

HEMATOLOGIC, BIOCHEMICAL AND HORMONAL FINDINGS OF BELUGA WHALE, *DELPHINAPTERUS LEUCAS*, FROM OKHOTSK SEA

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ABSTRACT

In 2009, Severtsov Institute of Ecology and Evolution of Russian Academy of Sciences initiated a long-term White Whale Program. Abundance, distribution and movement studies, genetic analysis, and health assessments are being conducted. Last summer, our research concentrated on the Okhotsk Sea beluga whale population and included satellite tagging, aerial survey, biopsy sampling for mtDNA and microsatellite genetic analysis. The objective of the health assessment study was to obtain hematological, biochemical and hormonal findings in free-ranging belugas summering around Chkalov and Baydukov Islands, Sakhalin Bay, the Okhotsk Sea.

Blood samples were collected from the belugas caught for tagging as well as from the animals caught for the oceanaria. Here, we report on hematological, serum and plasma chemical constituents in 23 samples obtained from 20 beluga whales between July 22 to August 5, 2009 (4 belugas were handled for tagging and 16 were captured for exhibit or research). For three of four animals that were captured for tagging, the samples were obtained before and immediately after the tag deployment procedure. All animals were examined for length, axillary girth, blubber thickness (determined by ultrasound in cervical area), color of skin, tooth size (if present), sex, and external pathologies (e.g., extensive skin lesions, orogenital lesions, emaciated body conditions, buoyancy, posture, respiratory parameters). The whales were categorized as immature or mature-sized based on body length criteria. Skin color also provided some indication of age. All white animals were considered mature.

We analyzed samples from 14 males (2 mature and 12 immature) and 6 females (3 mature and 3 immature). Beluga whales were captured by encircling them with a net. Two belugas were restrained in the shallow water immediately after capture for examination, tagging and collection of blood samples. Other animals were transferred to a floating sea pen for further investigation, sampling and adaptation (16 animals) or for tagging, sampling and release (2 animals). For this group of animals, we had different intervals of time between capture and sampling (1hour - 10 days). Mature female belugas received ultrasound examination to determine pregnancy status. One appeared to be pregnant and was immediately released. Blood samples were drawn from the periarterial venous rete in the fluke. Blood was collected in vacutainer tubes for hematology, serum and plasma separation.

On site, manual hematological techniques were applied for leukocyte, erythrocyte, relative leukocyte determinations, and erythrocyte sedimentation rate. Concentrations of serum chemistry analytes were determined in laboratory with automated analyzers and included analyses for electrolytes, metabolites, enzymes, proteins (including serum protein

electrophoresis). Thyroid and steroid hormones were determined by radio-immunoassay. Serum lactate dehydrogenase (LDH) isoenzyme patterns were analyzed by electrophoresis in all samples. A manual method based on PPD-oxidase assay was used for the determination of ceruloplasmin (minor acute phase protein for mammals). Analyses on serum specific antibodies against zoonotic disease agents, such as *Toxoplasma* sp., *Brucella* sp., morbilliviruses, and influenza A virus are currently being carried out.

Our sample sizes of samples for different intervals of time after capture, mature and immature, male and female, pregnant and dry belugas, tagged and intact animals, healthy and supposedly ill animals were small. Despite an overall sufficient sample size, representation from the above subgroups was far from uniform, which limited the options for statistical comparisons designed to elucidate the effects of these variables without the complication of multiple interactions. To maximize the value of the full data set, we combined values from males and females when no sex-related differences were noted, and allowed comparison of immature and mature animals. Hematological, serum and plasma chemical data obtained from all belugas were summarized.

Data for several hematological, serum and hormonal parameters have been earlier reported for free-ranging beluga whales.^{1,2,3} In the current study, the values for hematologic, biochemical, protein electrophoresis and hormonal parameters fell, with few exceptions, within the ranges described in previous studies of free-ranging beluga whales. The concentrations of cortisol were higher, and creatinine and bilirubin concentrations were lower compared to those previously reported for beluga whales; remaining results were strikingly similar. The current study is the first extensive health examination of the Okhotsk population of the beluga. In addition to the mentioned analyzes, our study also included LDH isoenzymes activity and ceruloplasmin (Cp) determinations, which to our knowledge have not been previously described. The quantification of the concentration of Cp and LDH isoenzymes appears to be a valuable tool providing diagnostic information on different pathologies in cetaceans. The obtained data provide valuable serum chemistry reference intervals for future health assessments of belugas in the Okhotsk Sea and other beluga populations. The extensive set of hematologic, biochemical and hormonal parameters described in this study can be used as a screening tool for health assessments. In the future, we plan to extend our investigations of free-ranging beluga health to include microbiological, cytological, parasitological and toxicological studies.

LITERATURE CITED

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