

Gross pathology, histo- and haemological findings and bacterial examinations of common minke whales (*Balaenoptera acutorostrata*) in Icelandic waters.

Vilhjálmur Svansson¹, Einar Jörundsson¹, Steinunn Árnadóttir¹, Sigríður Hjartardóttir¹, Droplaug Ólafsdóttir² and Gísli A. Víkingsson²

¹Institute for Experimental Pathology University of Iceland, Keldur v/Vesturlandsveg, IS-112 Reykjavík, Iceland.

²Marine Research Institute, Skúlagata 4, P.O. Box 1390, 121 Reykjavík, Iceland

Abstract

The aim of present study was to evaluate the of health status of minke whales in Icelandic waters by veterinary dissections, histopathological, haematological and bacteriological examinations of animals caught in the period 2003-2005. Basic veterinary necropsy was performed on fourteen animals (8 males and 6 female) and total of 49 organ tissue samples from these 14 animals and 95 tissue samples from other 48 animals caught in the same period were collected for histological examination. A total of 140 animals were blood sampled for analyses of hemoglobin, hematocrit and total leukocyte, neutrophils, lymphocytes, eosinophils and monocyte count. Bacteriological cultivation was made from a total of 135 swabs collected from 39 animals.

The gross pathological and histopathological findings in the studied animals were sporadic, usually mild and mainly due to parasites infestations. Large differences between animals were found in all white blood cell populations both in % and in absolute number. No pathological lesions were observed that could reflect infections with bacteria or viruses nor could pathogenic bacteria be isolated from blood and major organs of these animals.

In present study on the health status of common minke whales found in Icelandic waters, all animals examined were found to be in normal condition and with a healthy appearance. However the few the pathological observations made, reflect high parasitic burden found in some of these animals.

Introduction

Interest of the health status of different marine mammal populations has been growing in recent decades. Numbers of reports are available on single animal findings as well as mass mortalities among cetacean. Most of reports on pathological finding and infectious diseases in whales have focused on stranded carcasses of variable quality for post mortem examination and evaluation of causes of death. The epidemiology of many infectious agents found in marine mammals in relation to population dynamics of cetacean is most often poorly understood. Investigations of healthy whales can give valuable information in regard to how to interpret pathological findings in diseased animals. With exceptions of numerous reports of pollutants in minke whales few investigations of diseases and infectious agents in minke

whales have been made. Parasites reports described from minke whales are only two i.e. sea lampreys (*Petromyzon marinus*) and whaleworm (*Anisakis simplex*) (Nichols et al 2011, Ugland et al 2009, Umehara et al 2006). Tryland et al 1999 found serological evidence of *Brucella* infections in minke whale in the North Atlantic Ocean. A novel Gram-positive coccus, *Abiotrophia balaenopterae* sp. nov was isolated organs of minke whale beached on the northwestern coast of Scotland (Lawson et al 1999). Evidence for morbillivirus infections have been found in several marine mammals, Guardo et al 1995 detected anti-canine distemper virus antibodies in the serum of the adult minke whale found stranded on the coast of Tuscany, Italy in 1993. No serological evidence for infection with *Toxoplasma gondii* could be detected in serum sample from 202 minke whales off the coast of Finnmark, Kola Peninsula, Bear Island and Spitsbergen (Oksanen et al 1998).

The aim of present study was to evaluate the health status of minke whales in Icelandic waters by veterinary dissections, histopathological, haematological and bacteriological examinations of animals caught in the period 2003-2005.

Material and methods

Post mortem Examination (Necropsy)

Basic veterinary dissections were performed on fourteen animals (8 males and 6 female) caught in the period 2003-2005 (Table 1). Of these fourteen animals undergoing full necropsy, two were caught in 2003, seven in 2004 and five were caught in 2005.

Histology

Total of 49 organ tissue samples from 14 animals were collected for histological examination in connection to basic veterinary dissections in the period 2003-2005 (Table 1). Additionally 95 tissue samples were collected from 48 animals in the same period, during post mortem examination and flensing by non-veterinary personal (Table 1). Earplugs were collected from all animals caught in the years 2003-2005. The tissue samples and ear plugs were fixed in 10% neutral-buffered formalin up on collection. When the samples arrived to the laboratory they were paraffin-embedded using standard procedures with exception of earplugs. Paraffin-sections were stained with Hematein-Eosin and analysed in light microscopy. Earplugs were removed from formalin solution and stored in a 0.1M (pH 7,4) phosphate-buffered sugar solution (400 g sucrose per 1L buffer) for about 24 hours. Then the plugs were sectioned on a freezing microtome and stained in Sudan Black and Eosin.

