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Pathogenesis of *Streptococcus infantarius* subspecies *coli* valvular endocarditis in sea otters

The drastic decline of northern sea otters (*Enhydra lutris kenyoni*) in southwestern Alaska has resulted in them being listed as threatened. Valvular endocarditis due to *Streptococcus infantarius* subspecies *coli* is a major problem in the northern sea otter population where 50% of 130 fresh carcasses collected over the past three years have had valvular endocarditis. Valvular endocarditis and septicemia have also occurred in southern sea otters (*Enhydra lutris neretis*) in two cases. The objectives of this study are to carry out the first efforts at identifying a source of *S. infantarius ss coli* and identify genotypic and pathogenic differences between *S. infantarius ss coli* isolates. We hypothesize that *S. infantarius ss coli* isolates from vegetative endocarditis lesions are more virulent than isolates obtained from healthy animals and are therefore more capable of adhering to epithelial and endothelial cells and surviving in macrophages. Additionally, we hypothesize that prey species carry *S. infantarius ss coli* and can be a source for colonization of sea otters. The specific aims of this project include: 1) examining sea otter prey species from the Californian and Alaskan coasts for *S. infantarius ss coli*, 2) comparing the genotype of *S. infantarius ss coli* isolates from Steller sea lions, sea otters affected and unaffected by valvular endocarditis, and sea otter prey species, and 3) investigating the virulence of *S. infantarius ss coli* isolates by comparing their ability to survive in macrophages and to adhere to endothelial and epithelial cells. Sea otter prey species will be collected from Kachemak Bay, Alaska and Monterey Bay, California and cultured for *S. infantarius ss coli*. Isolates of *S. infantarius ss coli* from Steller sea lions, sea otters affected and unaffected by valvular endocarditis, and sea otter prey species will be genotyped using pulsed-field gel electrophoresis. Established mouse macrophages and human and mouse epithelial and endothelial cell lines will be used in macrophage survival and endothelial and epithelial cell adherence assays, and the investigators will attempt to develop primary macrophage, epithelial, and endothelial cell lines from sea otters or mink, a closely related species, for use in survival and adherence assays. Northern and southern sea otter populations are highly susceptible to the effects of oil contamination. *S. infantarius ss coli* valvular endocarditis is already active within the sea otter population and the stress of oiling and the rehabilitation process could result in an increased incidence. Very little is known about this disease, and understanding its pathogenesis will improve the care provided to oiled sea otters by directing appropriate antimicrobial use for prevention and treatment of infection. Identification of potential routes of entry will aid in preventing spread of the disease. Detection of differences in virulence properties in isolates from healthy animals and/or the environment with those that cause disease will help us to understand whether a highly pathogenic strain(s) is active within the sea otter population or that any isolate has the potential to cause disease and any stressed sea otter is at risk to develop valvular endocarditis.