

## Bisalbuminemia in a dolphin associated with elevated plasma cholesterol

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### Summary

Bisalbuminemia associated with elevated plasma cholesterol of a healthy bottlenosed dolphin (*Tursiops truncatus*) is reported.

### Introduction

The main proteins in the serum are albumin and globulin. Electrophoresis is the method of choice for fractionation of the serum proteins, based on the rate of the proteins movement in an electric field. The fraction of the albumin in electrophoresis was found to be usually most homogenic (Bloom, 1960; Coles, 1968; Phillips *et al.*, 1976). Mahaux & Delcourt (1949) and Glatthaar (1951) reported on the presence of two distinct serum albumins (bisalbuminemia) in human. The phenomenon appeared to be very rare in humans and animals (Phillips *et al.*, 1976; Pola & Tichy, 1985). The only publication on bisalbuminemia in aquatic mammals we could find in the literature, was the report of Medway (1979) about a female dolphin.

In this paper we report on bisalbuminemia in a healthy male bottlenosed dolphin, associated with an elevated level of plasma cholesterol.

### Case report

A total of 21 routine hematological investigations were carried out over a period of 4½ years in our animals. The following parameters were checked: Sedimentation rate, Red-cell count, Hemoglobin, Packed cell volume (hematocrit), Mean corpuscular volume (MCV), Mean corpuscular hemoglobin (MCH), Mean corpuscular hemoglobin concentration (MCHC), Leucocyte count (WBC), Differential leucocyte count, Blood urea nitrogen (BUN), Creatinine, Uric acid, Calcium, Phosphorus, Sodium, Potassium, Chloride, Total protein, albumin and globulin, Protein electrophoresis,

Bilirubin, Direct bilirubin, Cholesterol, Total lipids, Triglyceride, Alkaline phosphatase, SGOT, SGPT, LDHG, Amylase, CPK,  $\gamma$ GT, Cortisol, T-3, T-4, Progesteron, Testosterone, Protine and APTT.

In repeated blood examinations of an approximately 10 year old male bottlenosed dolphin (*Tursiops truncatus*) bisalbuminemia was found by means of electrophoresis (Figs 1 and 2). The relative proportions of the 2 albumin components was 1:1.1. The means of the total albumin levels was 4.43 and the total globulins 2.37.

Plasma cholesterol levels varied from 308 to 744 mg per 100 ml.

Other parameters of the various blood tests were normal. The animal was healthy and kept in captivity for 4½ years together with other non-related bottlenosed dolphins.

### Discussion

Bisalbuminemia is defined as a congenital abnormality characterized by the presence of two distinct serum albumins which differ in their electrophoretic mobility (Dorland's Illustrated Medical Dictionary, 1974). Bisalbuminemia was first reported in 1949 by Mahaux & Delcourt. The phenomenon was proved to be inherited (Knedel, 1957), and found to be a rare condition in humans and animals (Francis *et al.*, 1985; Phillips *et al.*, 1976; Pola & Tichy, 1985). Only 6 cases of bisalbuminemia in humans were found in approx. 250,000 blood samples that we checked.

Transient bisalbuminemia was reported in patients treated with high doses of antibiotics of the beta-lactamic group as penicillin and ampicillin, and in patients suffering from certain diseases, as diabetes mellitus and pancreatitis. The bisalbuminemia in these cases disappeared after therapy (Arvan D. A. *et al.*, 1968; Keidar *et al.*, 1981; Lapresle & Wal, 1979; Masciangelo *et al.*, 1981; Pola & Tichy, 1985; Wuhmann, 1959).

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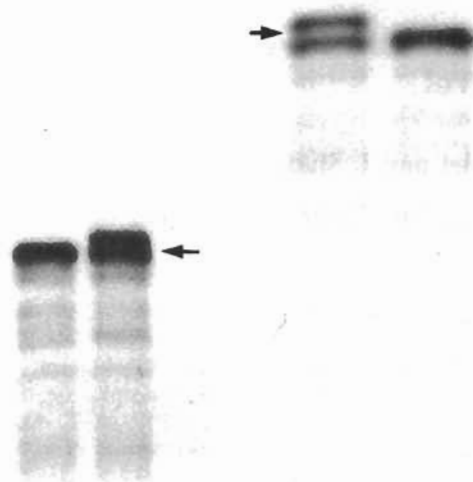


Figure 1. Two distinct serum albumin bands (arrow) in a bottlenosed dolphin, compared with normal albumin of another dolphin, determined by agarose electrophoresis (Helena Laboratories, Beaumont, Texas).

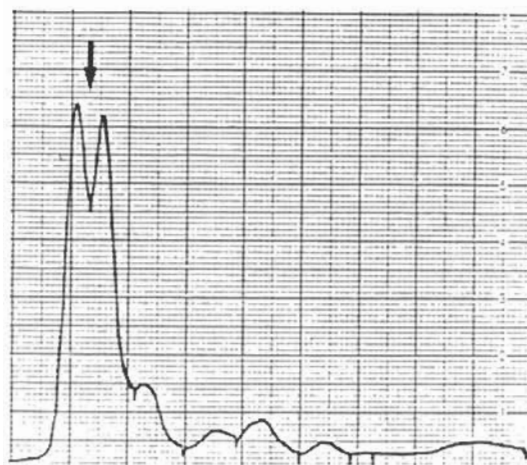


Figure 2. Electrophoretic pattern of a dolphin's serum, presenting bisalbuminemia (arrow).

Most genetically altered proteins do not cause pathologic conditions unless the protein normally found is not produced at all (Carstens *et al.*, 1986).

Medway (1979) reported on bisalbuminemia in a female bottlenosed dolphin. There was no association with any disease in this animal. Our observation in the male dolphin, is the second report of bisalbuminemia in aquatic mammals. The total albumin levels found in our bottlenosed dolphin (4.43) was in the frame of the normal values cited in the literature (Ridgway, 1972; Bossart & Dierauf, 1990).

Although our animal was healthy, repeated blood investigations showed that the levels of plasma cholesterol (308–744 mg/100 ml) were significantly higher than those found normally in other bottlenosed dolphins (Ridgway, 1972; Bossart & Dierauf, 1990).

We considered the abnormal albumin and the high cholesterol-levels to be independent, although they should be congenital abnormalities.

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