

BREATH Dissemination Event



Ballymascanlon House

Hotel, Dundalk

March 30th 2022

2pm – 5pm

Interreg



EUROPEAN UNION

Northern Ireland - Ireland - Scotland

European Regional Development Fund

BREATH Dissemination Event

We would like welcome you to our BREATH Dissemination Event in the Ballymascanlon House Hotel, Dundalk.

BREATH (Border and Regions Airways Training Hub) is an €8M EU INTERREG VA-funded cross-border partnership between Dundalk Institute of Technology, Queens University Belfast and the University of the West of Scotland. We have established a world-class cluster of scientists and clinicians to address the causes, treatment and prevention of chronic obstructive pulmonary disease (COPD). COPD has an annual EU economic burden of €141.4 billion and is particularly prevalent within the INTERREG VA Eligible Region.

BREATH has successfully trained 28 young scientists to PhD level, or beyond, in both project specific scientific skills and, through industrial interactions, in transferable and complementary industry-relevant skills. Many of these have progressed into high level jobs in industry and academia within the Region and beyond. We have active collaborations with 3 industrial partners and have engaged with another 16 local and international companies over the course of the project. To date the project has produced nearly 80 conference presentations and research papers, most of which have cross-border authorship. We also have an extensive public outreach programme consisting of multiple school visits and media events, through which we have actively engaged over 5,000 pupils to date across the Region.

Our dissemination event will highlight the success of BREATH across all fronts by presenting the achievements of the project over the last 5 years with presentations from our academic leads, political leaders, industrial partners and trainees.



The European Union's INTERREG VA Programme is managed by the Special EU Programmes Body. Match-funding for this project has been provided by the Department for the Economy in Northern Ireland and the Department of Enterprise, Trade and Employment in Ireland.



Schedule of Events

Session 1

2.00	Welcome by BREATH Lead, Prof Keith Thornbury	
2.05	Video address by Gordon Lyons, M.L.A., Minister for the Economy NI.	
2.10	BREATH, scope, aims and achievements Prof. Keith Thornbury, DkIT, BREATH Programme Lead	
2.30	BREATH Industrial Partnerships Prof. Lorraine Martin, QUB BREATH Lead.	
2.45	BREATH Public Engagement Prof. John Lockhart, UWS BREATH Lead.	
3.05	Presentation by Martin Charters (COPD Patient Advocate)	
3.15	Address by Emma Harper, M.S.P.(South Scotland)	
3.30 – 3.50	<i>Coffee Break</i>	

Session 2

3.50 Joint address by Dr Michael Mulvey, President DkIT and Prof. Ian Greer, Vice Chancellor, QUB.



4.00 Dr Ruth Matthews, BREATH PhD Student, DkIT



4.10 Dr Orla Dunne, BREATH PhD Student, QUB



4.20 Kimberly Black, BREATH PhD Student, UWS



4.30 Dr Roddy Large, BREATH Postdoctoral Research Fellow, DkIT



4.40 Dr James Reihill, BREATH Senior Research Fellow, QUB



4.50 Dr Richard Wilkinson, Almac Discovery, BREATH Industry Partner



5.00 Address by Helen Donaldson, Acting Director for the Joint Secretariat with the SEUPB.





BREATH Company Partner

Almac Discovery is a biotech company, supported by the Almac Group of companies, with sites based in Belfast, Edinburgh, and Manchester. The Discovery team has a track record of delivering successful drug discovery programmes and has made fundamental contributions to the development and advancement of new medicines that address unmet medical needs across a range of therapeutic indications.

Technology

A primary focus of Almac Discovery is targeting the Deubiquitinating enzyme class (DUBs).

DUBs are proteases that catalyse the de-ubiquitination of protein substrates and as such offer an alternative way to regulate protein homeostasis by affecting protein stability, signalling, and trafficking. Almac Discovery have developed a purpose-built drug discovery platform (UbiPlex™) for the identification and optimisation of DUB inhibitors. In 2020, Almac Discovery partnered with the BREATH consortium to focus on identifying roles for DUBs in the airway diseases COPD (chronic obstructive pulmonary disease) and CF (cystic fibrosis) using a CRISPR-based gene knock out screening approach; a first step towards identifying DUBs of therapeutic interest in these diseases. Potential lead therapeutic targets are currently being assessed to explore the therapeutic utility of Almac Discovery's DUB inhibitors as novel treatments for COPD and CF.

