

The effect of rehabilitation on antibiotic resistance of gastrointestinal bacteria in elephant seals

Rehabilitation of marine mammals during an oil spill involves treatment of clinical conditions induced by exposure to oil, as well as supportive care of the animal prior to its release. Such treatment often involves use of antibiotics. Certain commensal bacteria, such as *Escherichia coli* and *Enterococcus faecium*, are known to have a pronounced ability to acquire and disseminate antibiotic resistance, especially in the face of antibiotic usage. The resistant bacteria can pass on resistance to pathogenic bacteria within the gastrointestinal tract or in the environment once they are shed. Antibiotic resistant bacteria are a concern because they limit the treatment choices for bacterial infection in animals and humans and cause an increase in mortality, morbidity, and cost of treatment. This project will determine if antibiotic usage during rehabilitation of marine mammals alters the antibiotic sensitivity of bacteria within their gastrointestinal tract, increasing the prevalence and spectrum of antibiotic resistance in bacteria subsequently returned to the wild with the rehabilitated mammal. Specifically, it will establish the prevalence and spectrum of antibiotic resistance in *E. coli* cultured from northern elephant seals (*Mirounga angustirostris*) upon presentation to rehabilitation and the effect of antibiotic treatment. The effect of specific antibiotic combinations, therapeutic regimes, and clinical conditions in stranded northern elephant seals on the prevalence and spectrum of antibiotic resistance in *E. coli* will be determined. In addition, the prevalence of *E. coli* antibiotic resistance in stranded seals, both entering rehabilitation programs, and upon release, will be compared to that in age matched free-ranging northern elephant seal from two different colonies along the California coast. Elephant seals haul out for months each year during the molting and breeding season; therefore, they would be severely impacted by oil spills forming slicks on the coast at these times. This also makes them easily accessible for sampling, which can be done while the seals sleeping or resting on the beach without use of restraint, causing minimal disturbance. Northern elephant seals are also commonly rescued for rehabilitation and given antibiotics, allowing study of the effect of antibiotic treatment on resistance of *E. coli*. An understanding of the effects of antibiotic usage during rehabilitation on the development of antibiotic resistant bacteria is needed so that rehabilitation protocols for oiled seals can be developed that do not potentiate a problem that can impact the health of both marine mammals and humans.

