

Researcher (s):	Prof Wenxin Wang
Research Institution:	University College Dublin
Project Title:	Non-viral Cas12a gene editing approach for RDEB
Research Area:	Gene Therapy
Start Date: June 2021	End Date: Apr 2024
Funded by:	DEBRA Ireland

Lay Summary

Recessive dystrophic epidermolysis bullosa (RDEB) currently has no clinical therapy beyond palliative care and therefore a therapy to restore the structural integrity of the skin by conferring type VII collagen expression to the patients' own cells is greatly required. Genome editing is a way of making specific changes to the DNA of a cell and can be used to treat disorders like RDEB by repairing disease causing mutations. The latest genome editing technology, CRISPR-Cas has demonstrated unparalleled versatility and clinical translatability for treating patients with genetic disorders.

Our research group expertise lies in designing novel carrier systems for delivering gene therapy technologies into cells and tissues. So far we have demonstrated in cells and animals that our carrier systems can introduce CRISPR based technology to repair disease causing mutations in the COL7A1 gene and restore normal functional collagen VII production.

With this proposal we are looking to further develop our approach for a topical application directly onto RDEB patients' skin and expand our treatment target for additional common mutation sites.

Project Abstract

Our Cat-Polymers have shown efficient delivery of a dual-guideRNA CRISPR-Cas9 RNP system in vitro and in vivo for excising COL7A1 exon 80 in RDEB by topical application. Cas12a offers smaller size, more specificity and less off-target effects in comparison with Cas9. We are seeking in this proposal to develop a new treatment approach by combining our Cat-Polymers with the CRISPR-Cas12a system to improve the safety and efficiency of our previous approach for exon 80 excision. Moreover, we will expand our mutation targeting sites to include exon 31, identified as a prominent mutation location within the Irish RDEB population.

Blog post written about project for website

<https://debraireland.org/eb-news/ucd-researchers-developing-life-changing-treatment-for-painful-skin-condition/>

Quotes we have from researchers

Only quotes from UCD press release

Researcher (s) Bio

Wenxin Wang is Full Professor in Skin Research and Wound Healing, a Science Foundation Ireland (SFI) Principal Investigator at the Charles Institute of Dermatology, School of Medicine, University College Dublin (UCD), and a member of UCD Academic Council. He won the highly prestigious “Young Scientist Prize in Regenerative Medicine” in 2010 at TERMIS-EU conference, the “SFI Principal Investigator award” in 2011 and the DEBRA Award for Excellent EB Patient Service in 2014, which highlight his work ethic and achievements. Prof. Wang’s scientific interests are in the areas of biomaterials, stem cell and gene therapy for the treatments of skin wounds, cartilage/bone regeneration, dental tissue regeneration, tissue sealant/adhesive. His scientific contribution and achievements have been recognized both nationally and internationally including over 210 peer-reviewed scientific journal papers (Nat. Commun., Nat. Rev. Chem., Sci. Adv., Angew. Chem., JACS, Chem. Sci. and Nano Letters etc.), 5 book chapters, 34 patents, 147 conference abstracts and presentations, and 118 invited lectures and keynote presentations. Since 2009 he has graduated 19 PhD students and mentored over 25 postdoctoral researchers. His achievements have gained the increased interest in the wider public community with publicity media activities (56 times in TV Documentary, Videos and Newspapers), for example in RTE-TV, ‘The Sunday Times’, ‘The Irish Times’, ‘Science Daily’ and ‘Chemistry World’. He has been awarded significant funding (ca. 11.57 million Euros) from different sources, e.g., SFI, Health Research Board (HRB), Irish Research Council (IRC), Enterprise Ireland (EI) and European Union (EU-FP7 & EU Horizon 2020) to support his research activities. Prof. Wang has acted as the symposium convener and chair, the member of organizing committees and the member of the conference advisory board for 32 international conferences and has been selected as an expert reviewer and panel member by 26 international research councils and funding bodies. As the founder, Prof Wang has launched 3 companies - Vornia Ltd (www.vornia.com, acquired by Ashland - a Fortune500 US company in Jan. 2018, renamed as Ashland Specialties Ireland), Blafar Ltd. (www.blafar.com), and Branca Bunús Ltd. (www.brancabunus.com). There three companies currently hire 21 employees in Ireland. Furthermore, he has licensed 17 new technologies to 4 companies: Ashland, Amryt Biopharm, Blafar and Branca Bunús, and successfully launched and commercialized 5 newly developed technologies onto the market.

