cooperative Extension Service
Institute of Food and Agricultural Sciences

Columnaries Disease[1]

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Columnaris is a bacterial disease of freshwater fish which frequently causes problems during warm weather. The disease is caused by a gram negative rod, *Flexibacter columnaris.* Prior to 1974, the organism was known as *Condrococcus columnaris.* Common names for this disease include "fin rot", "cotton wool disease", "cotton mouth disease", or "saddleback disease."

History of the Disease

Columnaris was first described in 1922. The bacteria which causes the disease was not isolated until 1944. *Flexibacter columnaris* is a member of the group of bacteria known as Myxobacteria, or "slime bacteria." This group of bacteria is difficult to work with in the laboratory and requires special media for isolation. The disease affects salmonids (trout and salmon) as well as many warm-water fish. Columnaris disease is often complicated by the presence of other bacterial pathogens, such as *Aeromonas* or *Pseudomonas,* and secondary fungal infections.

Flexibacter columnaris is considered an ubiquitous organism which means that it is commonly found in water, soil, and even on the skin of healthy fish. Disease is thought to result more from stress factors which adversely affect the fishes' natural defense mechanisms, than from the presence of bacteria. Factors believed to predispose fish to this disease include parasitic infestation, seining and handling, crowding, and exposure to higher than normal water temperatures. Anything which causes damage to the epithelium (skin) may increase the likelihood of a columnaris outbreak.

Behavioral Signs of Columnaris

There are no specific behavioral signs exhibited by fish infected with columnaris. Sick fish show general signs of malaise such as loss of appetite, slow swimming, and hanging at the surface of the water. Sick fish make little attempt to escape capture. Fish infected with *F. columnaris* do NOT normally exhibit "flashing" or other signs of external irritation unless the bacterial infection is complicated by a parasitic infestation.

External Signs of Columnaris

Fish infected with columnaris usually show signs which can be recognized by the fish farmer before fish start to die. Ulceration of the skin or erosion of fins are the most obvious early signs. In scaled fish, the fins are often the first site of infection. Fins appear more ragged as the condition worsens, and fungal infection may become established in areas of dead tissue. A presentation such as this, with ragged, fungus-infected fins, is commonly described as "tail rot." Columnaris is not the only cause of tail rot, however.

In nonscaled fish, such as channel catfish, infection frequently starts on the skin along the lateral body wall or behind the dorsal fin. Infected skin can be recognized because it appears off-color, most commonly taking on a pale gray hue. Initially, the off-color area will be very small, but if unchecked, the infection will spread becoming wider and deeper, until in severe cases, the underlying musculature is exposed. In the most severe cases, the ulceration may be so deep that the backbone is

1. This document is FA-11, one of a series of the Department of Fisheries and Aquatic Sciences, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida First published: August 1988. Revised: December 1998. Please visit the EDIS Web site at **http://edis.ifas.ufl.edu**.

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visible. Fungal infections frequently occur in ulcerated areas giving the lesion a fuzzy brown appearance. Fish affected with this type of lesion are said to have "saddleback disease", and this is very typical for channel catfish infected with columnaris.

Some fish infected with columnaris never develop the skin lesions described above. The gills may be severely infected, however, causing the fish to show signs of oxygen stress. This condition can be discovered by lifting the operculum and examining the gill filaments. Gill tissue infected with columnaris will be severely decayed and large areas of gill filaments may be missing, exposing the cartilaginous gill arch. This can be distinguished from many parasitic diseases because most parasites cause irritation rather than evident decay of tissue, resulting in excess mucus production and causing the gills to appear swollen. Fungal infections commonly occur on gill filaments, secondary to bacterial infection, and appear as a brown fuzzy material on remaining tissue. Fish affected with columnaris would not be expected to have a distended abdomen ("dropsy"), bloody fins, or protruding eyes ("popeye"), unless an internal infection were complicating the disease. Mixed infections are common with columnaris so care must be taken to note these signs if they are present.

Internal Signs of Columnaris

Classic columnaris disease is considered an external infection, however systemic (internal) infection is a common complication. Non-specific signs of internal infection include pale internal organs with small bloody spots on them. The presence of fluid in the gut or abdomen may be suggestive of bacterial infection. The only way to know if an internal infection is complicating the fishes' recovery is to culture the internal organs, preferably the posterior kidney.

Sample Submission

A diagnosis of external columnaris infection can be made with a microscope, however, a bacterial culture of internal organs is recommended to determine antibiotic sensitivity and to identify any other bacteria which may be contributing to the disease outbreak. An examination for external parasites is also recommended because a parasite problem could complicate recovery or contribute to poor treatment results.

With a little practice, most fish farmers can learn to use a microscope to identify columnaris bacteria on skin or gills, as well as external parasites. Professional assistance is recommended for identification of bacteria cultured from internal organs and for antibiotic sensitivity tests. Live, sick fish can be packed on ice and sent to a diagnostic laboratory for this work.

Treatment of Columnaris

External columnaris can be treated with potassium permanganate at a concentration of 2 parts per million (ppm) for 8–10 hours. This concentration will cause the water to be wine red in color. If the color fades to yellowish-brown in less than 4 hours, it may be necessary to retreat. In a tank, potassium permanganate can be used at a slightly higher concentration, but fish must be observed during the treatment. As much as 10 ppm can be used for a short term bath of 30–60 minutes. Fish must be watched closely, and water should be changed immediately if they show signs of stress. Following treatment, a complete water change is necessary to avoid gill damage. Formalin is not a treatment of choice for an external bacterial infection such as columnaris, although it does an excellent job against parasitic problems.

Fish which have systemic infections must be treated with antibiotics. The most effective method of administering antibiotics to fish is in the feed or by injection. For food fish, the only approved antibiotic which is effective against columnaris is Terramycin, an oxytetracycline compound. Bacteria such as *Aeromonas* have a tendency to develop resistance to oxytetracycline, resulting in ineffective treatment if they are part of the problem, therefore it is very important that bacterial identification and antibiotic sensitivity testing be run. Terramycin is fed for 10 days as a sinking feed, and has a mandatory 21-day withdrawal time. The withdrawal time is the number of days fish must be held, without being sold, after feeding the drug for the last time.

Prevention of Columnaris

Columnaris disease has caused problems for fish farmers for many years. It is not easy to control, and because the disease is related to stress, an effort to identify and correct the source of the problem is necessary to prevent excessive or chronic mortalities. Fish are particularly vulnerable to columnaris following handling and transport. Abrasion from nets, crowding, and adverse water quality conditions during transport create a situation which is very conducive to columnaris outbreaks. Routine preventive treatment with potassium permanganate when fish are moved may be a means of minimizing losses to this disease.