

## TITLE

### Getting insight into the molecular determinants of foldopathies

## DESCRIPTION

Many foldopathies, affecting several tens of million people worldwide, share some physiological and biochemical events. Among them, protein misfolding and subsequent fibrillation, oxidative and nitrosative stress, as well as the dyshomeostasis of endogenous metal ions, like Cu(II) and Zn(II), have been extensively studied, although the connection between them has not fully understood yet. In this scenario, a key role is played by Intrinsically Disordered Proteins (IDPs), whose physiological role is still unclear in some cases. Their native unfolding state is also perturbed by post-translational modification, such as phosphorylation, oxidation, dysregulated enzymatic degradation and coordination with transition metal ions. The research activity will focus on the structural and functional characterization of some IDPs. The effect of endogenous and exogenous compounds on the physio-pathological activity of IDPs will also be investigated both *in vitro* and *in vivo*.

The student will have the opportunity to join a research programme within a multidisciplinary research network. The selected candidate will be involved in the cellular expression and purification of the main natural variants of IPDs by means of common biomolecular tools and by up-to-date chromatographic techniques (HPLC, FPLC, PAGE). The student will take advantage from a plenty of advanced spectroscopic (UV-Vis, Fluorimetry, Circular Dichroism), calorimetric (ITC, DSC) and spectrometric (MALDI-TOF, nanoLC-HRMS) skills in order to get information about the structural and functional features of IDPs. These experimental methods, along with a proteomic approach, will be used to assess how endogenous compounds (metal ions, protein and peptides) and pathological-like conditions can affect the conformational states and the biochemical activity of IDPs. Moreover, to cross the boundaries among different disciplines, biological studies aimed at determining the potential therapeutic efficacy of synthetic compounds will also be carried out, using either *in vitro* or *in vivo* biological models and taking advantage of microscopic and cytofluorimetric systems.

We are seeking a creative, self-motivated student with an interest in developing a research program at the interface between chemistry and biochemistry, mainly using physico-chemical and biochemical methods. Students with a background in related disciplines are encouraged to apply as well. The selected candidate will join a young yet creative research team, in an innovative, well- equipped and scientifically stimulating conditions with a variety of training opportunities. As a PhD student at IBB, she/he will be part of the Chemical Sciences International doctoral training program at University of Catania.

## SELECTION CRITERIA

### Eligibility Criteria

- Academic degree: Applicants shall have a master degree in **Chemistry Bio-molecular Chemistry or Biology**, corresponding to the second level of studies.
- Mobility rule: There will be no nationality restrictions. Applicants can be from any Country. However, according to the mobility rule, at the time of the application deadline researchers should not have resided or carried out their main activity (work, studies, etc.) in Italy for more than 12 months in the 3 years immediately prior to the reference date. Compulsory national service and/or short stays such as holidays will not be taken into account.

- Research experience: Applicants shall, at the time of the application deadline, be in the first four years (full-time equivalent research experience) of their research careers and not yet awarded a doctoral degree.

Full-Time Equivalent (FTE) Research Experience will be determined from the date when a researcher obtained the degree which would formally entitle her/him to embark on a doctorate, either in the country in which the degree was obtained or in Italy, irrespective of whether or not a doctorate is or was ever envisaged.

#### Evaluation Criteria

Step 1 -Evaluation of documentation provided by the candidate: a) Academic record and training b) Research activities c) CV/motivation letter; d) Level of English; e) Reference letters.

Step 2 - Interview: a) Scientific knowledge in the field of interest; b) Research experience in the field of interest c), Motivation; d) English proficiency.

#### Supervisor

Dr. Francesco Bellia

<http://www.ibb.cnr.it/?command=viewu&id=508>