HAEMATOLOGY AND BIOCHEMISTRY BLOOD PARAMETERS OF JUVENILE HAWKSBILL TURTLES (*Eretmochelys imbricata*)

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Introduction

The Hawksbill turtle (*Eretmochelys imbricata*) is classified as critically endangered [1]on the IUCN red list meaning it is at high risk of becoming extinct in the wild. The main causes for the decline hunting, egg collection, destruction of foraging and nesting habitats and oil pollution. Juvenile Hawksbill turtles wash up on the Gulf shores of the UAE coastline mainly in the winter months of December to February. These turtles are usually debilitated which is characterised by an above normal epibiont coverage (Figure1 and 2). The Dubai Turtle Rehabilitation Project aims to restore these amazing animals to health and release them back into the environment. Following rehabilitation the animal is given a physical examination and a blood sample is taken to ensure the animal is fit for release.

Materials and Methods

From October 2008 until May 2009 blood samples of 57 rehabilitated juvenile Hawksbill turtles were examined. A minimum of 0.5ml of blood was obtained from the supravertebral sinus with a 23 gauge needle and 2.5 ml disposable syringe and placed in lithium heparin tubes. Prior to centrifuging, haemoglobin (Hb) was measured using the Hemocue® B-Hemoglobin analyzer. Packed cell volume (PCV) was measured with a micro-haematocrit reader and the remaining haematological parameters were differentiated and counted manually (Table 1).
In June 2009, 22 of the 57 juvenile Hawksbills were released into the off-shore waters of Dubai (Figure 3). In addition to haematology, biochemistry measurements were also assessed using the Abaxis® VetScan Classic Analyzer (Table 2). Normally, for economic reasons, biochemistry parameters are only measured in sick animals. Blood samples contaminated with lymph were discarded.

Results

Table 1. Average haematology values for rehabilitated juvenile turtles prior to release n=57

Hb (G/DL)	PCV (%)	WBC (109/L)	H (%)	L (%)	M (%)	E (%)	B (%)	A (%)
6.81 ±1.74	16.19±3 50	2.41 ±0.73	73.26 ±5.29	17.25 ±8.20	2.42 ±2.46	0.33 ±0.76	0.37 ±0.96	6.39 ±6.35
(3.6-11.7)	(10-24)	(1-4.5)	(56-90)	(4-43)	(0-7)	(0-4)	(0-4)	(0-20)

Table 2. Average biochemistry results for rehabilitated juvenile turtles prior to release n=22

AST (U/L)	CK (U/L)	UA (MG/DL)	GLU (MG/DL)	CA++ (MG/DL)	PHOS (MG/DL)	TP (G/DL)	ALB (G/DL)	GLOB (G/DL)	K (MMOL/L)	Na (MMOL/L)
105.86 ±44.32	1033.31 ±406.24	1.03 ±0.35	84.04 ±16.34	7.43 ±1.21	5.43± 1.31	2.25 ±0.53	1.19 ±0.35	1.06 ±0.42	4.72 ±0.75	145.18 ±5.45
(35-231)	(516-1982)	(0.5-2)	(67-145)	(5.4-9.6)	(3.5-8.0)	(12-3.6)	(0.5-2.0)	(0.5-1.9)	(2.1-5.7)	(135-163)

± = Standard Deviation (highest-lowest)

Discussion

As far as the authors are aware, there are currently no published blood parameters for juvenile Hawksbill from the Gulf region that can be used as baseline data. Previous blood-work studies from the region have focused on the Green sea turtle (*Chelonia mydas*)[2].

When interpreting this data, factors as species, sex, age, environment, diet, and health status need to be considered. We have tried to control these variables by including only juvenile turtles estimated to be between six months and eighteen months of age. The diet was similar for each animal during the rehabilitation period. Gender was not determined for any individual as this requires a time consuming and invasive procedure. The results are considered Arabian Gulf specific.

We concentrated on the Hb and PCV to give an indication of anaemia and so, for practical purposes the red blood cell count (RBC) was not determined. Animals with values 10% below our determined normal parameters are not included in release programs. The classification of the white blood cells (WBC) of juvenile Hawksbill turtles in our study was based on current haematology nomenclature and descriptions[3]. Increased WBC, heterophil, monocyte and eosinophil counts were investigated as these parameters may indicate inflammatory disease, parasitic infection or tissue injury.

Elevations in total protein (TP) combined with WBC abnormalities indicated chronic inflammation. Animals with TP levels under 2 g/dL were retained for further treatment. Frequently these individuals were obvious from visual examination alone, exhibiting poor body condition. Suspected starvation or parasitism cases were treated individually. For practical purposes we found the most relevant biochemical value to be creatine kinase (CK). CK is purely a muscle enzyme, so increased values may be related to muscle damage attributed to starvation, stranding or capture/handling for procedures.

Fig 1+2: (© Warren Baverstock) Juvenile Hawksbill turtle covered with epibiont (barnacles), and after treatment

The interpretation of parameters such as Potassium, Sodium and Phosphorus is not yet clear in this species and needs further investigation.
These results form the first set of data on physically healthy, captive, juvenile Hawksbill turtles in the United Arab Emirates. We hope that the above work will help to contribute the furthering our understanding of these wonderful animals.

References:

1. IUCN (International Union for the Conservation of Nature and Natural Resources) Red List and Standards & Petitions Subcommittee (1982-2007)
2. Samour J.H. et al. Normal Haematology of Free-Living Green Sea Turtles *(Chelonia mydas)* from the United Arab Emirates (1998). Comparative Haematology International, 8:102-107
3. Campbell T.W. and Ellis C.K. (3rd edition 2007). Avian & Exotic Animal Hematology & Cytology, Blackwell Publishing, Australia
4. J.A & M Donnelly, et al (IUCN SSC Marine Turtle Specialist Group) (2008). Red List of Threatened Animals (online). Available: *http://www.iucnredlist.org/details/8005/0/full*

Fig 3: (© Jerry Balloch) Latest release of 22 juvenile Hawksbill and 2 mature Green sea turtles.