UNIVERSIDADE DE SÃO PAULO

Faculdade de Ciências Farmacêuticas

Departamento de Análises Clínicas e Toxicológicas

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I am writing to express my strong interest in participating in the Intercontinental Academia. The theme on different perspectives of "time" and how science and philosophy approach this issue fascinate me. As a scientist, I have participated in studies investigating (to some extent) the effect of time in biological phenomena and aging since I was an undergraduate student. Also, I am an avid reader on the subject of how time (aging, evolution, and in social experimentation) impacts individual perceptions and behavior, and whether and how such changes are affected by modification (genetic imprinting and synapses) of the brain. As a human being, the concept of time brings about confounding emotions. On one hand, I am conscious of time's presence and thus have an inherent drive for efficiency. On the other hand, the concept of impending mortality, without the placation of religion or spirituality, occasionally unsettles me.

As an undergraduate student, I worked in the laboratory of Dr. Regina Pekelmann Markus at University of São Paulo, Brazil, where I studied how the circadian rhythm's main hormone, melatonin, modulates acetylcholine receptors in skeletal muscle of rats. I later joined the laboratory of Dr. Sergio Verjovski-Almeida at the same university to pursue my Ph.D. in biology where my research focused on cancer, primarily an age-associated disease. I published numerous articles on the role of long noncoding RNAs in cancer progression and as prognosis biomarkers. During my research, I also became proficient in the field of bioinformatics and began to appreciate how this discipline could change the way that human diseases are not only studied, but how they are viewed and understood by the scientific and medical community.

In 2008 I started my post-doctoral fellowship in Dr. Bali Pulendran's laboratory at The Emory Vaccine Center, Emory University (Atlanta, Georgia, USA). The focus of the lab was on immune system mechanisms, an area that was previously little

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explored by computational biology. In this, I found a unique opportunity to apply my bioinformatics skills, and thus participate in the genesis of a new and exciting field of research, now known as "Systems Vaccinology". This interdisciplinary field combines systems-wide measurements, networks, and predictive modeling to study how the body responds to infectious diseases and vaccines that are developed for protection against them. Within 3 years, I was promoted to Research Assistant Professor in the Department of Pathology, Emory University School of Medicine. My key projects involved analyzing changes in transcriptomes (set of all RNAs) in the blood of humans after getting vaccinated or infected and extracting meaningful knowledge out of the sea of data generated. My time at Emory University was very rewarding and productive; our work was published in major journals such as Nature, Science, Immunity, and Nature Immunology.

In November 2013, I was hired as an Assistant Professor in the Department of Clinical and Toxicological Analyses in the School of Pharmaceutical Sciences, University of Sao Paulo, Brazil. In my laboratory, I focus on investigating the basis of infectious diseases and noncoding RNAs using computational systems biology. One of our projects involves the analysis of immunosenescence (i.e., the natural age-associated deterioration of immune function) by studying blood transcriptome from people of different age groups (0 to 90 years old). I am particularly interested in investigating the genetic alterations that occur with aging and how these weaken our ability to fight pathogens and respond effectively to vaccines. This research has invaluable implications for designing effective healthcare for the elderly.

I believe that my biology background, my expertise in computational tools, and my fundamental interest in social sciences will bring a valuable perspective to this interdisciplinary collaborative study on time. I propose to investigate how time is perceived as a result of an individual's (internal and external) experiences. This idea came about when I attended Cortona Week (http://www.cortona.ethz.ch/) in

Tuscany, Italy a few years ago. The meeting was intended to promote a "true inter- and trans-disciplinary experience between science, humanities, arts and spirituality". As common with most scientists, I constantly "feed" my brain with stimulating activities. In one meditation session during Cortona Week, however, this habit was challenged. I was tasked to sit quietly and observe another attendee (a complete stranger) who was to only breathe for 1 hour and half!! I thought I was going to die of boredom (as I probably would have in any other setting) but I found that in that particular environment, soft music, the vibe of the place and people, and the meditation, time seemed to fly by quickly, which shocked me. Instead of feeling boredom, my mind seemed to be at peace. I find this experience to be similar to a study published recently in Science (Vol. 345 no. 6192 pp. 75-77, 2014). In this work, the authors placed groups of volunteers in an unadorned room for 6 to 15 minutes with absolutely nothing to do, or receiving either positive or negative stimuli. They found that many volunteers preferred to self-administer an electric shock rather than be left alone with their thoughts. This further demonstrates how differently individuals perceive time, depending on our mindset and/or our environment. The question that I wish to address is which types of stimuli help to "disengage" our minds? My contribution will be to identify these stimuli using social media and gamification tools. I will create a website to evaluate how thousands of people from different religious, ethnic, and economic backgrounds perceive time when exposed to different kinds of stimuli (music, photo, colors, etc).

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It would be an honor for me to be a part of this scientific enterprise. I thank you for your time and consideration.

Sincere Regards,

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