

LIPIDOMICS OF THE LIVER TISSUES OF TWO AMAZONIAN FISHES BY NUCLEAR MAGNETIC RESONANCE (NMR)

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Abstract

Lipids are essential biomolecules for the maintenance of the human body and health. These very diverse biomolecules can be found in large quantities in the fish, and especially in the fish liver tissues. With the aim to explore better lipidomics of the Amazonian fishes and different feeding habits influence on lipid composition, we have chosen two species: *Cichla monoculus* (Tucunaré) and *Triporthus elongatus* (Sardinha). And had they lipidomics investigated using the following strategy: total lipids extraction, ^1H Nuclear Magnetic Resonance and chemometrics.

Key words: Lipids, liver tissues, Nuclear Magnetic Resonance.

Introduction

The omega-three and -six fatty acids (FA) are considered essential for humans and have to be acquired by a healthy diet. These FA are very abundant in fish and especially in their liver tissues. On the other side, the greatest and very unexplored diversity of fish species of the Amazon River had motivated this work that aims to compare lipidomics of fish with different eating habits. Highlighted are two species: *Triporthus elongatus* (sardinha amazônica), which is omnivorous; and *Cichla monoculus*¹ (tucunaré), which is piscivorous. Lipidomics also counted on influences of the food availability depending on the river period, such as flood and dry of the Amazon.

Results and Discussion

Total lipid extraction was performed by Bligh and Dyer method. Analyzed fish liver tissues had relatively high lipid contents, around 5% as in the case of omnivorous fish, and 2% for piscivorous fish.

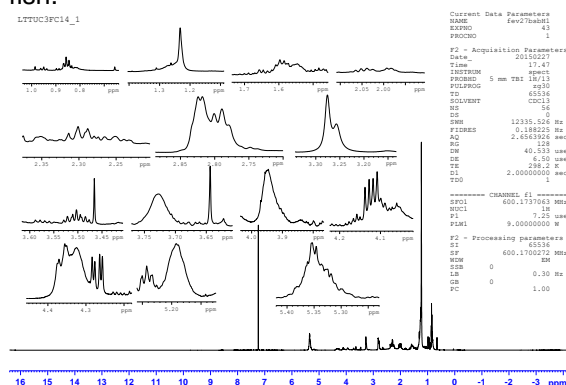


Figure 1. ^1H NMR spectrum of total lipids isolated from piscivorous fish (Amazon flood, 2014).

^1H NMR analyses were performed in a Bruker 600 MHz equipment in high resolution. NMR spectra, as shown in Figure 1, have lipids' resonances

attributed to triacylglycerols with medium chain fatty acids and also to the polar lipids. Then, the data were treated by chemometrics, using Principal Component Analysis (PCA), which showed good separation for the two groups by PC1 due to the chemical shift differences characteristic for fatty acids and unsaturation.

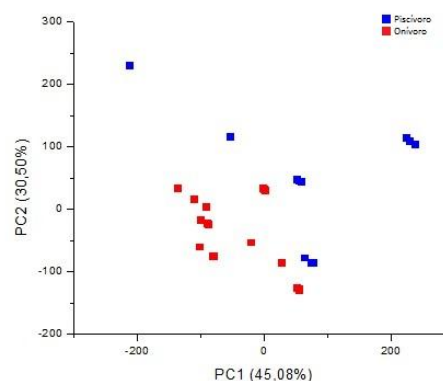


Chart 1. PCA score graph presenting NMR data on total lipids of the two fishes: blue – piscivorous and red - omnivorous (Amazon flood, 2014).

Conclusions

The greatest differences in the lipidomics of the analyzed species (piscivorous and omnivorous) are consequences of the fatty acids chain sizes and also of the number of insaturations of the fatty acids present. These results are the first of the kind on Amazonian fish lipidomics.

Acknowledgement

FAPESP (2014/11258-1 and 2013/14707-9);
INPA (Prof. Val, A. L.)

¹Santos, G. M, Ferreira, E. J. G., Zuanon, J. A. S. Peixes comerciais de Manaus, 2ª Ed. – Manaus: INPA, 2009.