In vivo metabolim of unsaturated fatty acids and lipid classes in *Octopus vulgaris* hatchlings

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Introduction

It has been reported that fatty acids (FA) have a critical role in *O. vulgaris* development, with polyunsaturated fatty acids (PUFA), and particularly EPA and DHA, being defined as essential for *O. vulgaris* paralarvae development (Navarro and Villanueva, 2003). However it is not only the general dietary FA profile that is crucial for development. The way the FA are presented to larvae is also important, as it could influence or limit specific lipid class (LC) biosynthesis or FA exchange between LC (Sargent et al., 1999).

Objetive

To contribute to determine the endogenous ability of *O. vulgaris* to biosynthesis lipid classes containing essential FA that would likely ensure normal development of paralarvae. To this end, the *in vivo* capability of *O. vulgaris* hatchlings to incorporate, esterify into different lipid classes and metabolise unsaturated FA was investigated.

Conclusions

The nutritional requirements of *O. vulgaris* hatchlings in terms of FA seems to be highly specific and so LC-PUFA must be considered as EFA and provided by dietary sources. The present results should be taken into account in octopus nutrition particularly considering that endogenous metabolism of live preys compromises the availability of essential FA for paralarvae.

Material & Methods

60-90 *O. vulgaris* hatchlings
10 ml of sea water
Gentle stirring
5-6 h incubation
21 ºC
N=4

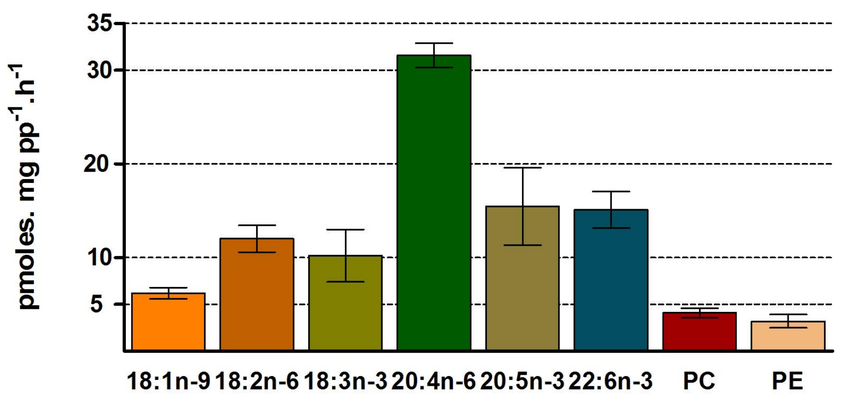
0.3 µM of:
[1-^{14}C]FA (**18:1n-9, 18:2n-6, 18:3n-3, 20:4n-6, 20:5n-3 or 22:6n-3**) bound to BSA

Phosphstidylcholine
(L-∝-1-palmitoyl-2-arachidonyl-[arachidonyl-1-^{14}C])
Phosphatidylethanolamine
(L-∝-1-palmitoyl-2-arachidonyl-[arachidonyl-1-^{14}C])
dissolved in ethanol

Incorporation of radioactivity into TL
(Rodríguez et al., 2002)
[1-^{14}C]-FA esterification into LC
(Tocher and Harvie, 1988; Exposure Cassete-K, Image Screen-K, BioRad)
[1-^{14}C]-FA transformation
(Rodríguez et al., 2002; Exposure Cassete-K, Image Screen-K)
Image acquisition
(Molecular Imager FX, BioRad)
LC and FA quantification
(Quantity One 4.5.2 1-D analysis software, BioRad)

