

## Introduction

The lipoprotein transport system in mammals is complex, and is affected by the interplay of many different factors. Hyperlipoproteinaemia may take the form of an increase in the levels of cholesterol, triacylglycerol or both. Disorders in lipoproteins may be divided into those that are secondary to conditions such as endocrinopathies, liver disease, nephrotic syndrome, obesity, drug therapy (glucocorticoids, megestrol acetate) and primary hyperlipoproteinaemias caused by a genetic defect. As yet few primary hyperlipoproteinaemias have been identified in domestic animal species, and it is likely that their incidence is rare.

## Sample Collection Protocol

- Collect 5 ml of blood into EDTA after 12-16 hours fast.
- If possible centrifuge the blood sample for 5 minutes at 3000 rpm, and transfer the plasma to a plain tube.
- In order to ensure the veracity of the results, samples should be dispatched on the same day, and should not arrive over the weekend.
- Results will usually be available within a week of sample receipt.

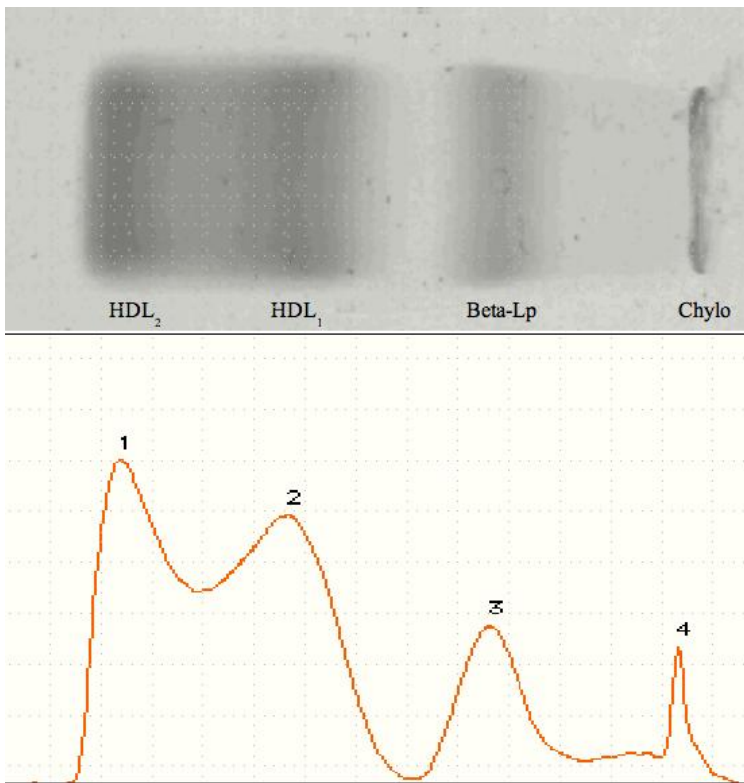
## *Methodology*

Lipoprotein analysis includes chemical analysis and Lipoprotein electrophoresis.

**Chemical Analysis** – Cholesterol (total and esterified), phospholipids, and triacylglycerol (adjusted for free glycerol levels) are routinely measured on samples submitted for lipoprotein analysis.

**Lipoprotein Electrophoresis** – Electrophoresis exploits differences in the size and charge of different lipoprotein particles and can typically resolve lipoproteins into up to 4 fractions; high

density lipoproteins (HDL<sub>2</sub> & HDL<sub>1</sub>), triacylglycerol-rich lipoprotein (TRL) and chylomicrons. The lipoproteins are visualised using specific lipid stains such as Sudan Black B or Oil Red O. Due to slight differences in the staining characteristics of the major fractions, this technique is not strictly quantitative but it provides adequate results for establishing lipoprotein phenotypes.



High Density Lipoproteins (HDL <sub>2</sub> & HDL <sub>1</sub> )	Cholesterol rich lipoproteins. Transport excess cholesterol from peripheral cells to the liver.
Beta-LP = Endogenous Triacylglycerol-rich lipoprotein (TRL).	Synthesised by the liver. Transport free fatty acids to the peripheral tissues. In man, termed low and very low density lipoproteins (LDL and VLDL).
Chylomicrons	Exogenous TRL. Synthesised by the enterocytes. Transport dietary lipid (primarily triacylglycerol) from the small intestine to peripheral tissues and liver.

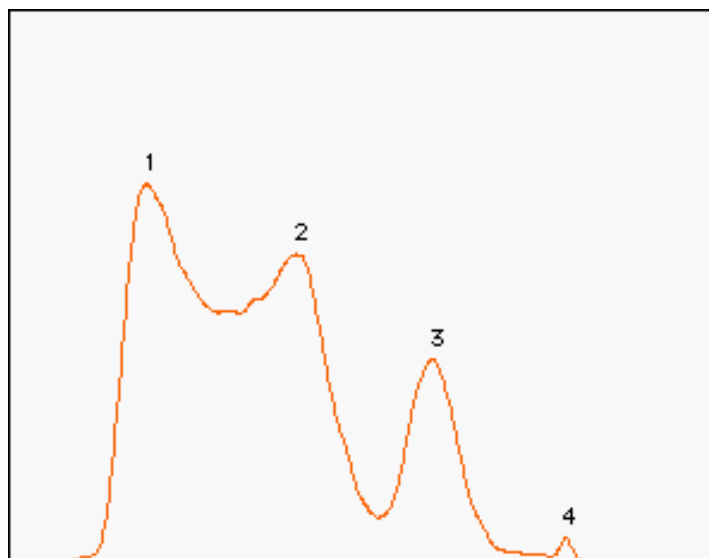
## AN EXAMPLE OF LIPOPROTEIN ANALYSIS REPORT / RESULTS

<b>Clinician</b>	<b>Case No.</b>	<b>Sample Type</b>	<b>Date Collected</b>	<b>Lab No.</b>
		Plasma		
<b>Animal</b>	<b>Species</b>	<b>Breed</b>	<b>Age</b>	<b>Sex</b>
	Canine	Dalmatian	10 years	male

### *Chemistry Results:*

				Reference Interval
Cholesterol	Total	10.03	mmol/L	3.3 – 7.0
	Esters	7.16	mmol/L	2.3 – 5.2
	%Esterification	71.4		68.1 – 73.4
Phospholipids		5.95	mmol/L	2.5 – 5.8
Triacylglycerol		1.29	mmol/L	0.0 – 0.7

### *Electrophoresis Results:*



Fraction No.	Identification	%Total	Concentration (mmol lipid/L)	Reference Interval (mmol lipid/L)
1	HDL <sub>2</sub>	60.1	10.38	4.6 – 9.9
2	HDL <sub>1</sub>	24.2	4.17	
3	TRL	15.7	2.72	0.2 – 1.5
4	chylomicrons	trace	trace	

**Interpretation:** The sample shows mildly raised HDL fractions, raised TRL and a very small amount of chylomicrons.