Find out more at <https://www.armacgroup.com/discovery/>

Industry Team:



Prof. Tim Harrison
VP Discovery Chemistry



Prof. Dan Longley
Group leader



Dr Ian Lobb
Technical Leader



Dr Richard Wilkinson
BREATH-funded
Post-Doctoral Research Fellow



Dr James Reihill
BREATH-funded Senior Research Fellow (QUB)
MRC Innovation Scholar (Almac Discovery)

BREATH Company Partner

OmniSpirant Therapeutic biotechnology SME founded in 2016 to develop first-in-class inhaled regenerative gene therapies for treating serious cystic fibrosis (CF). The company received funding in 2018 by H2020 SME Instrument to develop advanced therapeutics for cystic fibrosis and seal of excellence in 2020.

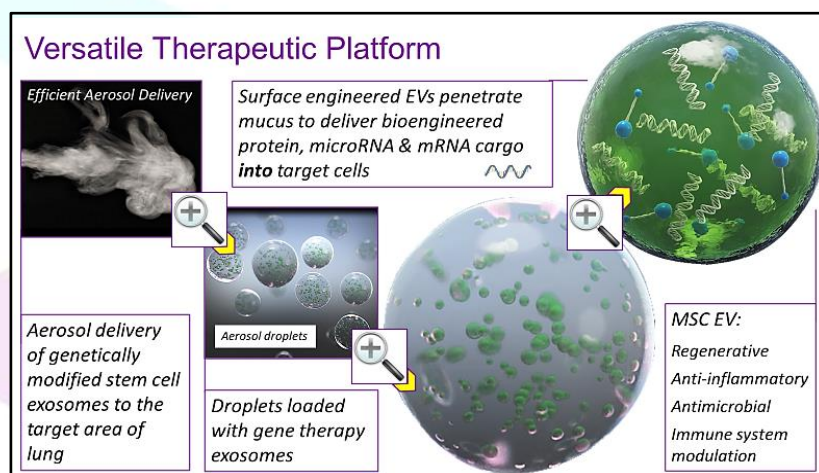
Technology

OmniSpirant have developed unique mesenchymal stem cell (MSC) extracellular vesicle (EV) bioengineering and surface-engineering technologies OmniSomes[®]; a game-changing innovation that:

- 1) enables safe and efficient inhaled delivery of diseased tailored gene therapy directly to the lung; and
- 2) is based on regenerative stem cell EVs, comprising a mixture of exosomes and larger microvesicles.

MSC EVs have proven therapeutic potential to reverse inflammatory lung disease damage.

Find out more at <https://www.omnispirant.com>



Industry Team:



Dr Gerry McCauley
CEO



Dr Katie Gilligan
BREATH-funded
Doctoral Research Fellow

BREATH Company Partner

pHion Therapeutics was founded in 2017 based on technology developed in the School of Pharmacy at Queen's University Belfast. pHion Therapeutics is a vaccine development company that is utilising its patented RALA peptide-based platform for the delivery of anionic cargo such as mRNA. When combined with mRNA, RALA generates a uniquely potent therapeutic CD8+ response, without provoking an innate immune response.

