



MYSTIC AQUARIUM
INSTITUTE FOR EXPLORATION

Review of
"Stress in Mammals: the potential influence
of fisheries-induced stress on dolphins in the ETP"

General Comment:

The review systematically documents all the known changes associated with the stress response in cetaceans, with appropriate references to other mammals. What is needed in many cases is some perspective of the time course of these changes. It is critical that the reader be given a sense of the reversibility of many of the changes that are discussed. Temporary changes in some constituents may be of little consequence to the integrity of the organism. In some instances, the lack of a response may be more significant than adaptations that impart survival benefits. For example, it might be accurately stated that thyroid hormones are lowered in stress, thyroid hormones are necessary for growth and development, therefore stress disrupts growth. What is missing is how long the hormones are decreased, and how long must they be decreased to have the stated effect on growth. Much of this information probably does not exist, but some context needs to be provided to avoid hastily-drawn conclusions.

Substantive Comments

p. 17, Section d., first sentence. Cortisol is continuously circulated in the bloodstream. When stimulated, the adrenal gland releases glucocorticoids such as cortisol (corticosterone in rodents) leading in most cases to detectable elevations in circulating levels. The first sentence gives the impression that cortisol is only circulated at stressful times.

p. 17, Section d., third sentence. The amount of bound cortisol varies among species. In humans and seals, the levels are as presented. Work in my laboratory (unfortunately unpublished) some years ago suggested that far less cortisol is bound in cetaceans. This appears to account for the fact that small changes in total cortisol in dolphins and belugas result in clear changes in constituents responding to cortisol, i.e., the levels of free cortisol show a proportionally larger change.

p. 24, last paragraph. The fact that radioimmunoassay was used in the indicated study is of no particular significance. Every other study cited (from my laboratory, and likely most of the others as well) used radioimmunoassay to measure adrenal and thyroid hormones. The statement in this sentence might

suggest to the reader that this was a novel approach, unique to this particular study.

last complete sentence. "Similar to the study..." This investigation did not identify short-term changes in thyroid hormones. It compared momentary levels in different groups of animals at different times of the year. Increased levels of rT3 concurrent with lowered T3 are characteristic of a stress response, since they are a consequence of the short-term influence of cortisol. Higher levels of rT3 on their own are a bit of a puzzle, and were explained in terms of the kinetics of thyroid hormone metabolism, whereby for some unknown reason the animals are diverting more T4 to rT3. This is not considered to be a stress response. The thoughts presented in this paragraph are quite jumbled and potentially confusing to the reader.

p. 35 and p. 57. It is puzzling that Cowan and Walker's study is mentioned in the Discussion but not in the earlier treatment of capture myopathy. The fact that they observed no evidence of capture myopathy is important. To state later that examination of kidney and heart would be required to complete the diagnosis misses the point. "Myopathy" is damage to muscle. Other lesions may be found as part of the syndrome, but if the muscle damage is not there, I find it difficult to refer to the syndrome on the basis of the other changes alone. This treatment give the impression of selective use of the information from a biased or predetermined perspective.

p. 40, last paragraph. The studies on white sided dolphins and beluga whales involve very different groups of animals, a point that needs to be developed in what is otherwise an oversimplification of the findings. The former were taken from a group that mass stranded, and are thus considered to be relatively fit animals. The pathogenesis of adrenal lesions in these would be very different from that in the beluga whales, which were all single-stranded and in general suffering from advanced, chronic disease (infection, neoplasia). The findings of hyperplastic nodules and cysts are mixed together in your treatment, though there is no agreed connection between the two. Stress may be seen as a unifying mechanism producing the conditions, but I don't believe you've made enough of a case as presented.

p.48, last paragraph. Stress can indeed interrupt lactation, though it is paradoxical that prolactin levels are elevated in some cases during stress. It is not enough to state that prolactin levels are "altered", giving no sense of the magnitude, direction or duration of the changes.

p. 59 first paragraph. I seriously doubt that meaningful information could be derived from immunohistochemistry of lymphoid tissues, relative to the stresses encountered in the lives of these animals. Without any other information on chronic or acute diseases, social status (intraspecific competition), contaminant burdens, nutritional state, or a host of other factors

potentially affecting immune status, it would be impossible to associate selected deficiencies in immune constituents with the capture issue.

Grammatical and Typographical

p. 10, line 1 - extra "in"

p. 19, line 2 - Carol Thomson's name, spelled correctly in the Literature Cited, is misspelled almost everywhere else.

p. 19, line 11. Spelling of "reabsorption"

p. 20, last sentence. "acting to realign"

p. 24, line 12. Spelling of "indicate"

p. 52, second paragraph. The effects of stressif stress affects milk quality

p. 57. First sentence of the one whole paragraph has no principal clause

p. 58, line 11. ...a significant effect on the reproductive success

p.59, line 19. were unable to adjust ...



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