Blood samples

Blood samples were sampled from the thoracic cavity directly after the animal had been taken on-board usually in the time range from 30 to 60 minutes after the animal had been killed. Full blood was collected in to 10 ml EDTA, heparin and serum blood tubes. Blood smears for differential counting were done on board. Serum was separated by centrifugation at 2000xg

for 30 min. within 1 hr. of collection and frozen down at -20°C.

Haematology

A total of 140 animals were blood sampled for haematological analyses from minke whales caught in the period 2003-2007 (see Table 2 and 3). All measurements were performed on heparin anticoagulated blood. Haemoglobin was estimated in gram per litre (g/L) by HemoCue haemoglobin meter. Haematocrit (% of blood volume occupied by red blood cells) was estimated by centrifugation. White blood cells count per μl of blood stained by Methyl-Violet using Neubauer counting chamber. Dried blood smears for differential counting were stained by May-Grünwald-Giemsa after fixation by methanol.

Samples for bacteriology

A total of 135 bacteriological swabs (Coban®) from 26 animals caught in 2003, 12 caught in 2004 and a single one in 2005 were collected from skin and faeces and aseptically as possible from lungs, liver, spleen and kidneys. The swabs were placed in transport medium and analysed upon arrival to the laboratory. The samples were cultured at 37°C, aerobically on Columbia Blood agar and/or Sheep blood agar, and anaerobically on Wilkins-Chalgren agar and/or Sheep blood agar. Positive cultures were investigated further by microscopical and biochemical method. Four samples were analysed for *Dermatophylus congolensis*.

Faecal samples

A total of 155 faecal samples were collected from the intestinal tract of 110 animals in the period 2003-2007. The samples were collected from rectum (110 samples) and additionally, faeces was also collected from duodenum (22 samples) and ileum (23 samples). Faecal samples were prepared as 20 % (w/v) suspension in Gibco minimal essential medium containing Dulbecco's MEM (Invitrogen) supplemented with 2 mM glutamine, 500 IU/ml penicillin, 500 IU/ml streptomycin. After been vortexed, the mixture was centrifuged at 2000 g for 30 minutes at 4°C and the supernatant collected and stored at -30°C for further virological analyses.

Results

Postmortem examination (Necropsy)

All fourteen animals undergoing full necropsy were found to be in normal condition and had a healthy appearance. Three of the six females were pregnant and no abnormalities were found in the foetus. Few pathological findings were noted with exception parasitic lesions in some of the animals. Parasitic lesions in the skin were mostly in form of scars (SC/F13/SP27). Internal parasitic findings were mainly trematode infestation in hepatic bile ducts most often judged to be of moderate grade. In several cases small cystic process thought to be of parasitic nature were found in the ductus deferens close to the tail of epididymis or in the epididymis of testis. Cystic processes 2-4 cm in diameter containing watery grey green fluid were found on visceral surface of several organs in many of the animals examined. One male animal had numerous cystic processes on the wall of the gastro-intestinal tract (4 processes on the stomach wall and 5-10 on the intestinal wall). In the gastro-intestinal tract large numbers of nematodes were found in the second and especially in the 3th stomach. Tapeworms (cestoda) were found on mucosal surface of 1-2 meter portion of the ileum-colon junction often in large numbers. Bilateral focal pleural thickening was observed in one animal (female) dorsally on the lungs. This animal had also hematoma (approx.. 25 cm in diameter) on the cranial surface of the liver with some fibrinous exudate on adjacent diaphragmatic peritoneum. In one female animal calcificated subcapsular nodules (0,2 to 0,5 cm in diameter) were found in the spleen.

Histological examination

Skin: Ten skin samples were histologically investigated. Most often examination reviewed focal ulceration and inflammation in epidermis with spongiosis. In some cases few to numerous protozoa were found on the ulcerated surface. Moderate leukocyte infiltration was seen in the superficial dermis with significant contribution of eosinophils and plasmacytoid cells.

Lung: Twelve lung samples were histologically investigated. Most often mild peribronchial leukocyte infiltration was found in the sampled material. In one animal chronic focal inflammation with leukocyte infiltration, fibroblast reaction and intraalveolar haemorrhage was seen.

Heart: Fourteen heart samples were histologically investigated. Mild to moderate focal calcification (protozoa?) in the myocardium were seen in all cases (Howard 1983). Calcified subepicardial nodules surrounded by chronic inflammatory reaction with connective tissue formation and macrophage infiltration were seen in one animal, probably due to calcified cestoda or nematode.

