

MSc in Biochemistry for Health

Dissertation Project – 2nd Cycle

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No.

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Lab/Institution: Proteomics of non-model organisms – ITQB NOVA

TITLE: Impact of regeneration on nerve metabolome

BACKGROUND

The potential for tissue, organ and limb regeneration, including the central nervous system, has its maximum expression in echinoderms. Preliminary studies on echinoderms regeneration were based on the morphological, histological and cellular basis of this phenomenon. In the meanwhile, advances have been made in the characterization of the associated molecular processes. Our studies have been focused on the starfish *Marthasterias glacialis*, a species common in the Portuguese coastal areas, that shows important regeneration capabilities. Radial nerve cords are components of the starfish central nervous system. We have recently confirmed by histological and functional assays that the nervous tissue is almost restored 14 days after partial excision. A preliminary characterization of nerve metabolome by NMR as shown the presence of

CF Franco et al Proteomics (2011) 11: 1359-1364; CF Franco et al Proteomics (2011) 11: 3587-92; CF Franco et al Electrophoresis (2012), 33, 3764–3778; C Franco et al J Proteomics (2014), 99: 1-25; C Franco et al Proteomics (2013), 13, 686-709 (Review article); Y Ben Khadra Cell and Tissue Research (2017) 370:13-28

OBJECTIVES

To contribute for a deeper knowledge of the molecular factors and biological processes involved in the regeneration of the central nervous system of starfish with potential applications in regenerative medicine. Nerve metabolome end its changes will be characterized during *M. glacialis* radial nerve regeneration.

PROJECT DESCRIPTION

The process of sea-stars handling, including the induction of regeneration and tissue collection, will be made at the Aquário Vasco da Gama (Dafundo, Oeiras).

Task 1: Extraction of metabolites will be performed according with an already developed protocol.

Task 2: MS and NMR data will be collected to characterize the metabolome and its changes

Task 3: A combination of the metabolites identified by NMR and MS and the previously characterized proteome in non-regenerating conditions will be used for functional analysis

Task 4: Quantification date will be evaluated by uni- and multivariate analysis to determine the metabolites relevant for the several regeneration steps

Task 5: Pathway analysis will be performed using the proteins identified with expression differences between regeneration time-points to determine the metabolic and cellular processes involved in regeneration

Task 6: Writing of Master Thesis

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10
Task 1										
Task 2										
Task 3										
Task 4										
Task 5										
Thesis										

TIMELINE

Disponibilidade do aluno: Total