



NEUROCYSTICERCOSIS

This information sheet is provided to help you understand which drug therapies can help treat neurocysticercosis.

Neurologists from the AAN are doctors who identify and treat diseases of the brain and nervous system. The following evidence-based information* is provided by experts who carefully reviewed all available scientific studies on the effectiveness of drug therapies for neurocysticercosis.

Neurocysticercosis is caused by tapeworm infection. It is important to understand neurocysticercosis in order to get the right treatment. People with this disease can be treated with a combination of albendazole and a steroid drug.

WHAT IS NEUROCYSTICERCOSIS?

Neurocysticercosis is an infection of the brain or spinal cord. It is caused by the tapeworm *Taenia solium*. A tapeworm is a type of parasite, which is a life form that lives in or on another life form. Tapeworms can live inside the bodies of people or animals. They also can live in the fecal matter (solid waste) of people or animals. When a tapeworm enters a person's body, it usually makes the person sick.

The tapeworm that causes neurocysticercosis also can infect the intestines. This is known as taeniasis. In taeniasis, symptoms usually set in 6 to 8 weeks after exposure to the tapeworm. However, some people with the infection may have no symptoms for years.

When taeniasis symptoms are experienced, they may include:

- Abdominal pain
- Constipation (difficulty passing stools/solid waste)
- Diarrhea (loose stools/solid waste)
- Nausea (stomach upset)

If the infection spreads to the brain or spinal cord, neurocysticercosis develops. Symptoms may include:

- Seizures/a form of epilepsy (a seizure disorder)
- Blindness
- Chronic headaches
- Hydrocephalus (water on the brain)
- Meningitis (infection of the tissue covering the brain and spinal cord)
- Swelling of the brain

Neurocysticercosis is becoming more common around the world. In the past, the infection occurred mostly in developing countries. These include some countries in Africa, Latin America, and Asia. The disease now is on the rise in developed countries such as the United States, Canada, and the United Kingdom.

Neurocysticercosis is a serious disease. In some cases, it may be deadly. However, it is usually manageable and can be prevented.

According to the World Health Organization, the form of epilepsy this tapeworm causes is the most common preventable epilepsy in the developing world. About 2 million people worldwide have epilepsy from this tapeworm.

WHAT CAUSES TAENIASIS AND NEUROCYSTICERCOSIS? CAN THESE INFECTIONS BE PREVENTED?

The tapeworm *Taenia solium* can infect a person in two ways. The infection of the intestines (taeniasis) happens when a person eats raw or undercooked meat that has the tapeworm cysts in it. These are sacs that have the larval (undeveloped) form of the tapeworm in them. A person gets neurocysticercosis by eating food or drinking water contaminated with the tapeworm eggs. Food or water can be contaminated with fecal matter from a person or animal who has the infection. Usually this happens from poor hygiene within a household or other environment. A person who develops this infection can spread it to others with whom they have close contact.

Infection from this tapeworm is preventable. To avoid it, people should be sure the meat they eat is cooked completely. In addition, practicing good personal hygiene is important. This involves washing hands thoroughly after using the bathroom. For more information on how these infections occur, see the graphic at this Centers for Disease Control and Prevention web page: www.dpd.cdc.gov/dpdx/html/cysticercosis.htm.

WHAT IS A SEIZURE?

Seizures are events caused by abnormal firing of neurons (brain cells). Brain cells use electrical energy to “fire” messages to one another. When the cells fire abnormally, a seizure may happen. This causes a surge of electrical activity in the brain. For some people, a seizure is a onetime event.

Other people may have recurrent seizures. These may occur the same day or over longer periods of time.

Having a seizure can be frightening. The person may become confused and lose the ability to communicate. The person’s muscles may contract repeatedly. In some cases, the person may lose consciousness (black out). Injuries may result from muscle spasms or from falls. In very rare cases, death may occur. But usually seizures are brief events, and the person recovers completely.

HOW IS NEUROCYSTICERCOSIS TREATED?

When the tapeworm *Taenia solium* has infected a person’s brain or spinal cord, treatment involves two main drug therapies:

- Albendazole, a drug that kills the tapeworm cysts
- The steroid drug dexamethasone or the steroid drug prednisolone

Albendazole is used to kill the parasite infecting the person’s body. Either dexamethasone or prednisolone is used to treat any inflammation (swelling) that may occur. There is moderate evidence that albendazole, when combined with either dexamethasone or prednisolone, helps treat neurocysticercosis. The evidence also shows this combination therapy:

- Helps to lower the number of active lesions (damage from active infection) in the body
- Can lessen how often seizures occur over time

There is not enough evidence to show if using steroids without albendazole is helpful.

Certain drugs often are used to treat seizures, including the seizures that can occur with neurocysticercosis. These drugs also are called “antiepileptic drugs” (AEDs). There are no studies available to show if AEDs help to treat the seizures experienced with neurocysticercosis. However, AEDs have been shown to be effective and safe in seizure treatment. Therefore, some experts assume AED treatment may help while lesions are active.

No studies are available to show what the best timing is for treating this infection with AEDs or steroids.

ARE THERE RISKS TO USE OF THESE THERAPIES?

The therapies available to treat neurocysticercosis are generally safe. Use of albendazole may lead to brain swelling as the parasite dies. This swelling could cause additional seizures and brain disease. This is why most experts recommend treatment with steroids at the same time as albendazole treatment.

All drug therapies have side effects and carry other risks. Using different drugs in combination also may involve some risks. It is important to discuss possible risks with a doctor before taking any drug. Be sure to ask a doctor about any side effects linked with use of the drugs described here.

This guideline was endorsed by the American Epilepsy Society.

This is an educational service of the American Academy of Neurology. It is designed to provide members with evidence-based guideline recommendations to assist the decision making in patient care. It is based on an assessment of current scientific and clinical information and is not intended to exclude any reasonable alternative methodologies. The AAN recognizes that specific patient care decisions are the prerogative of the patient and the physician caring for the patient, and are based on the circumstances involved. Physicians are encouraged to carefully review the full AAN guidelines so they understand all recommendations associated with care of these patients.

This statement is provided as an educational service of the American Academy of Neurology. It is based on an assessment of current scientific and clinical information. It is not intended to include all possible proper methods of care for a particular neurologic problem or all legitimate criteria for choosing to use a specific procedure. Neither is it intended to exclude any reasonable alternative methodologies. The AAN recognizes that specific patient care decisions are the prerogative of the patient and the physician caring for the patient, based on all of the circumstances involved.

*After the experts review all of the published research studies, they describe the strength of the evidence supporting each recommendation:

Strong evidence = more than one high-quality scientific study

Moderate evidence = at least one high-quality scientific study or two or more studies of a lesser quality

Weak evidence = the studies, while supportive, are weak in design or strength of the findings

Not enough evidence = either different studies have come to conflicting results or there are no studies of reasonable quality

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