Project ID: EUR24-01
EMBL Host group leader: Maria Bernabeu
Site: Barcelona, Spain
Host group webpage: https://www.embl.org/groups/bernabeu/

Project description:

The Bernabeu group uses bioengineered 3D blood-brain barrier to study cerebral malaria pathogenesis. The microfluidic 3D blood-brain barrier model is composed of human endothelial cells, astrocytes and pericytes. We work with both primary cells and differentiated cells from induced pluripotent stem cells. We then introduce *P. falciparum*-infected red blood cells or leukocytes within these models to better understand mechanisms associated with vascular barrier disruption and inflammation. Although our models are highly complex, we offer training on basic lab techniques such as *P. falciparum* and human cell culture, as well as introduce the resident into complex bioengineering approaches including microfluidics or 3D culture on hydrogels.

You will obtain the following wet lab skills:

P. falciparum culture, human cell culture in two and three-dimensions, micro-fabrication, microfluidics, confocal imaging and image analysis

You will obtain the following computational skills: Not applicable

Project ID: EUR24-02
EMBL Host group leader: Wolfgang Huber
Site: Heidelberg, Germany
Host group webpage: **www.embl.org/groups/huber**

Project description:

The project is a collaboration on statistical data analysis and multi-omics data integration between the Ingham lab at University of Heidelberg (http://tinyurl.com/3r4vkzas) and the Huber group at EMBL (https://www.huber.embl.de/group/). The candidate will analyze RNAseq and whole genome sequencing of *P. falciparum* aimed at identifying drug resistance markers in cultured parasites maintained under drug pressure, they will also learn how to integrate data with public datasets including relevant datasets included in PlasmoDB (SNPs generated by combining all SNP data for *P. falciparum* from the Broad Institute, NIH, and Wellcome Trust Sanger Institute and relevant RNAseq datasets such as 10.1111/j.1365-2958.2009.07026.x).

You will obtain the following wet lab skills:

P. falciparum culture, mosquito rearing

You will obtain the following computational skills:

Statistical data analysis and multi-omics data integration, RNA-Seq data analysis, single cell RNA-Seq analysis, machine learning, multi-omics factor analysis, open science practices and reproducible research for large, complex analyses

Project ID: EUR24-03
EMBL Host group leader: Andrew Leach
Site: Hinxton, Cambridgeshire, United Kingdom
Host group webpage: https://www.ebi.ac.uk/research/leach/
https://www.ebi.ac.uk/about/teams/chemical-biology-services/

Project description:

The ChEMBL team manages several databases containing information on (mainly) small molecules and related bioactivity data (ChEMBL), patent information (SureChEMBL), links between chemistry databases (UniChEM), and an ontology for biologically relevant small molecules (ChEBI). ChEMBL's bioactivity data has been measured on ~15 thousand different targets relevant for disease biology. As part of this project, the candidate shall identify targets and related bioactivity data for infectious (including neglected tropical) diseases as stored in ChEMBL and further use our model-building toolkit (such as Conformal Prediction models) to establish predictive *in silico* models. The generated models will subsequently be tested/validated by the candidate and best performing models will be added to our portfolio of predictive *in silico* models. Such models are powerful tools to perform virtual screening of large (vendor) libraries and thereby identify novel chemical scaffolds for further synthetic optimisation.

You will obtain the following wet lab skills:

Not applicable

You will need the following computational skills to participate in this opportunity:

candidate will need to be experienced in cheminformatics methods such as large-scale data analyses, QSAR, machine learning, predictive modeling or related disciplines; experienced in using at least one scripting language, preferable Python; experienced in handling small molecule/ drug discovery data

Project ID: EUR24-04
EMBL Host group leader: John Lees
Site: Hinxton, Cambridgeshire, United Kingdom
Host group webpage: https://www.ebi.ac.uk/research/lees/ www.bacpop.org

Project description:

One of the Lees group's interests is further enhancing the democratisation of pathogen genomics techniques used for public health and research questions in the Global South. In this project, the candidate will help develop and evaluate bioinformatic pipelines for the analysis of NGS data. The targeted outputs of these pipelines will be partly guided by the pathogen and hence relevant questions that the candidate is most interested in. The evaluation will draw on the candidate's own research experiences to give a holistic view to the evaluation, considering usability, training needs and data security as well as meeting state-of-the-art research requirements. Eventually these techniques will be implemented in a website to enhance their global reach. We have good links with Cambridge University and the Wellcome Sanger institute, and would also aim to include the candidate in relevant training courses on using pathogen NGS data run by these institutes.

You will obtain the following wet lab skills:

Not applicable

You will obtain the following computational skills:

Genome sequencing and NGS analysis (assembly, mapping, variant calling, phylogenetics, selection analysis). General data science skills. Programming, if desired.

Project ID: EUR24-05
EMBL Host group leader: Eva Kowalinski
Site: Grenoble, France
Host group webpage: www.embl.org/groups/kowalinski/

Project description:

A residency in the Kowalinski lab will offer training opportunities in cutting-edge structural biology, with a focus on RNA processing in the eukaryotic parasite *Trypanosoma brucei*. The Kowalinski lab applies advanced structural biology techniques, including X-ray crystallography and cryo-electron microscopy to characterize RNA processing enzymes and enzyme complexes complemented with biochemical and cellular assays. You will learn: protein expression and purification, production of RNA, protein-protein and protein-RNA interaction assays, and get an overview on available structural biology methods that can be used to elucidate the structure-function relationship of protein.

You will obtain the following wet lab skills:

You will learn: protein expression and purification, production of RNA, protein-protein and protein-RNA interaction assays, and get an overview on available structural biology methods that can be used to elucidate the structure-function relationship of protein.

You will obtain the following computational skills:

Non applicable