


HALA SHAKIB DHOWRE

CURRICULUM VITAE

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RESEARCH INTEREST

I have expertise in the application of regenerative medicine and stem cells research for restoration of normal functions in damaged and diseased cells/ tissues and their future applications in medicine. My research interests lie in the biomaterials that mimic natural microenvironments using 2D and 3D engineered models; surface modification, micropatterning and microfluidics.

A key focus is to increase speciality in understanding stem cell transitions and signalling, grow expertise in the combination of modelling, biophysical and biochemical approaches for cell-material interface in neuroscience and ophthalmology.

Currently I am developing my data science skills as a participant in the Tech Talent Academy's Data Academy Programme where I am furthering my knowledge to analyse large data sets with new skills in Python fundamentals, R, SQL, PowerBI and machine learning.

EDUCATION

2018 **Doctor of Philosophy (Ph.D) – Pharmacy (09/2013 – 10/2018)**

School of Pharmacy & Department of Electrical and Electronic Engineering, University of Nottingham, Nottingham, United Kingdom

Ph.D thesis: Surface chemistry guidance in controllable neural stem cells differentiation to direct stem cell fate. Future applications in building neural networks.

2013 **Master of Science (M.Sc.) – Pharmacology (09/2011 – 09/2012)**

School of Pharmacy, Aston University, Birmingham, United Kingdom

M.Sc. dissertation/ thesis: Screening a drug library for novel opioid receptor agonist using the electrically stimulated isolated Guinea-pig ileum.

2010 **Bachelor of Science with Honours (B.Sc. Hons.) – Biological Chemistry (09/2007 – 07/2010)**

Faculty of Chemical Engineering & Applied Chemistry, Aston University, Birmingham, United Kingdom

B.Sc. (Hons.) Dry Laboratory Dissertation (1): Langmuir and Brewster techniques in the study of biological fluids.

B.Sc. (Hons.) Wet Laboratory Dissertation (2): Characterising the oxidative stability of speciality plant seed oils.

PROFESSIONAL EXPERIENCE

Postdoctoral Research Scholar, Department of Ophthalmology, School of Medicine, Stanford Byers Eye Institute, Stanford University, Palo Alto, USA, 11/2021 – 11/2023

- Restoring the Ocular Surface Through Differentiation of Human iPSC into Corneal Limbal Stem Cells.

Honorary Research Associate, Department of Musculoskeletal Ageing Science & Department of Eye and Vision Science, Institute of Life Course and Medical Sciences, University of Liverpool, Liverpool, UK, 06/2021 – 05/2023

Postdoctoral Research Associate, Department of Musculoskeletal Ageing Science, Institute of Life Course and Medical Sciences, University of Liverpool, Liverpool, UK, 01/2021 – 05/2021

- Evaluating and comparing the biomechanical properties of osteogenesis imperfect mouse model (oim) to that of a Col1a2 null mouse. Specifically, we compared the mouse tail tendon of oim homozygous and heterozygous mutant mice with that of mice containing 1 or 2 copies of targeted Col1a2 null allele and wild-type controls, in order to determine the contribution of collagen (I) homotrimer to bone fragility.
- Evaluating and analysis of the biomechanics of the aorta.
- Analysis of three point bending (3BP) and micro-computed tomography (μ CT) of freshly isolated femurs and tibias, and allelic discrimination by quantitative PCR (qPCR).

Postdoctoral Research Associate, Department of Eye and Vision Science, Institute of Life Course and Medical Sciences, University of Liverpool, Liverpool, UK, 08/2019 – 01/2021

