

GA 706 – Hope – Report 2

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Our recently stranded pantropical spotted dolphin (*Stenella attenuata*), "Hope", has tested "positive" for morbillivirus infection. This is our first local stranding with this finding (a group of decomposing animals who drifted ashore last year that tested positive for morbillivirus were probably from the Louisiana area), and since there is a great deal of interest in both the animal and the disease, I have been asked to discuss morbillivirus disease, rather than the usual necropsy report.

Dolphin morbillivirus is closely related to the viruses that cause measles, canine distemper, and seal distemper, as well as several other similar diseases in a wide variety of animals. This family of viruses typically is spread by airborne droplets. Diagnosis in living animals is made using a serological (blood) test, and in the dead animal by demonstrating typical abnormalities, or lesions. Studies over the past few years (Duignan, et al, Can J. Vet Res 1992, 56:242-248) suggest that the virus is widespread in marine mammals without causing significant mortality. This conclusion comes from the observation of antibodies against morbillivirus in healthy animals. It is not known why some animals develop serious disease on exposure to the virus and others do not. It has been suggested that animals weakened by some other cause are more likely to become sick than otherwise healthy ones.

Study of dolphins dying with the disease indicate that the virus has at least three main tissue targets; the lungs, the brain and the lymphoid system. In the lungs it can cause a non-bacterial pneumonia. This may resolve, or may become chronic, associated with extensive fibrosis of the lungs. In the brain it causes an encephalitis, with loss of brain cells, demyelination (loss of the insulation of nerve fibers), gliosis (the brain equivalent of scar) with formation of characteristic giant

cells, and typical virus inclusions in the brain cells. Infection of the lymphoid system can cause a failure of the immune function, leading to an immunodeficiency state. When this happens, other organisms, not normally pathogenic, can grow on and in tissues and cause disease. One of the most common of these opportunistic organisms is the black fungus *Aspergillus*, which is a common cause of moldy bread, and is often found on the walls of shower stalls and other damp places. Growth of the fungus in the trachea, bronchi and lungs causes a condition called hemorrhagic pneumonitis which is usually fatal within 24-48 hours.

It is likely that a dolphin could survive morbillivirus pneumonia, just as a child can survive measles pneumonia, and return to normal. An organ like the lung, and probably the lymphoid system, can heal after the virus is overcome, and return to normal. The same is likely not true for infection of the nervous system. Inflammation of the nervous system may subside, and the virus cleared, but the damage is done. Although the animal may be in general "well", a damaged nervous system cannot restore itself, and with sufficient damage life-long impairment results. This is well recognized in many children who have survived an episode of measles encephalitis. Infection of the motor nerve cells of the spinal cord by the poliomyelitis virus has resulted in lifelong paralysis of arms and or legs in children and adults.

Did Hope have morbillivirus disease? She was positive by blood test, meaning that she has been exposed at some time in the past. This does not necessarily mean that she had an active infection or that her continued disability was caused by morbillivirus disease, although it may have been. She seemed well otherwise, and did not have signs of lung disease or infection. She had a very good appetite. Her behavior suggested nervous system injury, which could have been due to morbillivirus, but could as well have been due to parasites (flukes) burrowing into the brain. While the *Tursiops* we have seen have never had brain

parasitism, an earlier *Stenella* had worm eggs in the brain tissues. Brain parasitism was a major factor in dolphins (mainly *Delphinus*) stranding in southern California