Kidney: Thirty-eight kidney samples were histologically investigated. In all samples mild to moderate multifocal calcification was seen in the renal cortex and/or medulla (nephrocalcinosis). In one animal moderate focal inflammatory infiltrate in renal cortex was also observed.

Liver: Fifty-one liver samples were histologically investigated. In many of the samples mild to moderate dilatation, proliferation and fibrosis in portal bile ducts, with leukocyte infiltration due to parasite reaction. Also in many cases mild inflammatory infiltrates in portal triades, and mild hyperplasi in biliary vessels and mild to moderate sonal vacuolar degeneration (fatty change) in hepatocytes was seen. In some liver samples mild multifocal leukocyte infiltration in liver parenchyma was observed.

Spleen: Nine spleen samples were histologically investigated. In one of the samples multiple necrotic foci with central calcification was found, other samples appeared normal.

Intestine: Only two samples from the intestine were histologically investigated, one of them was from a cystic lesions on intestinal wall containing two encapsulated focal inflammatory processes filled with neutrophils and debris (abscesses). A cut surface of an organism (parasite?) was found in the lumen of one of the processes. In the second sample non-encapsulated nodules with chronic inflammatory reaction (fibroblasts and leukocyte infiltration) were seen with no signs of parasites.

Epididymitis: From 5 animal samples from epididymitis of testis were histologically investigated. Encapsulated cyst coated with cellular connective tissue showing leukocyte infiltration, and lined with thin epithelial surface was seen in two samples resembling cestode cyst with larva (monorygma?). In the other three samples no parasite could be found but in these samples tubulus was dilated, filled with purulent material and lined with chronic reaction.

Cystic lesions: Six samples from cystic processes fond on visceral surfaces of various organs were examined histologically. In this samples cystic process lined by basaloide (germinal?) epithelium, surrounded by connective tissue was found with and without parasites (hydatide cyst?).

Mammary gland: only one mammary gland sample investigated histologically, the gland was found inactive and without any pathological abnormalities.

Ear plugs: Examination of earplugs for age-calculation of killed animals were found to be problematic as the main problem of the ear plugs was their fragility as they stuck poorly to the

microslides staining was impossible in most cases. Age-calculation based on histological examination of earplugs could therefore not be performed. Instead age was estimated from aspartic acid racemisation in the eye lens (SC/F13/SP15)

Haematological examination

Haematological findings in animals in present research were categorised according to sex and year of catch and also to sex and age group. The animals were divided into 6 age groups based on results from estimation of age by aspartic acid racemization (SC/F13/SP15). In figure 1 and table 2 results from haematological examination of heparin stabilized blood are listed for each catch year in the period 2003-2007 and for age groups in the same period in figure 2 and table 3. Hemaglobulin could be measured for 48 males and 54 females animal for each catch year and 46 males and 50 females animal for each age group (table 2 and 3). The mean values for hemaglobulin was found to be 129-130 g/L for male animals and 137 g/L but great variation was seen for both genders ranging from 50 to 191 g/L. Hematocrit measurements similar for both genders or 35-36% for males and 38-39% for female animals. Variation from 12 to 50% was seen in the samples tested. The mean value for total blood leukocyte count was higher for the males than the females or 3.6×10^3 per μl and 2.8×10^3 per μl respectively but great variation was found as values were ranging from 0.4 to 9.0×10^3 per μl . Blood smears for differential count in % was done for 124 animals (catch year) and 117 (age group). Calculation for total number of cells in each cell population could be done for 86 animals (catch year) and 81 animals (age group). Large differences were found in all cell populations both in % and total in number with exception of monocytes that were usually found in low number (Figure 1-2 and Table 2-3).

Bacteriological investigations

Bacteria were isolated from 38 samples from 20 animals. No bacteria were isolated from 5 animals. Preliminary results of cultures from blood and major organs of these animals were negative with respect to pathogenic bacteria. The bacterial isolated belonged mainly to the groups *Aeromonas*, *Pseudomonas*, *Edwardsiella*, *Streptococcus*, *Moraxella*, *Staphylococcus* and *Vibrio*. *Dermatophylus congolensis* cultures were all negative.

Virological investigations

The virological investigations of the faecal and serum samples collected in 2003-2007 are in progress.

