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The lipidomic analysis in the veterinary field: study of the cell membrane lipid profile in physiological and pathological conditions

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Introduction

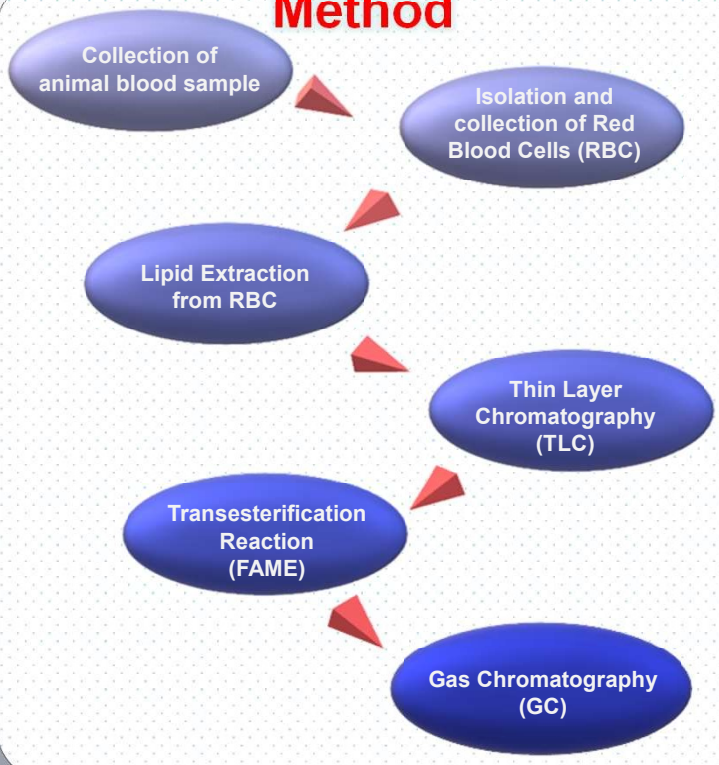
The role of lipids in health and disease in humans has been recognized for many decades, as evidenced by the early identification of cholesterol as an important risk factor of heart disease [1],[2]. Circulating phospholipids and sphingolipids are believed to play a role in obesity-related functions such as insulin resistance and cardiovascular disease[3]. The urine concentration of lysophospholipids seems to increase in diabetic patients [4].

Although there have been a series of studies that correlates the lipid profile with chronic diseases in humans, in animals there have not been similar studies.

This project for the first time will evaluate the lipidomic analysis on the lipids of the membranes of blood cells from animals either in physiological or pathological conditions. It is aiming to a better understanding of the function of the cell membrane, how its composition can be affected under different circumstances (chronic pathological diseases) and to the definition of the profile of the selected disease.

As soon as the profile of the disease is defined, it would be possible to determine type and quantity of the lipids requirements, as well as stress and lack of adequate protection and the effects of the radicals in the organism. A nutraceutical therapy will be thus considered.

Method



Results

- 24 blood samples from healty dogs (9 males, 15 females)
- median age: 57 months

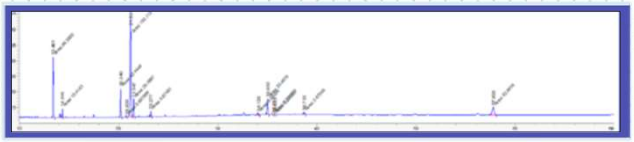


Figure1. GC chromatogram: Each peak represents the signal created when a compound elutes from the GC column into the detector. (x-axis:RT, y-axis:intensity of the signal)

Fatty acids	
16:00	palmitic
16:1 9c	palmitoleic
18:00	stearic
18:1 (n-9)	oleic
18:1(n-7)	vaccenic
18:2 (n6)	linoleic
18:3(n-3)	alpha-linoleic (ALA)
20:3(n-6)	Diomogamma-linoleic
20:4 (n-6)	arachidonic
20:5(n-3)	EPA
22:6(n-3)	DHA

Table 1. The fatty acids of interest for the project are identified in each chromatogram and the area percentage is calculated

Total FAME per family and indexes
SFA
MUFA
ω3
ω6
PUFA
Σ Trans
SFA/MUFA
SFA/PUFA
ω6/ω3
PUFA balance ω3/(ω3+ω6)
UI - Unsaturation Index
PI - Peroxidation Index

Table 2. Total fatty acids methyl esters (FAME) per family and membrane homeostasis indexes (Table 2) will be obtained from the collected data.

- the obtained data will be put into tables and be available for statistical analysis

Conclusions

- The lipidomic profile of healthy animals variates between breeds, sex, different age and size
- Statistical criteria must be taken into consideration for partitioning a reference database to obtain separate reference ranges for different subpopulations
- It will be necessary to assay more samples of healthy dogs within the next few months
- Samples from diseased dogs will be assayed so that a profile of the disease can be defined
- As soon as the profile of the disease is defined, it would be possible to determine type and quantity of the lipids requirements, as well as stress and lack of adequate protection and the effects of the radicals in the organism. A nutraceutical therapy will be thus considered

Reference

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