Technology

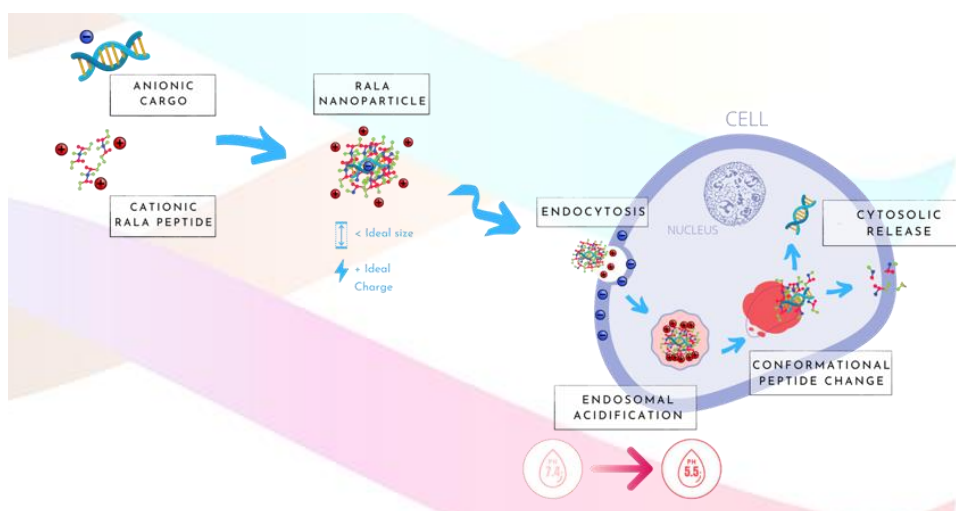
RALA is a 30 amino acid, peptide-based drug delivery system (DDS) which condenses anionic cargo of any size (RNA, DNA, small molecules) to nanoparticles.

RALA is highly efficient at cellular entry, without the manufacturing complexity or safety issues of viruses.

RALA-mRNA formulations are stable at room temperature.

pHion's development pipeline is initially focused on viral infections and oncology.

Find out more at: www.phiontx.co.uk



Industry Team:



Prof. Helen McCarthy
CEO



Darach Neeson
COO



Dr Emma Carroll
BREATH-funded
Post-doctoral Research Fellow



Dr Eamonn Bradley

DkIT Post-Doctoral Research Fellow

- **Personal profile**
 - *From Glenarm, Co. Antrim*
- **Academic background**
 - *BSc Physiology (QUB)*
 - *PhD Physiology (QUB)*



Role in the BREATH project:

I had a strong background in the life sciences before BREATH, having over 15 years experience in research (Cell Biology, specifically ion channels) resulting in publications in a range of high impact scientific journals and had presented my findings at a variety of conferences. During the BREATH project I was based in the SMRC in Dundalk IT. I provided help and support to the PhD students based there. I also researched sodium channels, potassium channels and chloride channels and specifically their role in airway smooth muscle contraction. My experience in the BREATH project has given me a skill set that I hope can be the base of a successful future career.



Key workshop, courses and conference attendance:

- FASEB Miami 2019
- Irish Thoracic Society Meetings
- Workshops during the covid lockdown



Additional skills that were developed through BREATH:

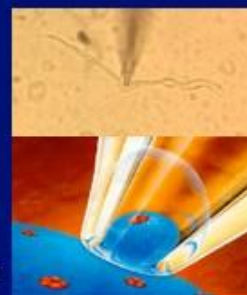
- Collaboration
- Effective project management

My most memorable BREATH moment:

- FASEB conference
- Michel Barnier at DkIT

My current & future plans:

- Use the skill set developed during BREATH in my new post in the Health and Safety Executive





Dr Srikanth Dudem

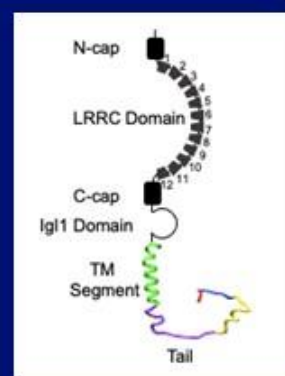
DkIT Post-Doctoral Research Fellow

- **Personal profile**
 - *Hyderabad, India.*
 - *Molecular Biologist &*
 - *Electrophysiologist*
- **Academic background**
 - *PhD (SMRC, DkIT)*
 - *MSc (Osmania University)*



Key Role:

- Responsible for molecular biology, cloning and cell culture facilities.
- Training new students in cell culture, molecular biology and electrophysiology techniques.
- Guiding PhD students in regular day to day experiments.
- Involved in data generation, analysis, interpretation, manuscript preparation and submission to journals.
- Helping PhD students in data generation, analysis and thesis writing.
- Oversee the aseptic techniques and good laboratory practices in the laboratory.