Discussions

Few analysis of health status of minke whales based on basic veterinary dissections, histology and haematology have been made so far. Reports on postmortem examination of minke whales have mainly been necropsy reports from few or single animal strandings (Hohn

et al 2006). All fourteen animals undergoing full necropsy in present study were in normal condition and with a healthy appearance. The gross pathological and histopathological findings in the studied animals were sporadic, usually mild and mainly due to parasites infestations. No pathological lesions were observed that could reflect infections with bacteria or viruses. The significance of observed parasites and parasitic lesions found in present study on health status of minke whales is difficult to interpretative. The effect on male-fertility of occurrence of parasitic cystic processes in ductus deferens/epididymitis found in majority of males at necropsy remains unknown. Similar cystic lesions in other whales species have not previously been reported to our knowledge.

Several haematological investigations have been made in bottlenose dolphins (*Tursiops truncatus*) (Cornell 1983, Cornell et al 1988, Dailey et al 2000, Geraci et al 1974, Hall et al 2007, Ridgway and Venn-Watson 2010, Schaefer et al 2011, Terasawa et al 2002, Venn-Watson et al 2011, Woshner et al 2008). Other whale species have been investigated to lesser extent in regard to haematology. Haematological observations have been made on beluga or white whale (*Delphinapterus leucas*) (Cornell et al 1988, Norman et al 2012), gray whale, (*Eschrichtius robustus*) (Dailey 2000) and killer whale (*Orcinus orca*) (Cornell 1983).

Little knowledge is available on normal haematological values in minke whales (Hohn et al 2006). In the present study hemoglobin and hematocrit values in minke whale were found to be similar to those reported in the literature for other whale species. Large differences between animals were found in all cell populations both proportionally (in %) and in absolute number with the exception of monocytes that were usually found in low numbers. However no differences in white blood cell values analysed were noted between males and females or between age groups of minke whales (Figure 2, Table 3). In male animals indication for variation in absolute cell count between years was seen. Numbers of animals were found to be low in total white blood cell count ($< 10^3/\mu\text{l}$) that also was reflected in low number in other leukocytes populations. The significance of this finding is unknown.

All the bacteriological samples came from apparently healthy animals. The animals had all been recently killed and samples taken aseptically. Many of the bacteria groups isolated are known to be common in sea so a question arises if the methods used for sampling were appropriate. There is not much known about the normal bacterial flora of *Cetaceans* and it is not known if the bacteria isolated are a part of the normal flora or if they are opportunistic pathogens. The bacteria cultures were stored and presently been kept at -80°C for later research. Final interpretation and further diagnostic work remains to be completed.

In present study on health status of normal minke whales found in Icelandic waters, animals examined were found to be in normal condition and with healthy appearance. However, the few pathological observations made reflect the high parasitic burden found in some of these animals.

