

IMMERGE: A New Generation of Experts in Immunodeficiencies in Europe will be trained at the Josep Carreras Institute

Dr. Esteban Ballestar and Dr. José Luis Sardina, Group Leaders at the Josep Carreras Leukaemia Research Institute, will coordinate the IMMERGE project “Storming Immune Monogenic Conditions through Multiomic and Gene Editing Approaches”. This project is a Marie Skłodowska Curie Action Doctoral Network funded by the European Commission under the Horizon Europe framework programme. Its objective is to train 12 Doctoral candidates to become world-class experts and provide new answers to tackle primary immunodeficiency patients.

Our immune systems define how well we respond to infections and eliminate defective cells, such as cancer cells. Unfortunately, some individuals bear mutations in genes that are important for the proper functioning of the system. There are more than 400 pathologies, known as primary immunodeficiencies or Inborn Errors of Immunity, that result from mutations in these genes. Currently, the clinical solutions provided for many of these patients are limited and, in some cases, result from a trial-and-error approach. Experts in different research and clinical areas are necessary to provide personalized solutions to treat these patients.

IMMERGE will bring together top experts in immunology, genetics, epigenetics, proteomics, single-cell omics, bioinformatics, and gene correction from 7 different countries to train the novel leaders in research and clinical treatment of primary immunodeficiencies.

The IMMERGE project plans to address critical challenges in the field, such as:

- 1) To describe and understand the impact of mutations in the different immune cell types using the latest technologies (such as single-cell and bulk multiomics).
- 2) To develop computational tools for dissecting the alterations in cellular pathways underlying specific primary immunodeficiencies.
- 3) To genetically correct or model primary immunodeficiencies and develop pre-clinical models.

The final objective of IMMERGE is to create a network of outstanding scientists and professionals, capable of developing impactful and game-changing studies in the field, create new tools for personalised medicine and generate awareness in society, aiming to influence policy makers.

The Josep Carreras Leukaemia Research Institute will coordinate the network and doctoral students will develop their projects in the following organizations, research institutions, and medical universities:

- Centre d'Immunologie de Marseille-Luminy, CNRS/INSERM/AMU (France)
- Universitätsklinikum Freiburg (UKLFR) (Germany)
- European Molecular Biology Laboratory Heidelberg (EMBL) (Germany)
- Ospedale San Raffaele SRL (OSR) (Italy)
- Hadassah Medical Organization (HMO) (Israel)
- Fondazione per l'Istituto di Ricerca in Biomedicina (IRB) (Switzerland)
- Genome Research Limited (GRL) (United Kingdom)

And two biotech Small and Medium Enterprises (SMEs):

- Alia Therapeutics SRL (ALIA) (Italy)
- Quantitative Genomics Medicine Laboratories SL (QGENOMICS) (Spain)

Additional partners contributing to the specific Ph.D. training program are: Universitat de Barcelona (UB), Aix-Marseille Université, Albert-Ludwigs-Universität Freiburg (ALU-UFR), Università Vita-Salute San Raffaele (**UniSR**), The Hebrew University of Jerusalem (HUJ), Universitat Pompeu Fabra (UPF), Università Degli Studi di Trento (UNITN), Chancellor Masters and Scholars of the University of Cambridge (Cambridge), and Università della Svizzera Italiana (USI).

In addition, specific training providers such as Scienseed SL (Scienseed) and Leadership Sculptor GmbH (Leadership) will reinforce the training tailored explicitly for the Doctoral Candidates. Other biotech companies as Onechain Immunotherapeutics SL (OneChain), EpiQMAx GmbH (EpiQMAx), and Olink Proteomics AB (Olink), will provide the fellows with specific training from the private sector.

Finally, IMMERGE will count with the support of the German patient association Deutsche Selbsthilfe Angeborene Immundefekte e. V (DSA1), that will provide the consortium and the fellows with the view of the patients during the project implementation and will also train the fellows on how to promote their participation in research and future treatments.

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