Key workshop, courses and conference attendance:

- Conference session chair for 2019 BREATH annual conference at QUB.
- Presented poster at K_v7 symposium, Naples, Italy, 2019.
- Presented poster at FASEB Smooth Muscle Conference, Florida, USA, 2019.
- Virtual TEVA industrial workshop, 2020.
- Virtual industrial day by Almac, pHion Therapeutics, Axis Bioservices, Causeway Sensors, 2021.

Additional skills that were developed through BREATH:

- Learned to train and guide PhD students in their research projects.
- Collaborations around the world (United Kingdom, Germany and USA) have increased links with the scientific community.

My most memorable BREATH moment:

- Published Handbook of Experimental Pharmacology book chapter in 2021.

My current & future plans:

- Increase my publication record, attract new research grants & secure a permanent academic position.





Dr Niki Mullins

Research Fellow in Medicinal Chemistry

Personal profile

- Cork City, Ireland

Academic background

- BSc – University College Cork
- PhD – Organic Chemistry, UCC
- 10+ yr postdoc experience
- 3+ yr lecturing experience



Key Role:

Research Fellow in Medicinal Chemistry
Design, synthesis and evaluation of novel small molecule ion channel modulators
Manual solid state synthesis of peptides
Collaboration with QUB and UWS on synthesis of molecules
Proofreading theses and other scientific literature from the SMRC group
Mentoring PhD and undergraduate project students
Dissemination of research through journal publications and attendance at (inter)national conferences



Selected Oral and Poster Presentation Conference Contributions:



- 2020 6th RSC/SCI Symposium on Ion Channels as Therapeutic Targets Feb 24-24 Cambridge, UK
- 2019 3rd Liverpool-Romark Medicinal Chemistry Symposium April 12, Liverpool, UK
- 2019 RSC Organic Division Ireland Regional Meeting, June 7, UCD, Ireland
- 2019 International Symposium on Synthesis and Catalysis, Sept 3-6, Evora, Portugal
- 2019 Recent Advances in Synthesis and Chemical Biology XVIII Symposium, Dec 6, TCD, Ireland
- 2018 BMCS Mastering MedChem IV Symposium, Mar 4, Glasgow, UK
- 2018 RSC Organic Meeting Ireland Division, May 2, QUB, Northern Ireland
- 2018 22nd IUPAC International Conference on Organic Synthesis, Sep 16-21, Florence, Italy
- 2017 Recent Advances in Synthesis and Chemical Biology XVI Symposium, Dec 8, UCD,

Additional skills that were developed through BREATH:

- Collaborative skills both academic and industrial
- Presenting skills

My most memorable BREATH moment:

- Attending the viva celebrations of each of the DkIT students !!!!!

My current & future plans:

- Part-Time Lecturer in Chemistry in Dundalk Institute of Technology





Tuleen Alkawadri

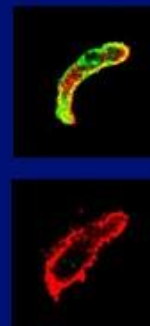
DkIT PhD Student

- **Personal profile**
 - *Damascus, Syria*
 - *Reading, Learning Languages, Art*
- **Academic background**
 - *PhD (DkIT)*
 - *MSc Pharmacology (NTU)*
 - *BSc Pharmacy (Damascus University)*

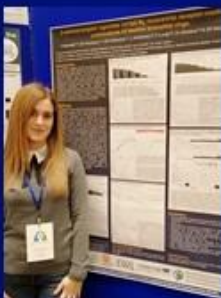


Mechanisms underlying cholinergic contractions of airway smooth muscle and their regulation by β -adrenoreceptor agonists.

Cholinergic contractions of airway smooth muscle (ASM) are thought to be primarily mediated by M_3 Rs, despite the higher expression ratio of M_2 Rs (4:1). Therefore, the exact post-junctional role of M_2 Rs remained elusive. The main aim of this project was to identify the post-junctional role of M_2 Rs in cholinergic responses of ASM, using a variety of experimental methods such as isometric tension, live-cell Ca^{2+} imaging, immunocytochemistry. The key finding of this project was the identification of a novel and profound M_2 R-mediated hypersensitisation of M_3 R-dependent contractions of ASM at low stimulus frequencies and intervals, which could be a causative factor in the generation of airway hyperresponsiveness in diseases such as asthma and COPD.



