INSTITUTO DE BIOLOGIA MOLECULAR E CELULAR
INSTITUTE FOR MOLECULAR AND CELL BIOLOGY

BOLSA DE PÓS-DOUTORAMENTO - BPD (m/f)

Encontra-se aberto concurso para a atribuição de uma Bolsa Pós-Doutoramento (BPD) no âmbito do projecto **"**Regulação da Glutamina sintetase pelo Oxido Nitrico em Medicago truncatula" (FCOMP-01-0124-FEDER-028335-PTDC/BIA-PLA/2291/2012), financiado por fundos nacionais através da FCT/MEC (PIDDAC) e co-financiado pelo Fundo Europeu de Desenvolvimento Regional (FEDER) através do COMPETE – Programa Operacional Factores de Competitividade (POFC), nas seguintes condições:

Referencia Interna: PR571401

Área Científica: Bioquímica e Biologia Molecular de Plantas

Requisitos de admissão: Os/as candidatos/as têm de possuir Doutoramento em Biologia ou áreas afim, experiência em bioquímica e biologia molecular de plantas, e bom domínio do Inglês falado e escrito. Os candidatos deverão possuir capacidade de iniciativa e de trabalho metódico e rigoroso. O Juri poderá não atribuir a bolsa se a qualidade dos candidatos for inferior ao pretendido.

Plano de trabalhos:
Nitric Oxide (NO) is widely recognized as an important endogenous signaling molecule involved in multiple physiological processes, from stress responses to normal plant growth and development. There is however, an astonishing gap between the knowledge on the abundant involvement of NO in several plant cell signaling pathways and the actual knowledge about its direct targets and effects at the gene expression level. We have recently shown that the key nitrogen assimilatory enzyme Glutamine Synthetase is a molecular target of NO in root nodules of Medicago truncatula. This is an important finding, since the molecular targets of NO in plants are largely unknown and its identification is essential to understand the NO signaling role and mechanisms of action. In view of the interest of this finding, this project is intended to deeply investigate the mechanisms of GS regulation by nitric oxide both at the transcriptional and posttranslational levels and to understand the physiological significance of this mechanism of regulation.
Glutamine Synthetase (GS) catalyses the first step at which nitrogen is brought into cellular metabolism and is also involved in the reassimilation of ammonium released by a number of metabolic pathways. Due to its unique position in plant nitrogen metabolism, GS plays key roles in all aspects of plant development, from germination to senescence and is a key component of nitrogen use efficiency (NUE) and plant yield. It is, therefore, extremely important to understand how GS is regulated. The model legume Medicago truncatula is being used as a model system in our laboratory, to study the regulatory mechanisms that control the enzyme and to evaluate its involvement in the regulation of NUE. From our previous studies, it was established that the enzyme is encoded by four expressed genes, two encoding cytosolic polypeptides (MtGS1a and MtGS1b) and two producing plastid-located polypeptides (MtGS2a and MtGS2b). We investigated how the individual genes are differentially regulated, the sites of expression of each gene and gene products, the isoenzyme composition and distribution in different organs of the plant, posttranslational mechanisms of GS regulation and structural and biochemical determinants of the isoenzymes. Our recent discovery that the enzyme is regulated by NO, through tyrosine nitration, is particularly exciting, since NO is a biological mediator involved in key physiological processes and its involvement in the regulation of an essential enzyme, such as GS, opens new avenues to explore its signalling role.

