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**EXAMINATION OF BLOOD SAMPLES OF THE EURASIAN OTTER
(*Lutra lutra*)**

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Abstract: Heparin and EDTA blood samples were analysed from 14 Eurasian otters. Reflotron and Vetest 8008 were used to identify ALB, ALPK, ALT, AMYL, AST, BUN, Ca, CK, CREA, GLU, Mg, BIL, GGT and CHOL. The electrolytes (Na, K and Cl) were measured by using VetLyte. The QBC haematology system gave a profile for HKT, Thrombo, Leuko, Gran and Lymph/Mono. These values were compared with those from dogs, cats and the North American river otter (*Lutra canadensis*). Several heparin parameters and a leucocytosis recorded in four individuals indicated that the otters were considerably stressed.

INTRODUCTION

There are only a few haematological records for otters in the literature (KANE, 1979; HOOVER et al., 1984; HOOVER et al., 1985), most of them are for the North American river otter (*Lutra canadensis*). Hence, the goal of this study was to identify such values for the Eurasian otter (*Lutra lutra*). In addition, evidence for stress as indicated by haematological parameters was investigated.

ANIMALS, MATERIALS AND METHODS

During 1992 - 1997 EDTA- and heparin blood samples were taken from 14 Eurasian otters, 9 females and 5 males, from which 13 were right after a surgery to implant transmitters into the abdomen (KÖNIG and KÖNIG, in press). The blood was taken from the vena jugularis.

Customary EDTA blood sampling tubes (1mg/1ml) and heparin blood sampling tubes (0.75mg/1ml) were used as anticoagulators. The blood sampling tubes were centrifuged as soon as possible (2-3 hours) in order to separate blood cells and plasma and then analysed immediately afterwards.

The heparin blood samples of the first 5 otters were analysed with the dry-chemical photometer Reflotron from Böhringer. The corresponding values of otter no. 6 -14 were analysed with a Vetest 8008 (Idexx). The following substrates and enzymes were investigated: Albumin ALB, alkaline phosphates ALPK, alanin transaminase ALT, amylase AMYL, aspartate transaminase AST, urea BUN, Calcium Ca, creatininekinase CK, creatinine CREA, glucose GLU, magnesium Mg, totalbilirubin TBIL, gamma- glutamyltransferase GGT and cholesterol CHOL. The electrolyte analysator VetLyte gave values for sodium Na, potassium K and chloride Cl in mmol/l.

The EDTA blood samples of 12 otters were analysed for the erythrocyte PCV values, the total leukocyte and the thrombocyte values. The leukocytes could be split in total granulocytes (including eosinophiles) and lymphocytes and monocytes. This was done by using the Quantitative Buffy-Coat analysator (QBC, Becton Dickinson) which is a very quick and precise tool for the haematological investigations of animals (LEVINE et al., 1988).

RESULTS

Table 1 gives blood values of 14 otters. In some cases, not all parameters could be identified, because the blood quantity was insufficient or the test equipment was unable to provide those parameters. The average of these values was compared with standard values of dogs and cats (BARONETZKY-MERCIER, 1992) and values recorded for *Lutra canadensis* (HOOVER et al., 1985). The Eurasian otter values of AST, CK, GLU, GGT and potassium were much higher than those recorded for dogs and cats, the other values were similar. The CK and the GLU values of the Eurasian otter were also much higher than was reported in the North American river otter.

Table 1. Haematological parameters of *Lutra lutra*

otter	machine	g/dl ALB	IU/L ALKP	GPT IU/L ALT	IU/L AMYL	GOT IU/L AST	mg/dl BUN	mg/dl Ca	IU/L Ck	mg/dl/L CREA	mg/dl GLU	mg/dl Mg	mg/dl TBIL	Na K mmol/L C	GGT U/L	Chol U/L
1	R			20.6	0	37.5	37.9		23.3	0.51	56		1		10.5	154
2	R			18	0	41.7	34.1		193	0.54	13		0.69		11.3	
3	R			46.3	0	110	65.3		58.3	0.68	190		0.59		2.8	102
4	R			166		>675	44.7		104	0.79	310		>0.5		10.6	
5	R			76.2		100	74		>1000	>0.5					22.9	
6	V	3.16		72	0		37.7	8.85	312	0.67	184.5		0.31	156.7	7.76	74.7
														5.52		
														115.5		
7	V					78				0.54	254.8				35	
8	V	3.34	103	42	0	84	31.1	9	498	0.62	316.8	2.42	0.29	158.9		
														5.8		
														116.4		
9	V	3.32	89	108	0	79	29.9	2.45	307	0.64	280.2	2.29	0	157.6		
														8.69		
														111.7		
10	V	3.07	73	78	0	87	23.4	8.39	411	0.62	214.5	3.02	0	160		
														5.28		
														117.2		
11	V	2.91	75	119	0	136	37.9	8.65	1906	0.33	243.9	2.56	0.01	157.9		
														4.99		
														118.2		
12	V	2.03	155	43	0	75	9.3	8.13	431	0.95	300.2	3.11	0.32	156		
														6.01		
														112.4		
13	V	3.17	39	73	0	110	20.8	8.72	836	0.9	310.7	2.62	0.22	160.6		
														6.1		
														114.4		
14	V	2.77	55	40	0	109	16	8.43	562	0.57	185.5	2.5	0.11	161.4		
														6.05		
														116.8		
mean		2.97	84	69.4	0	132.5	35.2	7.8	511	0.63	220	2.64	0.4	158.6	15.5	110.2
														6.06		
														115.3		
lit.		3.2- 3.8		3-80	0	70- 130	<80	7.9- 12.2	<200	<1.6	70- 130		<0.5	150-160 4.5-5	10- 35	70- 150
														111-120		
norm cat		2.6- 3.9	10- 200	10- 120	500- 1500	0-48	16- 36	8- 12	<80	0.8- 2.4	76- 145	1.45- 3.12	0- 0.5	150-165 3.5-5.8	0-1	70- 150
														112-129		
norm		2.7- 3.9		8-80	500- 1500	0-50	7- 12	7.9- 12	10- 15	0.5- 1.0	77- 145	1.4- 3.12	0- 0.5	144-160	0-7	110- 150

