Position Offered: PREDOCTORAL RESEARCHER

Project: *Analysis of biological images using AI to understand brain function and dysfunction (brAIn)*

Technological and scientific fields: Image analysis and computer vision

Location: Seville, Andalucía, Instituto de Biomedicina de Sevilla (IBiS) https://www.ibis-sevilla.es/es/

Research Group/PI: Mechanisms of neuronal maintenance / Alberto Pascual Bravo. https://www.ibis-sevilla.es/en/research/neurosciences/mechanisms-of-neuronal-maintenance/

PROJECT SUMMARY

The analysis of morphological and topological changes in the mammal brain during disease is still a challenge. Previous approaches to capture the organization of this organ have been mostly limited to the analysis of 2D images and/or small volumes. However, the brain is a very complex 3D structure characterized by high connectivity between brain areas. To understand the brain organization in physiologic conditions and its disorganization during pathology, we need to develop new analysis techniques that will allow us to exploit the huge amount of data that is being recollected by the scientific community. In particular, the use of the Artificial intelligence (AI) will be crucial. Changes in brain organization are intermingled with molecular alterations within the cells, therefore, to properly understand the impact of pathology on brain organization and find potential strategies for interventions, it is essential to integrate the vast information produced by -omics with the intricated morphology of the brain. In this sense, our institute (IBiS) has made a strong effort to implement single-cell technologies, receiving support to acquire single-cell transcriptomics and proteomics technologies and, more recently, spatial transcriptomics. The completion of brAIn will set up a new toolbox of computational strategies to analyze and exploit to its maximal level those new technologies. Of course, all IBiS researchers will benefit from these new pipelines, which could be applied to other organs and pathologies.

PROFESSIONAL PROFILE

Minimum requirements:

- Degree in Computer Engineering, Health Engineering, Statistics, or similar.
- Programming skills: R, Python or MATLAB
- Languages: spanish and english (fluid speaking or B2).

Merits to be considered:

- Knowledge/academic training in theoretical foundations of life sciences.
- Experience in transcriptomic/genomic data analysis.
- Experience in computational analysis of microscopy images.

WHAT IS OFFERED

The PIs have recently contributed in the fields of AD-omics (Alvarez-Vergara et al., 2021, Nat. Commun.; March-Diaz et al., 2021, Nat. Aging; Mora-Romero et al., 2024, Nat. Metabolism) and image analysis of complex 3D structures (Gomez-Galvez et al., 2018, Nat. Commun.) and in the development of software for image analysis and biomedical applications (CartoCell: Andrés-San Román et al., 2023, Cell Reports Methods; NDICIA: Saez et al., 2013, BMC Medicine). Therefore, an international impact of brAIn is expected. The predoctoral researcher will be trained in the acquisition, interpretation and analysis of images of different types, including but not limited to confocal planes, clarified brain volumes and massive data inputs from -omics, in situ, or spatial transcriptomics. Image analysis methods will be developed by "artificial intelligence" (AI) and computer vision to capture the maximum complexity of the data and be able to make comparisons and predictions about function and dysfunction.

Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

PRINCIPAL INVESTIGATOR CONTACT

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Financiado por la Unión Europea NextGenerationEU

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