Results

Incorporation of radioactivity into TL



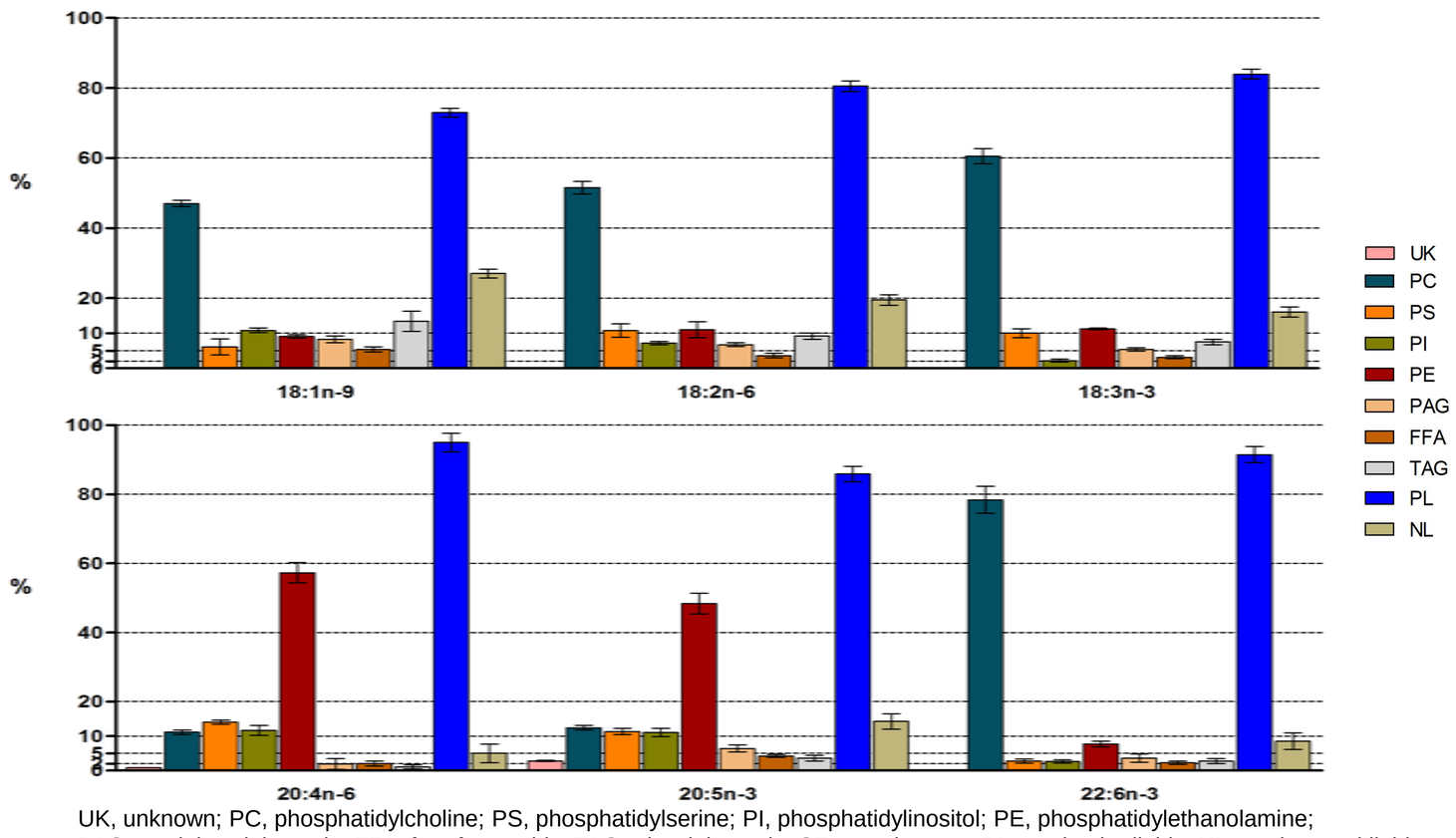
Data are presented in pmoles of ^{14}C fatty acid incorporated per mg of protein per hour of incubation.

Transformation of [1-^{14}C]FA substrates

18:1n-9	ELOVL	20:1n-9	ELOVL	22:1n-9
18:2n-6	ELOVL	20:2n-6	ELOVL	22:2n-6
18:3n-3	ELOVL	20:3n-3		
20:4n-6	ELOVL	22:4n-6		
20:5n-3	ELOVL	22:5n-3		
22:6n-3	ELOVL	24:6n-3		

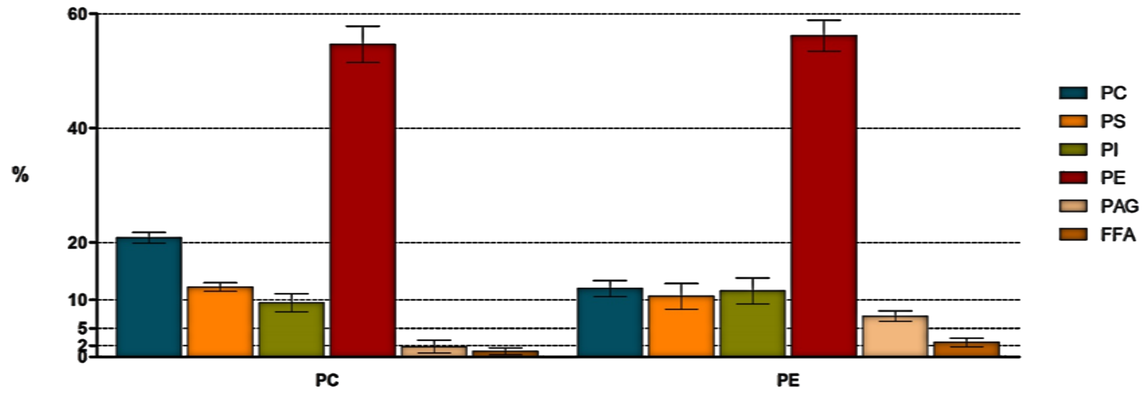
- Higher incorporation of ARA
- ARA and EPA mainly esterified into PE
- DHA and C18FA mostly esterified into PC
- Higher esterification of C18 FA into TAG
- Only elongations products were detected
- Depite the way ARA was presented, more than 50% was esterifed into PE

Esterification of [1-^{14}C]-FA (bounded to BSA) into different LC



UK, unknown; PC, phosphatidylcholine; PS, phosphatidylserine; PI, phosphatidylinositol; PE, phosphatidylethanolamine; PAG, partial acylglycerols; FFA, free fatty acids; TAG, triacylglycerols; SE, sterol esters; PL, total polar lipids; NL, total neutral lipids.

Esterification of [1-^{14}C]ARA (esterified into PC or PE) into different LC



References:
Navarro and Villanueva 2003. Aquaculture 219, 613-631; Rodríguez et al., 2002. Comp. Biochem. Phys. Part B 132,559-570; Sargent et al., 1999. Aquaculture 179, 217-229; Tocher and Harvie 1988. Fish Physiol. Biochem. 5, 229-239.

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