dog 3.8 1500 27 12 200 1.8 125 2.38 0.9 3.5-5.8 320
109-122

The QBC profiles of 12 otters are listed in Table 2. In four of them (otter no. 4, 7, 9 and 11) a leukocytosis was identified.

Table 2. Haematological parameters of *Lutra lutra*

otter	HKT%	Thrombo-cytes	Leukocytes	Granulo-cytes	%Gran	Lympho-cytes/ Monocytes	% Lymph/ Mono
1	na	na	na	na	na	na	na
2	na	na	na	na	na	na	na
3	43.7	19	7.8	7.8	91	0.7	9
4	46.5	524	13.6	11.9	87	1.7	13
5	37.4	393	9.6	7.6	78	2.0	22
6	56.4	638	8.6	6.0	69	2.6	31
7	52.0	496	13.4	9.1	68	4.3	32
8	42.8	825	8.8	6.5	74	2.3	26
9	54.4	687	14.9	11.3	75	3.6	25
10	48.6	836	10.8	8.3	77	2.5	23
11	40.5	489	13.9	11.1	80	2.8	20
12	61.3	735	7.8	4.7	60	3.1	40
13	59.0	511	9.8	5.4	55	4.4	45
14	53.7	644	8.0	5.4	67	2.6	33
mean	49.7	566	10.6	7.9	73.4	2.7	26.6
otter lit.	48-70						
norm cat	27-47	180-430	5-11	3.6-11.6	60-84	0.9-3.7	15-35
norm dog	44-52	200-400	6-12	3.3-10.0	55-84	0.8-4.1	15-35

Thrombocytes (G/L); Leukocytes (G/L); Granulocytes (G/L);

DISCUSSION

The blood was taken right after considerable stress for the animals caused by their capture, confinement and the just completed surgery. The increased glucose values (GLU of on average 220mg/dl) reflect this (SCHWENDENWEIN, 1995). A simultaneous increase of AST and CK is typically seen 2-6 hours after muscle damage, which can occur during an operation and also can be due to cramps caused by a ketamin immobilisation. These blood samples were, however, taken within one hour of the immobilisation. Therefore, it is theorised that these increased values of AST and CK must have another reason, which is probably also stress related (ARNEMO, 1991). The slightly elevated values of potassium indicate an acidosis in the blood and a reduced excretion through the kidneys. The extremely high value of 8.69 mmol/l for otter no. 9 was excluded from the calculation of the average value because it is believed to be a mistake of measuring. The recorded leukocytosis QBC profile is another indicator for stress when no inflammation is recorded as was the case in these otters. Stress hormones mobilise marginal reservoirs of leukocytes, usually in the form of a neutrophilie (SCHWENDENWEIN, 1995). One of the otters (no. 5) died two days after the operation (KÖNIG and KÖNIG, in press). The blood values obtained from this otter were not higher than those of the others, however, overstress following an inappropriate capture (DULFER, pers. comm.) and a secondary inflammation, appeared to be the reason for the death of this animal (KÖNIG and KÖNIG, in press). Handling and implanting transmitters in wild caught otters may place more stress on these animals than most of them can tolerate. The use of stress reducing drugs like long-acting anxiolytica might be one way to overcome this problem and should be tested in the future. Everything must be done to avoid stress, which implicates that special attention should be paid to all aspects concerning the catching, the handling, the transport and the holding facilities.

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RESÚMEN

Examen de muestras de sangre de la nutria europea (*Lutra lutra*).

Se analizaron muestras de sangre con EDTA y Heparina de 14 nutrias eurasiáticas. Se usaron Reflotron y Vetest 8008 para identificar ALB, ALPK, ALT, AMYL, AST, BUN, Ca, CK, CREA, GLU, Mg, BIL, GGT y CHOL. Los electrolitos (Na, K y Cl) se midieron usando VetLyte. El sistema hematológico QBC dio un perfil para HKT, trombocitos, leucocitos, granulocitos y linfocitos/monocitos. Estos valores se compararon con los de perros, gatos y nutrias norteamericanas (*Lutra canadensis*). Varios parámetros de heparina y una leucocitosis registrada en cuatro individuos indicaron que las nutrias estaban considerablemente estresadas.