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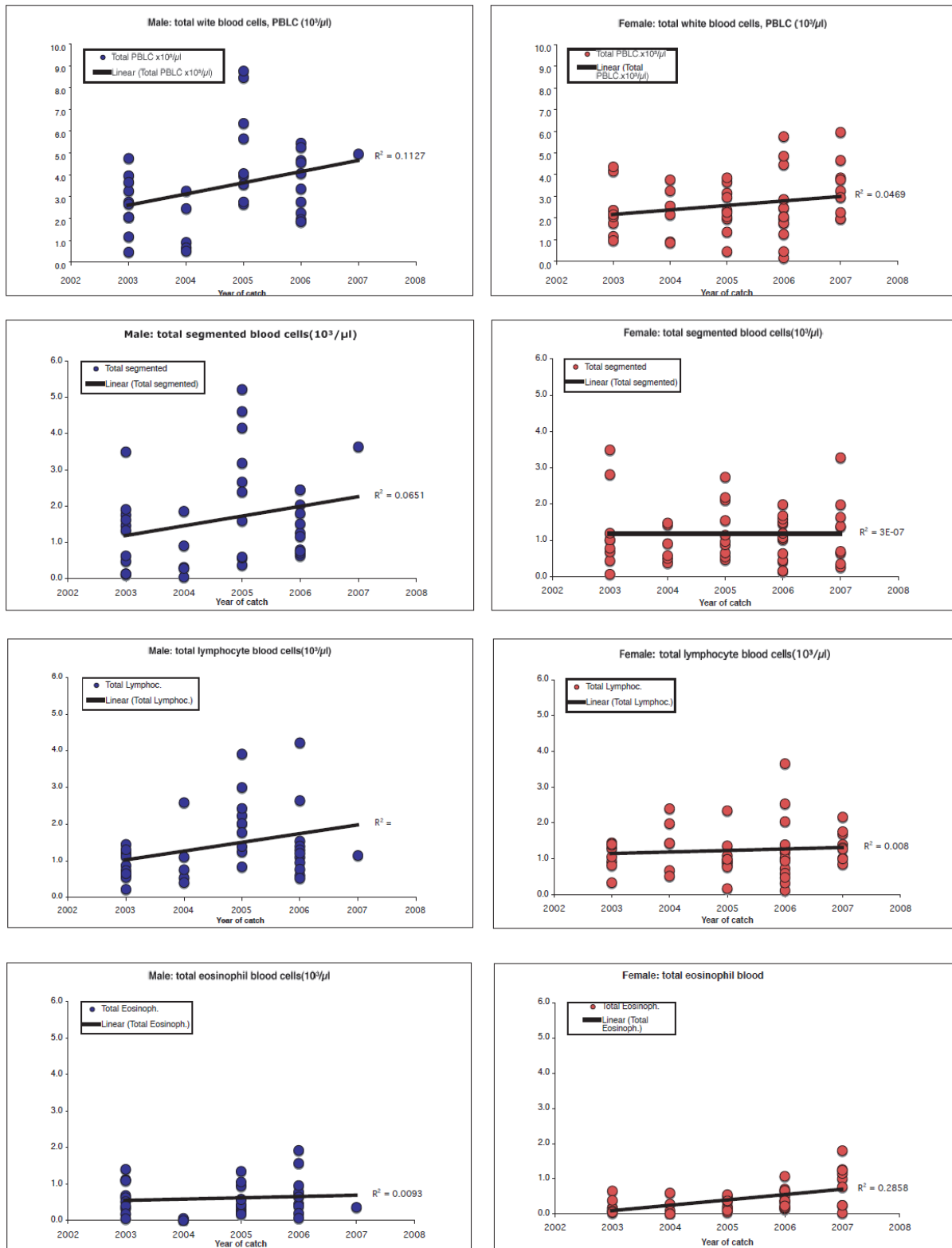


Figure 1. Total white blood cell count per μl per year of sampling for leukocytes, neutrophils, lymphocytes and eosinophils in bloods samples from male and female common minke whales caught in Icelandic waters in the period 2003-2007.

