Measuring and Validating Levels of Steroid Hormones in the Skin of Bottlenose Dolphins (Tursiops Truncatus)

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LONG-TERM GOALS

Our research group, under PI Thea Bechshøft, has recently shown that it is possible to extract and measure hormones in cetacean skin (Bechshoft et al. 2015). The goal of this project is to expand on the developed method by extracting and quantifying the concentration of a wider range of steroid hormones in cetacean skin, including corticosteroids, estrogens, androgens, and progestagens.

OBJECTIVES

At the conclusion of the project period, we expect to have produced a validated method for assessing a broad range of steroid hormones in cetacean skin. The analyses results are expected to provide a greater understanding of, in skin from bottlenose dolphins (*Tursiops truncatus*), a) the influence of age and sex on progestagens, estrogens, and androgens, b) the relationship between serum and skin concentrations of aldosterone, c) how long it takes for aldosterone , corticosterone, and cortisol to be measurable in the skin following an acute stressor; and d) baseline levels of corticosteroids in skin, as well as inter- and intra-individual fluctuations.

APPROACH

The project is executed under PI Dr. Thea Bechshoft, in collaboration with Dr. Dorian Houser (National Marine Mammal Foundation, USA), Dr. Bjarne Styrishave (Copenhagen University, Denmark), and Dr. Andrew J. Wright (George Mason University, USA and Aarhus University, Denmark).

The project described here is complementary to another currently ongoing project: "Validating the novel method of measuring cortisol levels in cetacean skin by use of an ACTH challenge in bottlenose dolphins" (Award Number: N000141310771). The dolphins will be sampled as part of an ongoing out-of water stress test and stress hormones study conducted by Dr. Dorian Houser in collaboration with the U.S. Navy Marine Mammal Program (MMP) under ONR project N000141110436. Non-invasive skin samples will be collected from a total of five animals at three points in time: pre-stress test, at time of the stress test, and post-stress test. Please see the FY15 report for project N000141310771 for

further details. The skin samples obtained from the bottlenose dolphins will, under the steroid hormone project (N000141512187) and based on the method described by Bechshoft et al. (2015), be analyzed for a broad range of hormones, including corticosteroids, estrogens, androgens, and progestagens. All skin samples will be analyzed at the University of Copenhagen, Denmark, at the laboratory that developed the original method for analyzing cortisol in cetacean skin (under Award Number N000141210896; Bechshoft et al. 2015).

WORK COMPLETED

All sampling has been succesfully completed. The resulting skin samples have been shipped to the University of Copenhagen, where the hormone analyses are currently ongoing.

RESULTS

Hormone analyses are currenlty ongoing. Results are expected by February 1st, 2016, after which statistical data analysis will ensue.

IMPACT/APPLICATIONS

A validated method for assessing steroid hormones in non-invasively collected cetacean skin samples will bring new possibilities for the assessment of stress and general health in cetaceans, opening up a new avenue of research in physiological response studies.

REFERENCES

Bechshoft T, Wright A, Weisser JJ, Teilmann J, Dietz R, Hansen M, Björklund E & Styrishave B. Developing a new research tool for use in free-ranging cetaceans: recovering cortisol from harbor porpoise skin. *Conservation Physiology*, 3: doi:10.1093/conphys/cov016