- Researched a new chemical cross-linkers capable of adjusting the biomechanical and structural properties of the cornea by crosslinking the collagen as a treatment for Keratoconus by optimising the current novel formulation; as well as developing new formulations.
- Evaluated the novel chemical cross-linker formulations by determining new chemical crosslinking bonds of the collagen fibres in the cornea by measuring the stiffness in *ex vivo* porcine cornea.
- Ability to setup and perform the pre-clinical studies in rat and rabbit models; as well investigating the systematic toxicology before and after treatment with the novel chemical cross-linker.
- Provided help and advice on the MRC Developmental Pathway Funding Scheme for the 'Preclinical evaluation of a new chemical cross-linker for the treatment of Keratoconus'.
- Collected data to support the prior art of the optimised chemical crosslinking technology (IP accepted in the USA and an application submitted to the EUIPO); as well as discussing closely with the IP lawyers a new IP for the newly developed chemical cross-linker formulation that we have established and validated.
- Attended and presented at the BI Office Event to pitch the commercial model of the novel chemical cross-linker to the Boehringer Ingelheim.
- Participated with a £5000 award in the first North-by-Northwest (NxNW) partners Lean Launch Programme (LLP) bootcamp of 2020 (QUBIS - the commercialisation arm of Queen's University Belfast). The bootcamp was a pre-accelerator initiative that enabled us as a team to validate our research, explore the most appropriate routes to market and gain further funding to our commercialisation journey.
- Attended the European Society of Cataract & Refractive Surgeons (ECRS) international conference to conduct the market research by discussing the new novel chemical cross-linking treatment for Keratoconus with ophthalmologists, optometrists, and the ophthalmic market.
- Awarded the 'Best Pitch' and 'Most Engagements' after presenting my findings on the LLP Pitch Day to a mix audience (i.e. investors, researchers, clinicians, journalists, IP lawyers etc...).
- Teaching responsibilities for the MRes. Clinical Sciences programme, which included lecturing, marking and demonstrating for the laboratory sessions.
- Teaching responsibilities on the Research Project Module of final year students at the School of Life Sciences. Planned a mini-lecture, journal club and workshop around the topic Pharmacology – Drug Delivery to the Retina titled 'Nanotechnology in the Biomedical Sciences'.

Postdoctoral Research Associate, Bioengineering & Health Technologies (BHT), School of Dentistry, University of Sheffield, Sheffield, UK, 03/2019 – 07/2019

- Researched newly designed microfabricated corneal membranes (manufactured via electrospinning) as promising alternatives to the amniotic membrane (AM) to be used in the Simple Limbal Epithelial Transplantation (SLET) technique for cornea replacement treatment.
- Evaluated the properties of microfabricated membranes in various solvent systems and the biological response of the cultured corneal explants.
- Visiting Research Associate at the LV Prasad Eye Institute Hyderabad (LVPEI, Hyderabad Area, India) to conduct a 6 week placement (25th May 2019 – 3rd July 2019) as part of the GCRF Sustainable Partnership at the L.V.Prasad Eye Institute (LVPEI) in the Prof. Brien Holden Eye Research Centre
- At LVPEI I explored the performance of the microfabricated scaffolds (i.e. synthesised at the University of Sheffield) prototypes in human cornea in vitro model with the help of Ph.D student Abhinav Reddy. Further training in the current limbal explant outgrowth characterisation used at LVPEI was provided as well as being invited to sit in during SLET operations by Dr Sayan Basu.

Researcher, Regenerative Medicine and Cellular Therapies Division (RMCT), School of Pharmacy

University of Nottingham, Nottingham, UK, 09/2013 – 11/2017

Pharmacology/ Pharmacy Intern, Molecular Biomedical Research Group

Aston University, Birmingham, UK, 11/2012 – 05/2013

Biological Chemistry/ Polymer Science Research Intern, CEAC Research Groups

Aston University, Birmingham, UK, 06/2011 – 10/2011

Graduate Intern (GSK), Biomaterials Research Group (Awarded)

Aston University, Birmingham, UK, 08/2010 – 12/2010

SKILLS & TECHNIQUES

- **Software:** Microsoft Package, Python (Numpy/ Pandas/ SciKit/ TensorFlow), R (programming language), SLQ, PowerBI, Machine Learning, MATLAB, TeX (LATEX, BIBTeX), Illustrator, ChemDraw, ImageJ, Origin, GraphPad Prism, Zenlite, CASAXPS, Nanoscope and Gwyddion.
- **Managerial Skills:** Mentoring, Commercial Awareness, Problem Solving and Decision Making, Strategic Thinking, Communication and Interpersonal Skills, Conflict Management, Adaptability, Time Management, Team Work and Leadership.
- **in vivo and in vitro skills:** Animal handling, dissection (i.e. brain, liver, spleen, eyes, etc...) and isolation of hippocampal neural embryonic (E18) cells/ limbal stem cells (LSCs)/ spleenocytes. Cell culture of NPSCs, IPSCs, and LSCs. Tissue and organ handling of (1) whole globe eyes and brain slicing, (2) Ca²⁺ imaging, and (3) electrical stimulation of the GPI model.
- **Cell analysis techniques:** Gel Electrophoresis, Southern Blot, Western Blot, RT-PCR, DNA/RNA/Protein Purification, Protein Assays, MTT Assays, Enzyme Assays, Oxidative Stress Biomarkers, Immunohistochemistry, Immunocytochemistry and Immunofluorescence.
- **Microscopy techniques:** Fluorescence Microscopy, CLSM, preparation of Biological TEM samples and analysis of TEM images, OCT, Live Cell Optical Imaging and Brewster Angle Microscopy.
- **Surface functionalisation:** Design and fabrication of surfaces modified with organic molecules (i.e. specifically peptides) via the SPPS approach “grafted from” or “grafted to” surfaces on 2D and 3D (i.e. nanoparticles, micro-channels, MEAs) materials.
- **Synthesis:** Organic molecules, particles and tissues including peptides, carbohydrates, lipids, proteins, polymers, and inorganic micro- and nanoparticles.