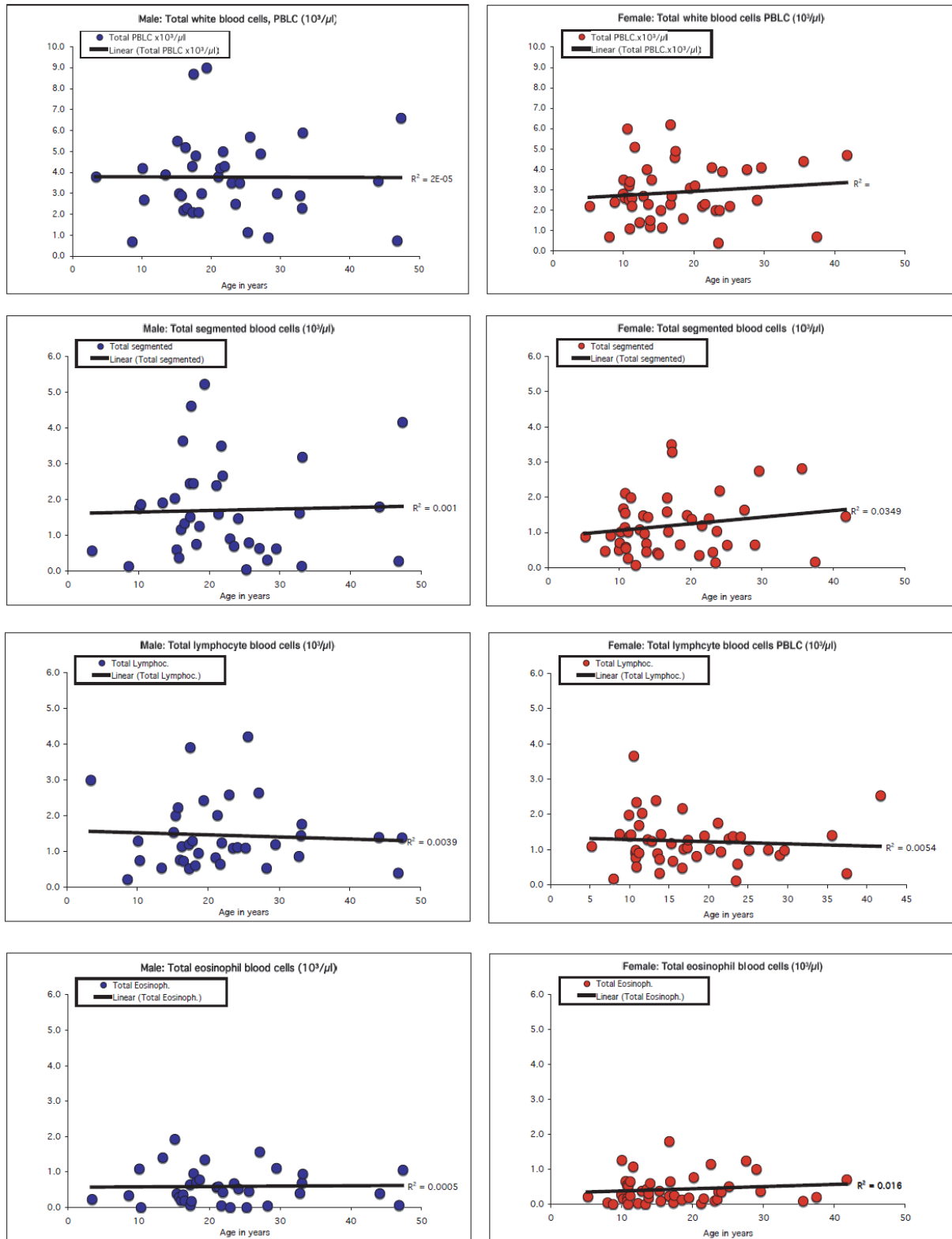


Figure 2. Total white blood cell count per μl per age group for leukocytes, neutrophils, lymphocytes and eosinophils in bloods samples from male and female common minke whales caught in Icelandic waters in the period 2003-2007.

Table 1. Overview of number of necropsy's and histological sampling in male and female common minke whales caught in Icelandic waters in the period 2003-2007.

Year of catch	Gender	Full necropsy	Histology													
		no. of animals	no. of animals	Organ type and number of samples:												
				Skin	Lung	Lymphnode	Heart	Liver	Spleen	Kidney	Intestine	Mammary gland	Epididymitis	Cystic lesion	Abscess	
2003	Male	0	19	4	5	1	6	17	0	7	0	0	0	0	1	
2004		4	6	0	0	0	0	5	5	6	0	0	2	2	0	
2005		4	16	2	0	1	2	11	2	9	1	0	3	4	0	
2003-05		8	41	6	5	2	8	33	7	22	1	0	5	6	1	
2003	Female	2	11	3	6	0	4	11	0	7	1	1	0	0	0	
2004		3	4	1	0	0	2	3	2	3	0	0	0	0	0	
2005		1	6	0	1	0	0	4	0	6	0	0	0	0	0	
2003-05		6	21	4	7	0	6	18	2	16	1	1	0	0	0	
2003-05		14	62	10	12	2	14	51	9	38	2	1	5	6	1	

Table 2. Haematological findings per year of sampling in bloods samples from male and female common minke whales caught in Icelandic waters in the period 2003-2007.

