Hawaii

IAAAM 2011

Kristi L. West[1]; Jeremiah T. Saliki[2]; Susan Sanchez[2]; David S. Rotstein[3]; Gregg A. Levine[4]; T. David Schofield[5]; Brenda A. Jensen[1]

[1]Hawaii Pacific University, College of Natural and Computational Sciences, Kaneohe, HI, USA; [2]University of Georgia, Athens Veterinary Diagnostic Laboratory, Athens, GA, USA; [3]Olney, MD, USA; [4]Kailua, HI, USA; [5]National Marine Fisheries Service, NOAA Pacific Islands Regional Office, Honolulu, HI, USA

Abstract

Morbillivirus outbreaks have had devastating impacts on naïve marine mammal populations in several regions of the world. Morbillivirus has not previously been identified from marine mammals in the central Pacific. This is the first report on the identification and preliminary characterization of morbillivirus from two beaked whales that stranded in Maui, Hawaii in the spring and summer of 2010.

One of the world's most poorly known whales, a Longman's beaked whale, stranded live at Hana, Maui in March of 2010. This young male died on site and a post mortem examination was performed the following day. Necropsy findings indicated that severe fractures of the mandible and maxilla likely impeded feeding. Histopathology findings included mandibular and maxillary osteonecrosis and fibrosis. A non-suppurative lymphoplasmacytic cerebral encephalitis was observed. The encephalitis was non-specific, but the pattern was indicative of an infectious cause. Despite no previous reports of morbillivirus in Hawaiian waters, follow up testing included known cetacean viruses, morbillivirus and herpesvirus.[1,2] Cerebrum, cerebellum, lung, spleen, thymus and various lymph nodes (mediastinal, scapular, mesenteric and colonic) tested positive for morbillivirus using RT-PCR. Partial sequencing of the phosphoprotein (P) gene revealed 89% similarity to pilot whale morbillivirus. Viral antigen was detected immunohistochemically in neurons in the brain and spinal cord.

On August 29th, 2010 a sub-adult male Hawaiian Blainsville beaked whale died after 12 days of rehabilitation effort. The whale presented weak and dehydrated. Initial bloodwork indicated that the whale was immunocompromised but seronegative for morbillivirus. The whale displayed clinical signs consistent with respiratory and gastrointestinal disease and therapy included antibiotics and gastrointestinal protectants. The necropsy and histopathology findings included a mixed bacterial and fungal (*Aspergillus fumigatus*) pneumonia, severe ulcerative gastritis and renal lesions. These gross findings were consistent with an immunosuppressed animal that finally succumbed to a severe pneumonia. Because of the previous findings of morbillivirus in the Longman's beaked whale (March 2010), frozen cerebrum, cerebellum, lung, spleen and various lymph nodes were again tested for morbillivirus using RT-PCR. All lymph nodes (mediastinal, scapular, tracheobronchial, mesenteric and anal) tested positive but the other tissues were negative. Sequencing of the P gene RT-PCR product indicated 90% similarity to pilot whale morbillivirus. However, alignment of the sequences from the two cases indicated that the two viruses were not identical.

These cases comprise the first reports of morbillivirus in marine mammals from the central Pacific. Other reports of morbillivirus in the North Pacific include the detection of this virus from stranded common dolphins in California, a Pacific white-sided dolphin from Japan and a pygmy sperm whale from Taiwan.[3-5] The surprising finding of morbillivirus in the beaked whales that stranded in Hawaii generates many questions about the history and prevalence

of this disease in this region of the Pacific. Future work includes a genetic characterization of the identified Hawaiian morbillivirus and an assessment of the potential impact of this disease on Hawaiian marine mammal populations.

Acknowledgements

We would like to thank Nicole Davis and the Maui marine mammal response network volunteers for their rapid response to the two beaked whale strandings. We also thank Dr. Jason Turner and the Hilo Cetacean Rehabilitation Facility staff and volunteers that cared for the Blainsville beaked whale. We are grateful to Whitney White, Susan Fertall White and the rest of the Hawaii Pacific University stranding response team. This work was supported by the Prescott Grant Program.

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Kristi L. West
Hawaii Pacific University
College of Natural and Computational Sciences
Kaneohe, HI, USA

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