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## Fish Tapeworm in Raw Alaskan Salmon

During October 1984 several cases of Diphyllobothrium (fish tapeworm) were reported among civilian and military personnel at King Salmon. Epidemiologic investigation showed that four outbreaks occurred. Three outbreaks were traced to individuals eating from at least four separate batches of raw salmon prepared using a recipe for cerviche brought to Naknek in early July by a visitor from California. In addition, a fourth outbreak of fish tapeworm occurred in an asymptomatic fishing guide who ate raw salmon for a number of years. Combining all four outbreaks, 11 of 17 individuals interviewed reported illness; seven passed worms. The following symptoms were reported: watery diarrhea (100%), abdominal cramping (100%), weight loss (73%), passing of worms (64%), fatigue (64%), nausea (55%), excessive gas (45%), loss of appetite (45%), constipation (18%), vomiting (9%), belching (9%). Weight loss ranged from 5-15 pounds with an average of 10.6 pounds. The time between eating implicated raw salmon and passing worms ranged from 7-84 days, (mean 28 days). Patients were treated with Niclosamide and are being followed to insure that their infestation has been eliminated.

Diphyllobothrium is the longest tapeworm of man and occasionally reaches a length of 10 meters. The tapeworm usually resides in the ileum and jejunum and may have a life span as long as 20 years. The life of Diphyllobothrium is complex and includes two intermediate hosts and a definitive host of man. Twenty-two mammals have been shown to be definitive hosts for the adult worm including dog, cat, walrus, bear, seal, fox, and whale.

Human infection is usually limited to a single worm, although numerous worms have occasionally been described. Anemia can be produced by infection of the worm high in the intestine as the worm competes for vitamin B12. Studies have shown that Diphyllobothrium latum absorbs 80-100 per cent of an oral dose of radioactive B12. Human infection is often asymptomatic, although abdominal discomforts occur.

Treatment of Diphyllobothrium requires the elimination of the worm head (scolex). The drug of choice is Yomesan (Niclosamide). Diagnosis of infection is made by examining stool for the presence of worm segments and eggs.

The growing popularity of raw fish dishes such as Japanese sushi and sashimi places humans at greater risk for helminthic infections. Fish tapeworm disease is acquired by ingestion of raw or incompletely cooked fish infected with the plerocercoid larva of Diphyllobothrium species. The usual sources of this infection in North America are fresh water fish. However, Dr. Robert Rausch clearly showed the high rate of infection of Red Salmon with Diphyllobothrium latum species in his zoological research studies in Alaska in 1970 to 1973. Several species of Diphyllobothrium that can occur in man are found in Alaskan fish.

Fish tapeworm infection is not acquired from properly canned fish. Infection from eating fresh fish can be prevented by cooking until all parts of the fish reach a temperature of at least 56°C (133°F) for 5 minutes. Freezing to -18°C (0°F) for 24 hours or to -10°C (14°F) for 72 hours can also prevent infection. Preparation by placing the fish in a brine solution may be effective if appropriate salt concentration, fillet size, and contact time is observed. Commercially prepared lox (smoked salmon) is usually brined before smoking and should not constitute a source of infection.

We urge all physicians and other health care providers to report all cases of diagnosed or suspected fish tapeworm to the Epidemiology Office, 561-4406.

(Contributed by Sue Anne Jenkerson, RNC, MSN, FNC, Epidemiology Office, Anchorage)