SCIENCESPRINGDAY

FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

REQUIMTE /CQFB - Chemistry Department

Microbial Stress and Bioremediation

Team: 2 BSc, 1 Master and 3 PhD students and 2 post-doctoral fellows, and 2 project scholarships.

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I am Assistant Researcher at REQUIMTE, since October 2007.
I was awarded a PhD in 2003 from Edinburgh University and UNL and I was a Postdoctoral fellow at CERM, Florence University from 2005 - 2007.

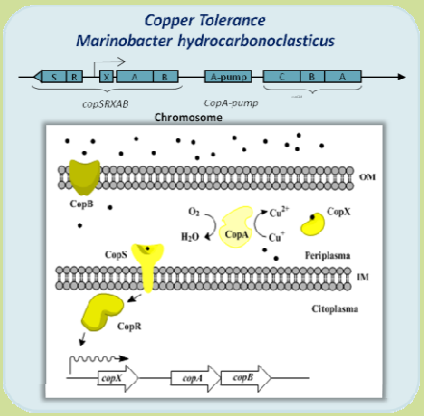
Total Publications: 30 and 2 Book Chapters.

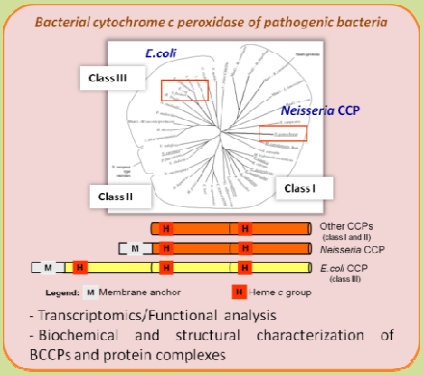
Objectives

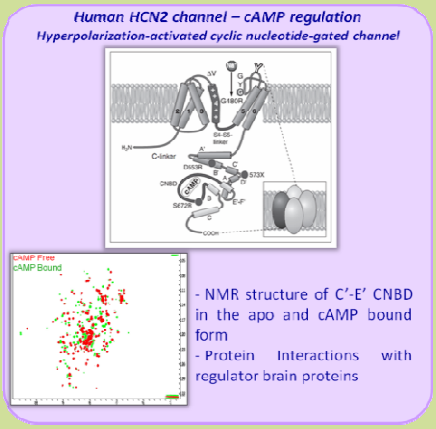
Structural Biology / Biophysical Chemistry / Systems Biology

The projects focus on medical and environmental oriented problems: microbial stress response to reactive oxygen species and metals and the activation mechanisms of hyperpolarization-activated cyclic nucleotide-gated (HCN) channels using NMR methodologies, biochemical techniques together with proteomics and transcriptomics.

Structurally characterize (transient) protein complexes combining biophysical data with NMR methodologies and restraint molecular docking simulations.







Methodology

- We use a Systems Biology approach in most of the projects of the group, combining proteomic and transcriptomic profiling of the bacterial cells when exposed to stress conditions (metals and ROS).

- The proteins of interest are either isolated from natural sources or hetero(homo)logously expressed, and biochemically characterized using several biophysical (Isothermal titration calorimetry, enzymatic assays) and spectroscopic techniques.

- The proteins of interest (up to 25 kDa) are structurally characterized using NMR methodologies. NMR is also used in combination with molecular docking to structurally characterize transient complexes.

Expected Results

- The Systems Biology approach applied to the copper tolerance system will enable the elucidation of the regulatory mechanisms and adaptive response responsible for the 1.5 mM $CuSO_4$ MIC of *Marinobacter*.
- The study of bacterial cytochrome *c* peroxidases from pathogenic bacteria, *Neisseria gonorrhoeae* and *Escherichia coli*, will contribute to a better understanding of the oxidative stress response of microbial pathogens. This enzyme constitutes a promising target for drug-design, since its inhibition would make the bacteria more susceptible to the response of the host immune system.
- The structural characterization of HCN channels and the elucidation of the molecular mechanisms associated with its regulation will provide a better understanding of the mechanisms underlining hyperpolarization-activated currents in the brain and in pathologies, as epilepsy and chronic pain.

Funding as PI:

- FCT-ANR/BBB-MET/0023/2012 (2013-2015)
- PTDC/BIA-PRO/109796/2009 (2011-2014)
- PTDC/BIA-PRO/098882/2008 (2010-2013)
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- FCT-CNRS 2011-2012, with Dr. Corinne Aubert, France.
- Pessoa 2011-2013 , with Dr. Corinne Aubert, France.

Funding as Team Member:

- PTDC/QUI-BIQ/116481/2010 (2012-2014)
- PTDC/QUI-BIQ/098071/2008 (2010-2013)