

Chemistry Department

## Signalling Pathways | ROS & RNS Biochemistry

**BIOLOGICAL CHEMISTRY**  
at FCT/UNL

<http://sites.fct.unl.pt/biologicalchemistryatfctunl>



**Luisa B. Maia**

(luisa.maia@fct.unl.pt)

Post-Doc Researcher

Ph.D. in Pharmaceutical and  
Clinical Biochemistry (FCUL)

Lic. in Biochemistry (FCUL)



### Objectives

- Human signalling pathways
  - Formation/consumption of NO, CO, H<sub>2</sub>S, SO<sub>2</sub>
  - Xanthine oxidase (XO) and aldehyde oxidase (AO) in novel pathways of formation/consumption of signalling molecules
  - In vitro* and *in vivo/situ* studies
- New catalytic activities of molybdoenzymes
  - Mechanistic and kinetic studies | Mammalian & bacterial enzymes
- Structure-activity relationships of metalloenzymes | Mammalian & bacterial enzymes
- Reactive oxygen and nitrogen species (ROS/RNS) metabolism

### Methodology

- Protein purification - bovine, rat and human liver enzymes
- Enzyme kinetics - polarographic techniques and UV-visible spectroscopy
- Mechanistic studies - EPR, NMR, mass, UV-visible spectroscopies
- *In silico* studies - theoretical and computational calculations
  - reaction mechanisms with atomic details
- Tissue cultures - cell lines of human hepatocytes and endothelia
- Fluorescence methodologies - probes to follow the signalling molecules
- Models of oxidative stress

### Expected Results

Answer questions raised at two different levels:

#### Molecular Level

How our enzymes carry out the formation/consumption of NO, CO, H<sub>2</sub>S, SO<sub>2</sub>?  
How is the ROS/RNS metabolism regulated?

↳ kinetics, fluxes, molecular mechanism, structure-activity relationships

#### Tissue Level

How do the reactions take place inside a living cell?

↳ evaluation of physiological significance and fluxes, under normoxia and hypoxia

The work envisaged will contribute to a better characterisation of the XO- and AO-dependent pathways, with emphasis on structural and mechanistic aspects, and to predict how relevant these novel pathways would be *in vivo*.

Funding: Project PTDC/QUI/100366/2008 (FCT-MCTES, Portugal)