- **Multi-disciplinary characterisation techniques:** WCA, AFM, XPS, ToF-SIMS, Fluorescence Spectroscopy, FTIR, HPLC, ESI-MS, NMR, UV-Vis Spectroscopy, DLS, ζ -potential, EDX, Biomechanical Tensile Testers (Bose Machine, CellScale Univert and Linkam), Rheometer, TGA, DSC, GC and SEM.
- **Fundamental knowledge and training:** FACS, CRISPR/CAS9, Super-resolution Microscopy (i.e. STORM, PALM, FPALM), Electrophysiology Patch Clamp, Microfluidic Devices, SPR based characterisation tools (i.e. Biacore, SPRI) and some experience with Clean Room facilities (i.e. device fabrication).

PUBLICATIONS

- **Hala S. Dhowre***, Sunil Rajput, Noah A. Russell and Mischa Zelzer, 2015. Responsive cell-material interfaces, *Nanomedicine*. 10(5), 849-871 (DOI: 10.2217/nnm.14.222)
- Thomas E. Paterson*, **Hala S. Dhowre***, Danilo Villanueva Navarete, Joseph W. Holland, Abhinav Reddy Kethiri, Vivek Singh, Frederik Claeyssens, Sheila MacNeil, Ilida Ortega Ascencio, 2021. Tuning electrospun substrate stiffness for the fabrication of a biomimetic amniotic membrane substitute for corneal healing, *ACS Applied Bio Materials* (DOI: 10.1021/acsabm.1c00436)
- Hidalgo-Alvarez, V., **Dhowre, H. S.**, Kingston, O. A., Sheridan, C. M. & Levis, H. J. Biofabrication of Artificial Stem Cell Niches in the Anterior Ocular Segment. *Bioengineering* **8**, 135 (2021).

LICENSES

- Home Office Personal License, PIL Number I74709761, granted on 20th November 2019.

AWARDS, GRANTS & FUNDS

- 02/2021 University of Liverpool, Department of Eye & Vision Science, Research Support**
– Development of nanofibrous core-shell scaffolds for optic nerve regeneration.
(£1000)
- 01/2021 University of Liverpool, Department of Eye & Vision Science, ECR Research Fund**
– Development of nanofibrous core-shell scaffolds for optic nerve regeneration.
(£1930)
- 01/2020 University of Liverpool, The Enterprise Fund – University of Liverpool**
– to participate in the LLP programme for the market research of the chemical cross-linker
(£5000)
- 12/2016 Disease Models and Mechanisms Conference Travel Grant, Company of Biologists; Royal Microscopy Society Travel Grant; University of Nottingham, BA Bull Postgraduate Travel Prize, School of Pharmacy; Biochemical Society General Travel Grant; Royal Society of Chemistry Travel Grant, Environment, Sustainability and Energy**
– to attend Pacific Rim Symposium on Surfaces, Coatings & Interfaces 2016, Hawaii, USA
(£600; £450; £450; £650: £620)
- 11/2016 AVS Dorothy M. and Earl S. Hoffman Travel Grant; Institute of Physics C.R. Barber Trust Fund; Institute of Physics Travel Prize, Biological Physics Group; University of Nottingham, Postgraduate School Travel Prize**
– to attend the AVS 63rd International Symposium & Exhibition, Nashville, USA
(£300; £175; £300; £600)
- 03/2015 Royal Society of Chemistry Travel Grant, Chemistry Biology Interface Division**
– to attend the Nanopeptide 2015 Glasgow, UK
(£120)

PROFESSIONAL ASSOCIATIONS

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| • Royal Society of Chemistry | • Institute of Physics |
| • Royal Microscopy Society | • Physiological Society |
| • Biochemical Society | • Institute of Engineering and Technology |

REFERENCES

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