Potentially Useful Biomarkers for Obesity

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Abstract

The mechanism of obesity is a complex one, while in regulating feeding behavior there are other factors that act, among which the hypothalamic centers, the metabolic balance of the internal environment, information's digestive system, endocrine system or adipose tissue response. The study on a group of cats aimed to evaluate specific biochemical parameters of lipid metabolism – cholesterol, triglycerides, LDL, HDL, including a parameter less assessed in medical veterinary practice – apolipoprotein B (Apo-B). Increased levels of this parameter are found in disorders such as obesity, hiperlipoproteinemia, nephrotic syndrome, diabetes etc. The results revealed significant disorders of lipid metabolism with predisposition to obesity, hyperlipidemia and cardiovascular disease.

Keywords: *pets obesity, apolipoproteins, lipid profiling*

INTRODUCTION

Genetic differences play an important role in the development of obesity but environmental factors are also very important (Elliott and Johnson, 2007). There are very few studies that refer to Apo-B and pets - according to the literature it has been shown that dogs exhibit no cholesterol ester transfer protein (CETP) activity in vitro, in contrast to humans (Bailhache *et al.*, 2004) and both cats and dogs have hormones and adipogene factors similar with other species, being affected in a similar way through obesity (Blum *et al.*, 2008). Apolipoproteins (Apo-A, Apo-B, Apo-E) represent the proteic component of lipoproteins (LDL, HDL, VLDL); these confer structural integrity for the central hydrophobic lipids and have a role in the transport of lipids from intestinal level to the liver and the organism's cells; HDL are the predominant lipoproteins in plasma of dogs and cats (Watson, 1996) and play an important role in recognizing the receptors for lipoproteins and the regulation of certain enzymes from the lipoprotein metabolism (Sako *et al.*, 2001, 2003). Other research was focalized towards identifying and understanding the molecular level interactions between nutrients

and other bioactive substances from food and genome (Simopoulos, 1989).

AIMS AND OBJECTIVES

The research primarily aims at following the values of Apo-B markers in the blood, at a group of cats registered with a veterinary clinic in Bucharest, Romania. The objective is to highlight the values of some biochemical parameters specific to the lipidic profile and Apo-B, carried out to two years difference-2014 and 2016, at the investigated patients.

MATERIALS AND METHODS

Cases that have been investigated are 6 European feline aged between 3 to 9 years, castrated, with the obesity tred, monitored in the environment in which they grow, concomitently with the monitoring of changes in alimentation. The biochemical analyses were done on Analyser of dry biochemistry ARKRAY SPOTCHEM EZ-SP-4430 REFURBISHED. The biochemical analysis of urine was done on Analyser with strips Vielab U-11V West Medica. Apolipoprotein B was determined through the measurement technique

Tab. 1. Case summaries with the biochemical analyses results performed in 2014 and 2016

	Albumin	AST	ALT	Bilirubin	Glucose	Triglyceride	Cholesterol	LDL col	HDL	Urea
2014 Total	N	6	6	6	6	6	6	6	6	6
	Mean	2,9833	37,9167	61,6667	1,0000	112,1667	1,4667	206,6667	143,8333	35,3333
	Median	3,0500	36,2500	62,5000	,6500	115,0000	1,4500	201,0000	151,5000	32,0000
	Sum	17,90	227,50	370,00	6,00	673,00	8,80	1240,00	863,00	212,00
	Minimum	2,30	18,00	29,00	,10	92,00	,80	120,00	80,00	25,00
	Maximum	3,50	60,00	80,00	3,00	130,00	2,10	290,00	170,00	55,00
	Range	1,20	42,00	51,00	2,90	38,00	1,30	170,00	90,00	30,00
	Std. Deviation	,41673	15,42212	18,42462	1,08628	15,77868	,43205	57,81234	33,64768	10,57670
	Variance	,174	237,842	339,467	1,180	248,967	,187	3342,267	1132,167	111,867
	Std. Error of Mean	,17013	6,29605	7,52182	,44347	6,44162	,17638	23,60179	13,73661	4,31792
2016 Total	N	6	6	6	6	6	6	6	6	6
	Mean	3,0667	37,5833	59,1667	1,2333	121,0000	1,4583	208,5000	141,1667	39,0000
	Median	3,1000	38,0000	53,0000	,8000	106,0000	1,3500	182,5000	137,5000	39,5000
	Sum	18,40	225,50	355,00	7,40	726,00	8,75	1251,00	847,00	234,00
	Minimum	2,60	12,00	38,00	,20	98,00	1,20	165,00	118,00	27,00
	Maximum	3,50	68,00	90,00	4,10	178,00	1,90	283,00	175,00	58,00
	Range	,90	56,00	52,00	3,90	80,00	,70	118,00	57,00	31,00
	Std. Deviation	,36148	20,45585	18,44361	1,42782	31,59114	,28003	53,15919	22,74570	11,31371
	Variance	,131	418,442	340,167	2,039	998,000	,078	2825,900	517,367	128,000
	Std. Error of Mean	,14757	8,35106	7,52957	,58290	12,89703	,11432	21,70215	9,28589	4,61880

Descriptive statistics by SPSS

using immunoturbidimetric kits (334nm, 340nm, 365nm).

RESULTS AND DISCUSSION

Apo-B is the principal apolipoprotein from chylomicrons and LDL (proteins with low density) and the higher levels of this marker appear in changes of the lipidic metabolism which entail excessive lipidic deposits (over-weight, obesity, atherosclerosis, vascular and cardiac diseases). In the following (Tab.1) we present the results obtained from the case studies investigated.

Firstly, from Table 1 it can be observed that all parameters have 6 determinations for each of 2014 and 2016, while ApoB was only determined for 2016. Thus, we are able to make a direct comparison over time for all but one of the parameters determined. When looking at the Mean and Median, it can be observed that Albumin, AST, Bilirubin, Glucose, Urea and Creatinine display values within the reference limits for both years. However, the generally high Standard deviation and Range suggest that among the 6 cases studied there are values above and well below the reference. On the other hand, ALT, Triglyceride, Cholesterol, LDL col, HDL and

ApoB (only for 2016) have values either in one or both years that exceed the reference limits. In the case of ALT we can see a clear improvement as the values return within the reference in 2016. For Triglyceride, Cholesterol and LDL col the values are above the reference limit in both years, although in 2016 the Median is significantly lower than the mean which suggests that within that year some of the cases have values within the reference bracket, while the rest compensate and lead to a Mean slightly over the limit. In spite that the HDL Mean and Median values in 2016 are also outside the reference limit, the values are very close (39 and 39.5 respectively) which suggests a clear improvement in this parameter and a return towards the reference.

CONCLUSIONS

In this studies, we can observe a tendency for parameters to improve and return to the reference limit in 2016. However, since the cases are not a random sample, most of the changes can be explained by external factors to these parameters such as stress factors, type of food and diet or physical state of the animal, factors which are largely influenced by the pet owners themselves.

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