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# MR Appearance of Cerebral *Drancunculus borealis* Infection

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**Summary: This case is described to illustrate the MR appearance of a rare case of nematode infection in a human.**

**Index term: Neuroradiology and neuroradiologists, bon bons**

## Case Report

The body of a male human approximately 40 years of age was recovered from a glacier in Upernavik, Greenland in 1992 (Iceman 2). The cause of death has been the subject of extensive pathologic studies for 3 years. The body was brought to the magnetic resonance (MR) scanner at Gela Alta after plain films to screen for intraorbital metallic foreign bodies and chest roentgenograms to exclude artificial heart valve or pacemaker.

MR of the head was performed in an experimental 2.08-T imager with a Gianturco coil and a three-dimensional spoiled gradient-echo sequence at 30/30/1 (repetition time/echo time/excitations), 16-cm field of view, no phase wrap disabled, phase in RL direction, and frequency in AP. The tubing and container for the gadolinium-containing contrast medium, which was not needed because of the deceased status of the subject, were placed eccentrically in the field of view. Images were acquired in the axial projection. Ear plugs were used and the power deposition was restricted to Food and Drug Administration guidelines. The MR center frequency was tuned to 88.7 MHz (PBS). For postprocessing, a model SSS 1040 Ultra High Speed buffer was used (1).

MR images revealed multiple well-defined high-signal-intensity curvilinear structures in the cerebral white matter (Fig 1A, B). The sulci and ventricles were normal for a patient preserved for 6000 years. The study was negative for a linguobuccal dislocation (2).

A brain specimen was acquired. The sample was fixed in formalin and stained with hematoxylin-eosin and examined under light microscopy. The microscopic examination revealed multiple cysts within the brain consistent with nematode infection (Fig 1C).

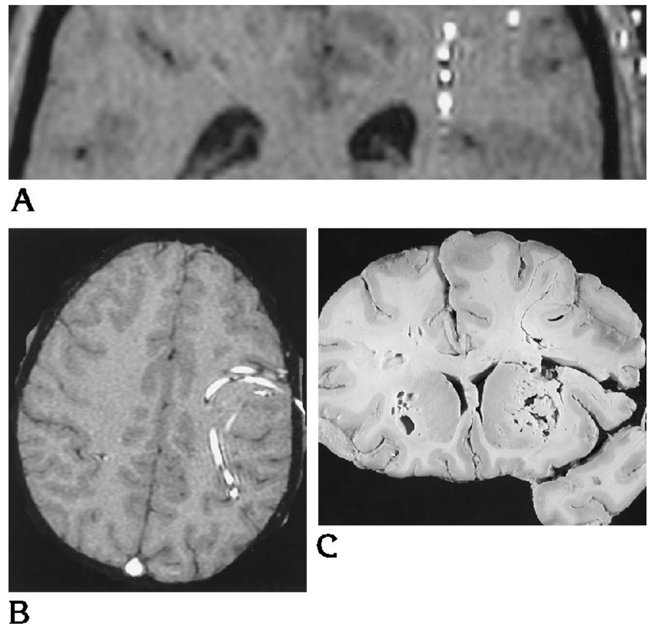


Fig 1. *A* and *B*, Axial MR images show a worm in the left hemisphere. The worm appears to have a low signal intensity in these images, while the contents of the intestines have a high signal intensity suggesting a paramagnetic substance, which has not been identified.

*C*, Brain section shows the multiple cystic spaces resulting from the worm infestation. In the differential diagnosis of such cystic changes is "Swiss cheese brain" caused by bacteria in the blood stream at death, which produce pockets of gas in brain tissue. During the fixation process, formalin penetrates the brain from the fluid interfaces at the rate of about 1 to 2 mm per day. Therefore, bacteria in the center of the brain continue to produce gas, which creates holes in the brain. However, in this case, since the brain was presumably frozen quickly, we excluded a postmortem artifact due to bacteria.

## Discussion

*Drancunculus borealis*, the arctic worm of the subclass Drancunculoidea of the phylum Nematoda is a large parasite found in whales, seals, and dolphins (1). Its intermediate host is the *Cyclops marinus*, or water flea. The larvae of *Drancunculus* are eaten by the water flea and form a worm. When the flea is ingested, it disintegrates, releasing the *Drancunculus* organisms, which bore through the intestines. The

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female reaches the subcutaneous tissues and forms a nodule, while the male infects other organs. The host is not adversely affected by infestation with the worm. The worm has been considered a possible cause of the disappearance of the dinosaurs. No imaging studies of cerebral Drancunculus infection have been reported, although fatal cases and subcutaneous infections have been described (3).

The MR findings clarify the cause of death. Probably the cadaver is that of a native who explored the caves in a glacier. At sufficiently deep levels in the glaciers, melt-water is present because of the elevated pressure of the ice above. The arctic worm probably flourishes in these melt-water regions. Contact with the melt-water likely leads to infestation and, in a susceptible host, rapid proliferation of the worm.

The differential diagnosis of multiple cystic regions in the brain is extensive. In this case, however, no evidence of cysticercosis, cryptosporidium, or *Trichinella* organisms was found. Infarction and demyelination were excluded on the basis of the pathologic examination.

The MR appearance of arctic worm infection is not specific. The appearance cannot be distinguished from other multifocal cerebral processes producing cystic spaces in the brain, from enlarged Virchow-Robbin spaces, or even from incidental nonspecific white matter changes or "leukoariosis." The presence of the high-signal-intensity material within the spaces in this case suggests that the intestines of the worm contain a paramagnetic substance. The diagnosis of *D borealis* infestation is therefore made by finding the typical MR changes in someone with symptoms of a cerebral infection and a history of exposure to glacial melt-water in an endemic arctic region. Infection in humans is rare because the human immune system reacts to the worm and because humans rarely come into contact with the glacial melt-water in which the worm is found.

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## References

1. Sobel DF, Larsen M, Zyroff J, et al. Buffing up MR images. *AJNR Am J Neuroradiol* 1993;13:301–302
2. Fasejus IM, Kidden J. A linguobuccal dislocation studied with MR. *AJNR Am J Neuroradiol* 1995;16:777–778
3. Hoeg P. Fröken Smillas fornemmelse for Sne (English translation: Smilla's sense of snow). Copenhagen: Rosinante/Munksgaard; 1992:436