NO and derived reactive species exert their biological action through the chemical modification of targets, mostly acting by inducing protein posttranslational modifications, such as S-nitrosylation and tyrosine nitration. It is also known that NO modulates the expression of a number of genes that sustain a diversity of cellular functions, including GS. However, the NO dependent intracellular signaling pathway(s) that lead to the activation or suppression of the genes have not yet been defined. In this project we propose to identify the M.truncatula GS genes that are modulated by NO and characterize the responsible regulatory cis-elements and binding transcription factors. The regulatory regions will be identified by deletion analysis, and functional testing of promoter deletions fused to reporter genes, using the M. truncatula transgenic hairy root system. Transcription factors that can bind to the regulatory elements will be identified by electrophoretic mobility shift assays (EMSA) and one hybrid system. Besides affecting GS gene expression, NO directly affects GS activity. We have previously shown that MtGS1a is inactivated by tyrosine nitration in root nodules of M.truncatula, whereas MtGS2a appears to be regulated by S-nitrosylation. These studies highlighted subtle differences between the regulatory effects of NO on different GS isoenzymes and under different physiological contexts, corroborating the prevailing idea that NO signaling is specific under determined physiological backgrounds. This aspect will be further explored in this project, by characterizing the posttranslational modifications induced by NO in each GS isoenzyme, identifying the relevant regulatory amino acid residues and evaluating the effects in GS activity and/or protein turnover. Finally, we will investigate the physiological significance of these modifications. A special attention will be devoted to root nodules, where GS is particularly abundant, NO is known to be produced and previously shown to be involved in GS regulation. The results obtained during this project are expected to shed a new light both on the mechanisms of GS regulation and on the signaling role and mechanisms of action of NO at the transcriptional and posttranslational levels.

Legislação e regulamentação aplicável:

"Estatuto do Bolseiro de Investigação Científica, aprovado pela Lei no 40/2004, de 18 de agosto, alterado e republicado pelo Decreto-Lei no 202/2012, de 27 de agosto."; Regulamento de Bolsas de Investigação Científica da Fundação para a Ciência e a Tecnologia, I.P., 2013 e Regulamento de Bolsas de Investigação Científica do IBMC aprovado pela Fundação para a Ciência e a Tecnologia.

Local de trabalho: O trabalho será desenvolvido no grupo "Biologia Molecular da Assimilação do Azoto" do Instituto de Biologia Molecular e Celular, sob a orientação científica da Doutora Helena Carvalho.

Duração da(s) bolsa(s): A bolsa terá duração de 5 meses, com início previsto a 1 de Fevereiro de 2015, eventualmente renovável se o projeto for prorrogado, e de acordo com o estipulado no Regulamento de Bolsas de Investigação da Fundação para a Ciência e a Tecnologia, I.P. — 2013.

Valor do subsídio de manutenção mensal: O montante da bolsa corresponde a €1495 conforme tabela de valores das bolsas atribuídas diretamente pela FCT, I.P. no País (http://alfa.fct.mctes.pt/apoios/bolsas/valores) e será paga mensalmente por transferência bancária (preferencialmente).

Métodos de seleção:

Será efetuada avaliação curricular, da carta de motivação e das cartas de referências, e, caso seja considerado necessário, será realizada entrevista aos candidatos selecionados nas três a cinco primeiras posições. A valoração dos critérios será respectivamente 70%, 15%, 15%, ou 50%, 10%, 10%, 30%, caso seja realizada entrevista (a realizar no IBMC).

O júri reserva-se o direito de não atribuir a bolsa no caso de não se apresentarem a concurso candidatos com perfil adequado.

Composição do Júri de Seleção:

Presidente: Helena Carvalho (PhD)

Vogais efetivos: Mariana Sottomayor (PhD), Alexandra Moreira (PhD)

Forma de publicitação/notificação dos resultados: Os resultados finais da avaliação serão publicitados, através de lista ordenada por nota final obtida, publicada no site do IBMC, sendo o candidato(a) aprovado(a) notificado através de e-mail.

Prazo de candidatura e forma de apresentação das candidaturas: O concurso encontra-se aberto no período de 29 de dezembro de 2014 até 13 de janeiro de 2015.

As candidaturas devem ser formalizadas, obrigatoriamente, através de submissão electrónica de carta de motivação, duas cartas de recomendação incluindo os contactos dos autores, certificado de habilitações e CV detalhado em:
http://www.ibmc.up.pt/gestaocandidaturas/index.php?codigo=PR571401