Year of catch	Gender	Hemoglobin			Hematocrit			Leukocytes			Neutrophil granulocytes			Lymphocytes			Eosinophil granulocytes			Monocytes														
		g/L			%			x10 ⁹ /μl			%			x10 ⁹ /μl			%			x10 ⁹ /μl														
		mean (*)	min.	max.	mean (*)	min.	max.	mean (*)	min.	max.	mean (*)	min.	max.	mean (*)	min.	max.	mean (*)	min.	max.	mean (*)	min.	max.	mean (*)	min.	max.									
2003	Male	132 (11)	69	172	37 (11)	15	50	2.9 (11)	0.7	5.0	35 (19)	6	70	1.19 (11)	1.11	3.50	38 (19)	13	76	0.85 (11)	0.22	1.45	25 (19)	1	51	0.69 (11)	0.05	1.40	2 (19)	0	6	0.06 (11)	0.00	0.30
2004		124 (7)	62	191	34 (7)	19	48	2.1 (7)	0.7	5.1	35 (6)	4	69	0.68 (5)	0.05	1.86	58 (6)	28	96	1.08 (5)	0.41	2.59	7 (6)	0	22	0.03 (5)	0.00	0.06	1 (6)	0	3	0.02 (5)	0.00	0.08
2005		134 (14)	81	171	37 (14)	22	49	5.0 (13)	2.8	9.0	43 (15)	13	63	2.54 (10)	0.38	5.22	44 (15)	21	79	2.08 (10)	0.84	3.92	13 (15)	1	28	0.60 (10)	0.17	1.35	0 (15)	0	0	0.00 (10)	0.00	0.00
2006		125 (15)	50	156	34 (14)	12	44	3.4 (14)	0.4	5.7	41 (23)	13	72	1.41 (11)	0.64	2.45	36 (23)	15	74	1.48 (11)	0.53	4.22	21 (23)	3	42	0.76 (11)	0.06	1.93	1 (23)	0	4	0.04 (11)	0.00	0.23
2007		124 (1)	-	-	35 (1)	-	-	5.2 (1)	-	-	70 (1)	-	-	3.64 (1)	-	-	22 (1)	-	-	1.14 (1)	-	-	7 (1)	-	-	0.36 (1)	-	-	1 (1)	-	-	0.05 (1)	-	-
2003-07		129 (48)	56	191	35 (47)	12	50	3.6 (46)	0.4	9.0	40 (64)	4	72	1.61 (38)	0.05	5.22	41 (64)	13	96	1.39 (38)	0.22	4.22	19 (64)	0	51	0.61 (38)	0.00	1.93	1 (64)	0	6	0.03 (38)	0.00	0.30
2003	Female	138 (9)	53	173	38 (7)	16	49	2.6 (9)	1.2	4.6	41 (10)	5	76	1.28 (9)	0.07	3.50	50 (10)	23	92	1.12 (9)	0.34	1.45	8 (10)	1	25	0.19 (9)	0.03	0.65	1 (10)	0	4	0.02 (9)	0.00	0.09
2004		132 (8)	81	165	37 (8)	19	49	2.4 (8)	1.1	4.0	38 (12)	18	54	0.88 (6)	0.38	1.48	47 (12)	29	71	1.41 (6)	0.52	2.40	14 (12)	0	31	0.16 (6)	0.00	0.60	1 (12)	0	3	0.04 (6)	0.00	0.12
2005		139 (12)	80	166	39 (11)	22	46	3.0 (12)	0.7	6.2	52 (12)	16	71	1.33 (10)	0.47	2.75	37 (12)	18	69	1.04 (10)	0.18	2.35	11 (12)	3	21	0.29 (10)	0.05	0.55	0 (12)	0	0	0.00 (10)	0.00	0.00
2006		138 (15)	83	162	39 (15)	24	48	2.6 (15)	0.4	6.0	38 (18)	21	69	1.03 (14)	0.14	1.99	42 (18)	21	61	1.23 (14)	0.12	3.66	18 (18)	6	43	0.42 (14)	0.14	1.07	1 (18)	0	3	0.01 (14)	0.00	0.07
2007		135 (10)	91	151	38 (10)	25	42	3.5 (10)	1.8	6.2	32 (9)	12	67	1.29 (9)	0.26	3.28	42 (9)	25	80	1.39 (9)	0.85	2.17	23 (9)	1	40	0.86 (9)	0.02	1.80	3 (9)	0	6	0.11 (9)	0.00	0.25
2003-07		137 (54)	53	173	38 (51)	16	49	2.8 (54)	0.4	6.2	41 (60)	5	76	1.17 (48)	0.14	3.50	44 (60)	18	92	1.22 (48)	0.18	3.66	15 (60)	0	40	0.40 (48)	0.00	1.80	1 (60)	0	6	0.03 (48)	0.00	0.25

Table 3. Haematological findings in blood samples from different age groups of male and female minke whales caught in Icelandic waters in the period 2003-2007.

