

Researcher (s):	Prof Dimitrios Zevgolis (PI) Co-Researcher: Dr Hasan Uludag
Research Institution:	University College Dublin and University of Alberta, Canada
Project Title:	Epidermolysis bullosa: Development of advanced biomimetic living equivalents (EB-DOABLE)
Research Area:	Cell Therapy
Start Date: May 2023 (TBC)	End Date: Nov 2023 (TBC)
Funded by:	DEBRA Ireland and University of Alberta, Canada

Lay Summary

Epidermolysis bullosa (EB) is a rare genetic and incurable disease that is associated with severe and painful skin and mucosae fragility, which results in blisters and erosions. It is estimated that 1 per 50,000 live births are diagnosed with EB and that 1 per 100,000 people have the disease. Its severity ranges from mild to fatal and affects every racial and ethnic group worldwide and both sexes equally.

The market size of EB in seven (USA, UK, Germany, France, Italy, Spain, Japan) major markets is estimated at US\$ 2,283.40 million per year, with compound annual growth rate of 5.67 %. Although cell-based tissue engineering therapies have shown remarkable clinical safety, efficiency and efficacy, no product has been commercialised (they are at various stages of clinical trial assessment).

This limited technology transfer from bench-top to clinic has been attributed to the prolonged cell culture time required to develop marginally functional and three-dimensional implantable devices.

This lengthy culture period not only results in cellular phenotype, function and therapeutic potential losses, but also is associated with very high manufacturing costs.

We have developed a patent-protected technology, termed macromolecular crowding, that enables the accelerated (days as opposed to months) development of functional and truly three-dimensional living substitutes. EB-DOABLE will assess the potential of macromolecular crowding in naïve and engineered to synthesise collagen type VII cell populations, ultimately allowing for the development of functional therapy

for EB. EB-DOABLE is a collaborative project between the University College Dublin and the University of Alberta.

Project Abstract

None

Blog post written about project for website

*Not blog post, 'how will this project benefit patients lives?' in application form

This Seed Funding proposal will identify suitable cell populations for Epidermolysis bullosa (EB) that will be used in a subsequent Full Proposal. Ultimately, the project addresses bottlenecks in the development of functional cell-based therapies to provide superior therapeutic solutions for EB, leading to improved quality of life for patients.

Currently used tissue culture environments are primitive and result in cell phenotypic drift, senescence, and loss of the cells' therapeutic potential during the prolonged cell culture time required to develop an implantable device. This project will advance standard ex vivo culture using macromolecular crowding (MMC). We have demonstrated *in vitro* and in preclinical setting that MMC not only maintains cell phenotype during ex vivo expansion, but also allows for the accelerated development of functional advanced therapy medicinal products (within days as opposed to weeks or even months that traditional therapies require). Thus, the project represents a paradigm shift in patient treatment, away from traditional and suboptimal therapies.

Quotes we have from Researchers

None

Researcher (s) Bio

Prof Dimitrios Zevgolis is the Director of the Regenerative, Modular & Developmental Engineering Laboratory (REMODEL) at University College Dublin (UCD), Dublin, Ireland. Dimitrios is Irish Ambassador of European Orthopaedic Research Society (EORS); member of the Endorsement and Editorial Committees of Tissue Engineering and Regenerative Medicine International Society (TERMIS); founder and council member of Matrix Biology Ireland (MBI); and Editor-in-Chief of Biomaterials and Biosystems (Elsevier). Dimitrios has authored >100 peer-reviewed articles, >400 peer-reviewed conference papers and >15 peer-reviewed book chapters. He is on the editorial board of >10 journals and acts as reviewer for >130 journals and >30 funding agencies. Dimitrios has chaired / co-chaired >15 conferences and >50 symposia and has acted as advisor in >25 conferences. Dimitrios has secured 2 patents and founded 2 companies. He has conducted research for >40 companies and has been involved in

the development and commercialisation of numerous food and medical device products.