Establishing Death in Stranded Odontocetes (Toothed Whales) Using Other Mammals: A Pilot Study

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Abstract

The aim of this study was to investigate and evaluate a new method for determining death in stranded odontocetes (toothed whales). The new method was using the pulsations seen in the retinal blood vessels in the place of the heart rate. The retinal blood vessels can visualized, using an ophthalmoscope, in the fundus of the eye. Initially the procedure was to be testing using animals at a mass stranding, but there were no suitable strandings that took place during the time of the study.

Therefore other mammal species were used to test the procedure. These mammals were cattle, sheep, and dogs, with additional observational testing carried out on seals, sea lions and dolphins. The mammals were chosen because of their availability and supply.

The results showed that there was a strong relationship between the heart rate and the pulsations measured in the retinal blood vessels. This was expected as the cardiovascular system is connected and pulsations of blood vessels must have originated from the heart. The results using dogs, also indicated that there is a relationship between the cessation of the pulsations in the retinal blood vessels and the cessation of the heart beat. Dogs were used as a benchmark by which all other mammals could be compared.

Therefore this study indicates that it is possible to identify the cessation of the heart using the cessation of the pulsations in the retinal blood vessels

General Introduction

Cetacean (whales, dolphins and porpoises) strandings have been recorded since Aristotle 2000 years ago (Geraci 1978) and have provided intrigue and interest for both scientists and the general public since that time. Strandings can be divided into two categories, single strandings and multiple or mass strandings (Geraci 1978, Robson 1984, Dawson 1985). Single strandings occur in many species throughout the world, and have provided valuable scientific information (Odell 1987). But it is mass or multiple strandings, which can involve hundreds of individuals, that rouse the highest level of interest. This type of stranding happens only in certain parts of the world and regularly involves only certain species (Odell 1987), all of which are social odontocetes (toothed whales) (Geraci 1978).

At a mass stranding where seemingly healthy animals came ashore while still alive, 80% of those animals that strand will not survive (Mazzuca *et al* 1999). Therefore it is very important to be able to make accurate judgements about an animal's state of health in order to improve the overall welfare of the animals at a stranding. Unfortunately the 'usual' methods for determining death in mammals are difficult to apply to cetaceans, because of a number of anatomical and physiological features (Pabst *et al* 1999) that they have. This accurate assessment of their state of health is not a straight forward exercise.

The aim of this study is to investigate and evaluate a new method of determining death using pulsations in the retinal blood vessels. The intention was to examine recently stranded whales, however over two years far fewer than the average number of strandings occurred, and the one or two that did were not accessible in time. Accordingly the measurement was tested using dogs, sheep and cattle with additional observational testing carried out on seals, sea lions and dolphins. In order to fully understand how this technique can be assessed it is important to understand the complexity of the cetacean cardiovascular and visual systems, and these are compared with those species used to test the procedure.

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