

RICARDO LOURO

Associate Professor

ITQB NOVA



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10:30 AM – 11:30AM

Steele 006

“Molecular Piracy of Iron: Structures and Functional Mechanisms of Siderophore-Interacting Proteins”

Abstract: Iron is an essential element for virtually all life forms on Earth. It is, however, mostly found as ferric oxides in minerals which are insoluble. Therefore, despite its abundance on Earth, its bioavailability is limited ever since the activity of photosynthetic organisms promoted its precipitation from Archaean oceans. To work around this problem, extant organisms use small organic molecules with exquisite affinity for ferric iron called siderophores to obtain iron from their environment. This capacity is crucial for the viability of the cells and has impacts in areas as diverse as the productivity of the open-ocean or virulence of pathogens towards their hosts. More than 500 siderophores have been described and their uptake by the cells is ensured by a vast number of siderophore receptors at the surface. However, the mechanisms of extracting the iron from the siderophore and make it available to the cell metabolism are limited. Among those, siderophore recycling is highly prevalent and offers an option that is efficient in terms of ATP expenditure in biosynthesis. This is performed by siderophore interacting proteins that are known to exist in two classes: SIPs which are flavoproteins and ferric siderophore reductases (FSRs) which contain an iron sulfur redox center. Some organisms have representatives of only one of the classes whereas some have representatives of both. Recent and some unpublished results on the investigation of the molecular details underpinning the mechanisms of ferric siderophore reduction by SIPs and FSRs, and the structural characterization of these proteins will be presented. These will be discussed in the context of the evolutionary relationship between the two classes of proteins, together with the consequences for their physiological function and for the fitness of the bacteria that contain them.

Bio: Ricardo Louro obtained a PhD from Universidade Nova de Lisboa under the supervision of Prof. António Xavier. He is Associate Professor of spectroscopy and bioenergetics, and his laboratory investigates the molecular basis of microbial interactions with metallic minerals through metalloproteins, with relevance for biogeochemical cycles of the elements, biotechnological development and infection control. He coordinates the operation of CERMAX, the NMR centre with the highest field NMR spectrometer in Portugal that is dedicated to structural biology and directs the Molecular Biosciences PhD Program. He is currently on sabbatical leave supported by the Fulbright foundation and is being hosted at Caltech where he was awarded a Moore Distinguished scholarship.