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Observation of a Polar Bear with Rabies

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ABSTRACT: On 1 November 1989 the first confirmed case of rabies in a polar bear (*Ursus maritimus*) was encountered by Inuit hunters in the vicinity of Cape Kendall, Southampton Island, Northwest Territories (Canada). The adult male polar bear had posterior paralysis. Rabies was detected by mouse inoculation and a positive immunoperoxidase reaction on spinal cord and Gasserian ganglion from the bear. Histologic lesions in the lumbar region of the spinal cord were consistent with the posterior paralysis. The impact of rabies on the population dynamics of polar bears probably is minimal. Rabies in polar bears constitutes a potential health hazard for polar bear hunters.

Key words: Polar bear, *Ursus maritimus*, rhabdovirus, rabies, mortality, case report.

On 1 November 1989 Inuit hunters observed a polar bear (*Ursus maritimus*) dragging its hind legs at Cape Kendall, Southampton Island, Northwest Territories (Canada; 63°40′N, 87°10′W). The bear was shot and found to have fur rubbed off the thighs and rump, with superficial infection of the abraded tissue. The hunters skinned the bear and the carcass was allowed to freeze at the site where it was killed. The meat was not taken because of the abnormal circumstances. On November 27, a field necropsy was conducted. The polar bear had a thick layer of subcutaneous fat. Examination of the spine did not indicate trauma to any muscle or bone. There was no indication of hemorrhage except at the site of the bullet wound in the head. The internal organs showed no gross lesions. The head and portions of the spinal column were collected and sent to the Department of Veterinary Pathology, Western College of Veterinary Medicine, University of Saskatchewan (Saskatoon, Saskatchewan, Canada S7N 0W0).

Multiple skull fractures were associated with the gunshot wound. Histopathologic examination revealed moderate to severe mononuclear inflammatory cell cuffing of blood vessels and gliosis in the grey matter of the lumbar spinal cord. Immunoperoxidase testing (Wiktor et al., 1980) was strongly positive for rabies virus antigen in lumbar spinal cord and Gasserian ganglion sections. Brain was submitted to Agriculture Canada's Animal Disease Research Institute (Lethbridge, Alberta, Canada T1K 3M4) for rabies testing. The fluorescent antibody test (Dean and Abelseth, 1873) was negative, but a positive mouse inoculation test (Koprowski, 1973) at 16 days post-inoculation confirmed the presence of rabies virus. Typical negri bodies were not detected in the spinal cord, and no histological lesions were seen in the brain.

Approximately 620 polar bears are killed annually by Inuit from polar bear populations within or shared with the Northwest Territories. Most hunters recognize abnormalities in behaviour, morphology or anatomy of polar bears. Specimens are taken from abnormal animals and submitted through Renewable Resource Officers for veterinary diagnosis. Between 1978 and 1989, 366 canids, mustelids, felids, ursids and rodents were tested for rabies. Five of these were polar bears, all of which were negative for rabies. Seventy-two mammals were positive for rabies, and all were canids. Two foxes and one dog were diagnosed positive for rabies in the Coral Harbour area (Northwest Territories, Canada) in 1989.

Rabies has been observed in canids throughout the circumpolar basin. The ursids and canids are closely related (Kurten, 1964). However, rabies has not previously been reported in polar bears. Rabies has

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been identified in black bears (*Ursus americanus*) (Schoening, 1956; Tabel et al., 1974).

Rabies is enzootic in arctic fox in the Northwest Territories (Secord et al., 1980). Epizootics may occur in peak years of the 3 to 4 year population cycle (Secord et al., 1980; Ritter, 1981). The most probable source of rabies for polar bears is contact with an infected canid. Polar bears in the Hudson Bay area seek summer retreats on land when the sea ice melts (Stirling et al., 1977). During the summer retreat period polar bears subsist mainly on fat reserves augmented by token herbivory and scavenging (Lunn and Stirling, 1985). Rabies typically is transmitted by the bite of an infected animal, but transmission is also possible through ingestion of infected tissue (Soave, 1966; Rosatte, 1988). The polar bear may have been infected by a bite from a rabid fox, or by scavenging the carcass of a fox that had died from rabies. Rabies has been identified in seal (Odegaard and Koogsvud, 1981), a primary prey of polar bears, and infection may have occurred through consumption of infected seal tissue.

It is unclear why rabies has not previously been reported in polar bears. Polar bears that are infected or dead due to rabies may not be detected due to their low densities and preference for sea ice habitat.

Polar bears typically are solitary except during the mating season (Ramsay and Stirling, 1986, 1988). Their prey consists primarily of live seals and most carrion feeding also occurs on marine mammals (DeMaster and Stirling, 1981; Amstrup and DeMaster, 1988). Contact with infected canids appears to occur infrequently at present. As a result rabies does not appear to be a significant factor in polar bear population dynamics. Rabies is invariably fatal to the host organism (Gillespie and Timoney, 1987). If a significant number of polar bears became infected with rabies, both the population and the sustainable harvest could decline.

The meat of polar bears is eaten by Inuit people and all polar bears are skinned for the hide. Skinning and butchering is done without gloves, thus rabies in polar bears could pose some hazard to human safety.

We thank the hunters that found, reported, and relocated the polar bear. Thanks to their diligence and land skills, the polar bear was identified as rabid and all those exposed received post-exposure vaccination against rabies. We acknowledge B. Philibert, D. Middleton, and K. Loewen who made the diagnosis of rabies. Particular thanks to I. Stirling, P. Prentice, K. Elkin, the assistant editor, and two anonymous reviewers for their review and contributions to the manuscript.

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