***DOTTORATO DI RICERCA IN BIOLOGIA CELLULARE E DELLO SVILUPPO***

**38° ciclo**

**Proposta di assegnazione di una borsa di Dottorato**

**Titolo della ricerca:**

***Saccharomyces cerevisiae* and *Bacillus cereus* group to study molecules of pharmaceutical interest**

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**Summary**

*S. cerevisiae* is the world’s most popular yeast, being essential in baking and brewing since ancient times. This yeast has also gained increasing interest among biotechnology researchers: thanks to several features that make it an easy-to-handle organism, this budding yeast has made possible the discovery of fundamental biological processes often shared with higher eukaryotic cells, at the point to be considered as an honorary mammal (Resnick & Cox, 2000). Many pathways are conserved from yeast to human and we are investigating the function of small molecules on yeast cells, specifically interested in the mitochondrial function. A simple test can predict if a molecule, with a possible pharmaceutical interest, has a negative effect on yeast mitochondria, opening the possibility of an early prediction of its toxicity in human cells. Our research line is based on two small molecules which act as inhibitors of the Csn5 enzyme, involved in the ergosterol/cholesterol pathway, but we are also studying some drugs with side effects in humans, already on the market.

Another type of molecules, synthetic peptides, are investigated in our laboratory, using as a model system the *Bacillus cereus* group. These bacteria are extraordinary from an

evolutionary point of view, and their extreme environmental resistance relies on spore

formation. Nevertheless, this characteristic is a huge problem because spore resistance is the main concern of contamination in food industry. The most famous species are *B. cereus*, *B. anthracis* and *B. thuringiensis*. Some of them are pathogenic for humans and *B. anthracis* is a potential biological terrorism threat because the spores are resistant to destruction and can be easily spread by release in the air. To investigate their peculiar characteristics, we are studying new *Bacillus cereus* strains selected from the environment during bioarchaeological studies and a simulant of *B. anthracis* to test new synthetic peptides with an antimicrobial activity.

**Research objectives**

The aim of this project is to study molecules of a pharmaceutical interest (small molecules and synthetic peptides) and to investigate drugs, already on the market, to study their side effects related to mitochondrial dysfunction.

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