Is subclinical Toxoplasma gondii in northern elephant seals (Mirounga angustirostris) a risk for rehabilitation?

Lauren Palmer DVM
Marine Mammal Care Center, Fort MacArthur
3601 S. Gaffey St.
San Pedro, CA 90731
(310) 548-5677
lpalmer@marinemammalcare.org
laurensptpl@aol.com

Co-Investigator
David Bard Director of Operations
Marine Mammal Care Center Fort MacArthur

3. Hypotheses and Objectives: The project objective is to determine the prevalence of positive serum titers to Toxoplasma gondii in stranded northern elephant seal pups (Mirounga angustirostris) in southern California with the objective of identifying subclinical infections and possible threats to successful rehabilitation.

4. Experimental Plan: The experimental plan would determine the prevalence of antibody titers to T. gondii from paired sera collected from stranded northern elephant seal pups (Mirounga angustirostris) presented to the Marine Mammal Care Center Fort MacArthur (MMCC/FM), San Pedro, CA. Each spring between 75-90 post-fasted elephant seal pups are admitted for rehabilitation and the number of elephant seal pups admitted has been increasing annually for each of the past 5 years. For this study blood samples would be collected on admission and prior to release and the paired sera would be assayed for antibodies using the immunoflourescent antibody test (IFAT) to T. gondii at the CAHFS Lab of University of California, Davis, CA. The prevalence of positive titers to T. gondii would be determined using Statistica software. The statistical correlation, if any, between titer, gender and survival would be evaluated. A minimum sample size of 75 animals would be expected if future strandings follow recent stranding patterns. Histopathological findings in deceased animals with both positive and negative titers to T. gondii would be evaluated by Dr. Judy St. Leger. Twenty five necropsy cases are expected. David Bard would assist with sample collection at the MMCC/FM.

5. Significance to oiled wildlife health: Antibodies to T. gondii, a zoonotic, intracellular parasite, have been identified in several marine mammal species by serosurvey including northern elephant seals.\textsuperscript{1,2} T. gondii induced encephalitis has been identified as a significant cause of mortality in California sea otters \textsuperscript{3,4} a northern elephant seal,\textsuperscript{5} a rough toothed dolphin,\textsuperscript{6} as well as other species along the Pacific coast\textsuperscript{7,8} and Hawaii.\textsuperscript{9,10} Post fasted elephant seals inhabit much of the same California coastal area as southern sea otters and may be exposed to similar infectious pathogens. The proposed study would establish the prevalence of antibodies to T. gondii in northern elephant seal pups stranding in southern California and evaluate whether stressful conditions such as those that occur during rehabilitation create an opportunity for subclinical T. gondii infections to affect successful rehabilitation of northern elephant seals during spill events.
Recently, a stranded, non-releaseable northern elephant seal that had been at the MMCC/FM for several months was identified on routine serology as having a positive titer to *T. gondii* but was asymptomatic. This animal subsequently died within 6 days of transport of *T. gondii* induced encephalitis. The timing of this animal’s death, without prior clinical symptoms, suggested that transport induced stress fostered a favorable physiological state for *T. gondii*. The survival rate for this cohort of stranded elephant seals at the MMCC/FM was 85% and mortality in this individual was unexpected. This case presented rehabilitators with the possibility that *T. gondii* could be a cause of mortality in stressed animals, as might occur during rehabilitation after petroleum exposure. The project objective would support the OWCN’s Research and Technology Program by investigating medical conditions that might affect successful rehabilitation of northern elephant seals during a spill event. While northern elephant seals do not currently represent an endangered population, their pupping grounds could be severely impacted by an oil spill off of the California coast.