Age in years	Gender	Hemoglobin			Hematocrit			Leukocytes			Neutrophil granulocytes			Lymphocytes			Eosinophil granulocytes			Monocytes														
		g/L			%			x10 ³ /μl			%			x10 ³ /μl			%			x10 ³ /μl														
		mean (*)	min	max	mean (*)	min	max	mean (*)	min	max	mean (*)	min	max	mean (*)	min	max	mean (*)	min	max	mean (*)	min	max	mean (*)	min	max									
< 5	Male	165 (1)	-	-	39 (1)	-	-	3.8 (1)	-	-	23 (2)	15	30	0.57 (1)	-	-	70 (2)	60	79	3.00 (1)	-	-	8 (2)	6	9	0.23 (1)	-	-	1 (2)	0	1	0.00 (1)	-	-
6 - 10		105 (5)	69	149	27 (5)	15	42	2.4 (5)	0.4	4.2	40 (7)	19	69	1.25 (3)	0.13	1.86	42 (7)	28	71	0.76 (3)	0.22	1.30	16 (7)	1	48	0.48 (3)	0.00	1.09	2 (7)	0	7	0.04 (3)	0.01	0.08
11 - 20		132 (16)	98	166	36 (15)	27	46	4.0 (16)	0.7	9.0	43 (25)	13	72	2.09 (14)	0.38	5.22	39 (25)	14	77	1.42 (14)	0.53	3.92	18 (25)	0	36	0.67 (14)	0.17	1.93	1 (25)	0	2	0.02 (14)	0.00	0.10
21 - 30		124 (16)	50	172	35 (17)	12	50	3.6 (15)	0.9	6.4	36 (17)	4	70	1.42 (11)	0.32	3.50	45 (17)	13	96	1.65 (11)	0.54	4.22	17 (17)	0	42	0.55 (11)	0.00	1.57	1 (17)	0	6	0.06 (11)	0.00	0.30
31 - 40		137 (4)	120	153	40 (4)	33	49	4.0 (4)	2.3	5.9	44 (5)	6	59	1.65 (3)	0.14	3.19	35 (5)	21	63	1.36 (3)	0.87	1.77	20 (5)	14	30	0.68 (3)	0.41	0.94	1 (5)	0	1	0.01 (3)	0.00	0.02
> 40		157 (3)	129	191	42 (3)	36	48	3.7 (3)	0.8	6.6	51 (4)	38	63	2.08 (3)	0.29	4.16	36 (4)	21	54	1.07 (3)	0.41	1.40	13 (4)	8	16	0.50 (3)	0.06	1.06	0 (4)	0	0	0.00 (3)	0.00	0.00
All		130 (46)	50	191	36 (45)	15	50	3.6 (44)	0.4	9.0	41 (60)	4	72	1.73 (35)	0.13	5.22	41 (60)	13	96	1.45 (35)	0.22	4.22	17 (60)	0	48	0.59 (35)	0.00	1.93	1 (60)	0	7	0.03 (35)	0.00	0.30
< 5	Female	123 (1)	-	-	36 (1)	-	-	2.2 (1)	-	-	40 (1)	-	-	0.88 (1)	-	-	50 (1)	-	-	1.10 (1)	-	-	10 (1)	-	-	0.22 (1)	-	-	0 (1)	-	-	0.00 (1)	-	-
6 - 10		137 (5)	94	166	55 (3)	31	47	2.4 (5)	0.7	3.5	35 (9)	18	67	0.72 (5)	0.50	1.01	47 (9)	25	71	1.29 (5)	0.18	1.99	17 (9)	0	43	0.35 (5)	0.00	1.26	1 (9)	0	4	0.04 (5)	0.00	0.14
11 - 20		137 (27)	80	166	38 (27)	22	49	2.9 (28)	1.1	6.2	44 (31)	5	76	1.31 (26)	0.07	3.50	43 (31)	18	92	1.33 (26)	0.34	3.66	13 (31)	0	29	0.42 (26)	0.00	1.80	1 (31)	0	4	0.03 (26)	0.00	0.12
21 - 30		141 (13)	110	165	39 (12)	30	46	2.5 (12)	0.4	4.1	38 (13)	16	67	1.13 (11)	0.14	2.75	42 (13)	24	80	1.03 (11)	0.12	1.76	19 (13)	1	40	0.49 (11)	0.02	1.15	2 (13)	0	6	0.05 (11)	0.00	0.25
31 - 40		128 (2)	83	173	37 (2)	24	49	3.1 (3)	0.7	4.4	45 (3)	23	64	1.49 (2)	0.16	2.82	38 (3)	32	47	0.87 (2)	0.33	1.41	16 (3)	2	29	0.15 (2)	0.09	0.20	1 (3)	1	2	0.05 (2)	0.01	0.09
> 40		127 (1)	-	-	36 (1)	-	-	4.7 (1)	-	-	31 (1)	-	-	1.46 (1)	-	-	31 (1)	-	-	2.54 (1)	-	-	15 (1)	-	-	0.71 (1)	-	-	0 (1)	-	-	0.00 (1)	-	-
All		137 (50)	80	173	39 (46)	22	49	2.8 (49)	0.4	6.2	41 (57)	5	76	1.18 (46)	0.07	3.50	44 (57)	18	92	1.23 (46)	0.12	3.66	15 (57)	0	43	0.41 (46)	0.00	1.80	1 (57)	0	6	0.03 (46)	0.00	0.25