

RESEARCHING RESPIRATORY PHYSIOLOGY & MEDICINE in DOLPHINS

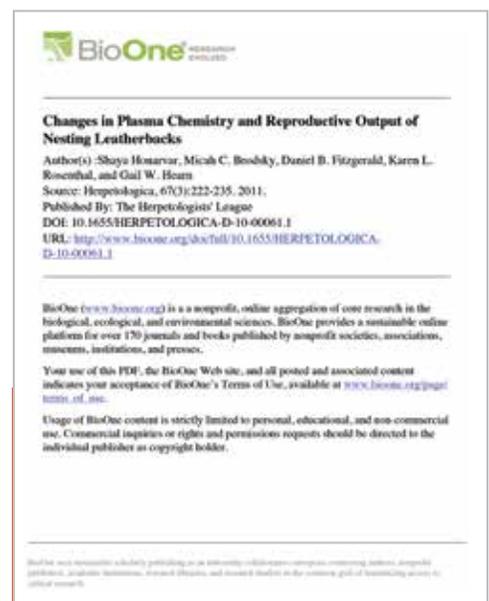
Contributing Author:

Dr. Micah Brodsky
Michah Brodsky, VMD Consulting



CONTRIBUTING AUTHORS

IN August 2014, Dr. Andreas Fahlman (Texas A&M University – Corpus Christi) (TAMUCC), Dr. Micah Brodsky (Michah Brodsky, V.M.D. Consulting), and collaborators from Dolphinaris (Dr. Leonardo Ibarra, Mr. Carlos Camarena, Dr. Raul Fuentes, and Dr. Esmeralda Sepúlveda) came together in Quintana Roo, Mexico, to continue developing effective lung function testing in cetaceans (dolphins and whales). This project is part of a long-term study that includes collaborators from academic institutions, conservation organizations, zoo's and aquariums around the world, including Dolphinaris.



Please visit
abaxis.com/vetcom/volume-55/
to download the complete white paper.



Dolphins and whales are mammals, with similar respiratory anatomy to their terrestrial counterparts, however they routinely perform amazing feats of physiology. Some species can dive thousands of meters deep (the maximum recorded dive is deeper than 2900m) and hold their breath for up to two hours, while actively hunting. When they return to the surface the demands placed on their respiratory system are extreme. Dolphins can exchange up to 95% of their lung volume in a single breath (compared to approximately 50% in terrestrial mammals), with peak expiratory flows over 200 l/s reported in the literature. That flow rate is more than 10 times faster than a human, and approximately 2.5 times faster than a galloping horse (the respiratory super hero of terrestrial mammals).

The research team is working to develop minimally invasive testing methods for measuring respiratory parameters under physiologically normal conditions. In addition to providing key information on diving physiology, respiratory physiology, and measuring metabolism, this work has significant implications for clinical medicine. Respiratory tract disease is one of the most important causes of morbidity and mortality in wild dolphins and whales, as well as in collection animals. While lung function testing is routine in human physiology and medicine, testing dolphins presents numerous unique challenges that have historically precluded utilization of this important diagnostic tool. The methods developed by this team are likely to prove extremely valuable in the triage and evaluation of stranded marine mammals, providing critical, real time information on respiratory disease, metabolic derangement, and ventilatory disturbances that inform decisions on euthanasia, attempted rehabilitation, or attempted “immediate” release of these majestic animals.

With support from Abaxis, and our dedicated colleagues at Dolphinaris, we were recently able to test different techniques, and to identify novel approaches for obtaining arterial blood (this is extremely challenging in dolphins because of their vascular anatomy). The ability to estimate arterial blood gasses from respiratory gasses will allow for non-invasive real time assessment of blood gasses. In addition, the work supported by Abaxis brings us closer to accurately characterizing the respiratory system of marine mammals and to validating our methodology and custom built equipment.

Like most wildlife, dolphins mask clinical signs of illness until they are very sick. Developing diagnostic tools with the potential to provide early diagnosis and localization of respiratory disease, in real time, is critical for enhancing



our ability to provide cutting edge medical care for animals under direct human care. The physiological information we gather from these animals can be applied to free ranging, wild dolphins and whales, stranded animals, and those in rehabilitation. Understanding the normal, baseline physiological function of dolphins and whales has significant implications for conservation in the rapidly changing environment of the world's oceans.