Key workshops, courses and conference attendance:



- Oral presentation at Physiology 2019 meeting, Aberdeen, Scotland.
- Oral presentation at British Association for Lung Research 2021 meeting, Online event.
- Poster presentation at Irish Thoracic Society Meeting, Belfast, Northern Ireland, 2018
- Poster presentation at Irish Thoracic Society Meeting, Galway, Ireland, 2019
- TEVA industry event/training event, Queen's University Belfast, 2019
- Chiesi ENGAGE Event, Queen's University Belfast, 2019
- Visit to GlaxoSmithKline house, Stevenage, London, 2019
- Virtual TEVA industrial workshop, 2020
- Virtual industrial day by Almac, pHion Therapeutics, Axis Bioservices, Causeway Sensors, 2021

Additional skills that were developed through BREATH

- Networking and collaboration with researchers and clinicians in QUB and UWS.
- Confidence in presenting scientific data to both researchers and laypeople through participation in conferences and BREATH outreach events.

My most memorable BREATH moment:

- The amazing friendship with the SMRC PhDs, especially the BREATH students, whose support was invaluable throughout the PhD journey.
- Publishing my first author paper titled "Contribution of post-junctional M_2 muscarinic receptors to cholinergic nerve-mediated contractions of murine airway smooth muscle" in APS Function.



My current & future plans:

- Excited to start my postdoc at SMRC and to publish more research!



Ritu Dwivedi

DkIT PhD Student

Personal profile

- Alwar, India
- Cooking, Reading, Planning events

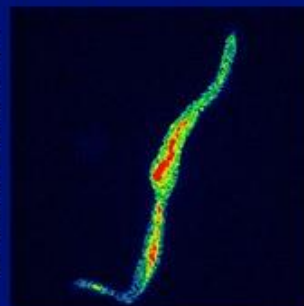
Academic background

- Masters of Research
(University of Manchester)
- Bachelor of Technology
(Jaypee Institute of Technology)



Investigation of ion channels involved in cholinergic activity in mouse bronchial smooth muscle

The primary aim was to investigate the role of ion channels in cholinergic activity in mouse airway. Multiple ion channels such as TMEM16A (calcium-activated chloride channel), VGCC (voltage-activated calcium activated), TRPs (non-selective cation channel) and STIM/ORAI (calcium-released activated calcium channel) were found to be expressed in airway smooth muscle, however, their contribution to cholinergic responses remains unclear. A variety of experimental techniques including live-cell calcium imaging, isometric tension recording and primary mouse airway smooth muscle cells isolation were used to investigate the involvement of ion channels in carbachol-evoked cholinergic responses of mouse airways. Key findings of this project are that TMEM16A channels unexpectedly play only a minor role in carbachol-evoked responses of mouse airways, while the STIM/ORAI channels play a major role.



Key workshops, courses and conference attendance:

- Irish Thoracic Society Meeting, Belfast, Northern Ireland, 2018
- TEVA industry event/training event, Queen's University Belfast, 2019
- Chiesi ENGAGE Event, Queen's University Belfast, 2019
- The FASEB Science Research Conference on Smooth Muscle, West Palm Beach, Florida, USA, 2019.
- Visit to GlaxoSmithKline house, Stevenage, London, 2019
- Irish Thoracic Society Meeting, Galway, Ireland, 2019
- Virtual TEVA industrial workshop, 2020
- Virtual Industry training day by Almac, pHiion Therapeutics, Axis Bioservices, Causeway Sensors, 2021

Additional skills that were developed through BREATH:

- Working collaboratively as part of multi-disciplinary team
- Delivering my ideas and work to clinicians and fellow researchers

My most memorable BREATH moment:

- Incredible outings, infinite laughter and friendship shared with BREATH girls
- Presenting my work in FASEB conference, Florida

My current & future plans:

- Current plan: defend my thesis successfully
- Future plan: obtain a post-doctoral position within academia or industry





Shruti Kulkarni

DkIT PhD Student

Personal profile

- From Pune, India
- Love travelling, reading and listening to music

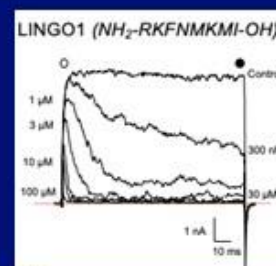
Academic background

- M.Sc. Biotechnology (U. Pune)
- B.Sc. Biotechnology (U. Pune)



Project Title: LINGO proteins novel inactivating subunits of BK channels

BK channels consist of tetrameric α subunits and associated β or γ subunits which can modulate their biophysical and pharmacological properties. Since the four γ subunits are Leucine Rich Repeat (LRR) proteins we examined if other LRR proteins such as LINGO1 also modulated BK channels. The aims of my study were as follows: 1) to examine the effects of LINGO tail peptides on BK channels, 2) to elucidate the mode of action of LINGO1 tail peptide-mediated inactivation of BK channels and to identify potential sites of interaction between the LINGO1 tail and the BK channel pore. The key findings of this study were: 1) mRNA expression for all four LINGO subtypes was detected in murine airway and brain, 2) Synthetic tail peptides of LINGO1 and LINGO2 inactivated BK α currents. However, LINGO4 tail peptide blocked but did not inactivate BK α currents, 3) The net positive charge and the position of positive charges in the LINGO1 tail peptide affected its ability to inactivate BK channels, 4) LINGO1 tail peptide appears to insert itself into the pore of the BK channel and may compete with quaternary ammonium ions for a common binding site, 5) The positively charged residues of LINGO1 tail peptide may interact with negatively charged residues in the S6 helix of the BK channel pore.



Key workshops, courses and conference attendance:

- Irish Thoracic Society Meeting, Belfast, Atrium, Northern Ireland, 2018
- All Island Civic Dialogue Event, DkIT, Ireland, 2018
- Received best Oral Presentation Award, BREATH conference, 2018
- TEVA industry event/training event, Queen's University Belfast, 2019
- Chiesi ENGAGE Event, Queen's University Belfast, 2019
- FASEB Research Conference on Smooth Muscle, West Palm Beach, Florida, USA, 2019
- Visit to GlaxoSmithKline house, Stevenage, London, 2019
- Irish Thoracic Society Meeting, Galway, Ireland, 2019
- Virtual TEVA industrial workshop, 2020
- Virtual Industrial day by Almac, phion Therapeutics, Axis Bioservices, Causeway Sensors, 2021

Additional skills that were developed through BREATH:

- Networking and collaborations with researchers and clinicians in QUB and UWS
- Confidence in summarising and presenting scientific data to both researchers and laypeople through participation in conferences and BREATH outreach events

My most memorable BREATH moment:

- The amazing friendships with the SMRC PhDs, especially the BREATH students, whose support was invaluable throughout the PhD journey
- Publishing my first paper titled "LINGO1 is a regulatory subunit of large conductance, Ca²⁺-activated potassium channels" in the prestigious journal, PNAS (USA)

My current & future plans:

- Currently I am working as an Associate Scientific Writer in Indegene, India





Ruth Matthews

DkIT PhD Student

Personal profile

- Termonfeckin, Co. Louth, Ireland
- Hobbies: Traveling, interior design, my dog Bagel!

Academic background

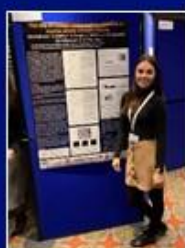
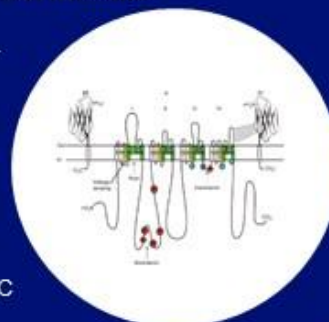
Degrees:

- PhD Electrophysiology, Dundalk IT, 2021
- BSc.(Hons) Biopharmaceutical Science, Dundalk IT, 2017.
- BSc. Applied Bioscience, Dundalk IT, 2016



Characterisation of a fast Na⁺ current in murine airway smooth muscle

The present study reveals the presence of a voltage-gated Na⁺ channel (Na_v) in murine airway smooth muscle (ASM). The current was TTX sensitive, unlike the TTX-insensitive Na_v1.5 current previously described in rabbit ASMCs. RT-PCR and immunocytochemistry experiments exhibited consistent expression of Na_v1.7 in isolated ASMCs. Additionally, the current was highly sensitive to modulation by the Na_v1.7-specific antagonist, PF-05089771 and agonist, OD1. Further experiments demonstrated Epac-mediated regulation of the ASM Na⁺ current whereby Epac activation inhibited Na⁺ conductance. Isometric tension recordings demonstrate that thromboxane-induced phasic activity in murine bronchial rings was sensitive to Na_v channel modulators. These data suggest the presence of Na_v1.7 in murine ASMCs and furthermore, whole tissue experiments suggest a potential functional role in ASMC contractility.



Key workshops, courses and conference attendance:

- The Smooth Muscle Conference (FASEB) – West Palm Beach, FL, USA (2019)
- Irish Thoracic Society Meeting – Belfast, Galway (2018, 2019)
- GSK Visit - Stevenage, UK (2019)
- TEVA industry workshops - QUB, Virtual (2019, 2020)
- Industry Day with Almac, pHion Therapeutics, Axis Bio and Causeway Sensors – Virtual (2021)

Additional skills that were developed through BREATH:

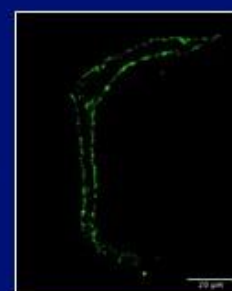
- Data analysis & problem solving
- Project management & organisation

My most memorable BREATH moment:

- The Smooth Muscle Conference in Florida – This was an incredible opportunity to engage with experts in the field and build a professional network

My current & future plans:

- I'm currently working as an Insights Analyst at LinkedIn where I leverage our data to build narratives to drive insights which address our client's business challenges





Leanna Morgan

DkIT PhD Student

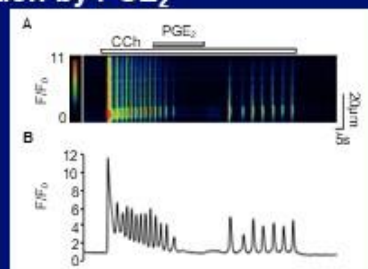
- **Personal profile**
 - *Dublin, Ireland*
 - *Travelling and reading*
- **Academic background**
 - *BSc. (Hons) Biopharmaceutical Science, DkIT*
 - *Ph.D.*



Regulation of airway smooth muscle contraction by PGE₂

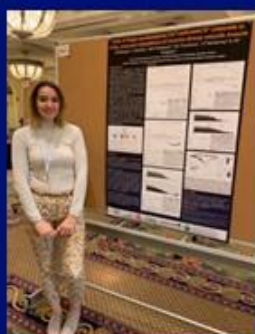
The aim of my project was to examine the mechanisms underpinning the bronchodilator effects of prostaglandin E₂ (PGE₂). The key findings were:

- Activation of PAR2 inhibited cholinergic contractions of airway smooth muscle (ASM) via production of PGE₂
- PGE₂ exerted its inhibitory effects via activation of EP2Rs and subsequent activation of the AC/cAMP/PKA pathway.
- PGE₂-induced relaxations were reduced by blockade of BK channels.
- PGE₂ reduced the frequency and amplitude of CCh-evoked calcium oscillations in airway smooth muscle cells.



Modulation of carbachol-induced Ca^{2+} oscillations in airway smooth muscle cells by PGE_2

James W. Hargrett,¹ Jonathan Marks,² Nicholas D. Hayles,³ Mark S. Hargreaves,⁴ Keith D. Thornburg,⁵ David
Newman,^{1,2,4,6}



Conferences, Seminars & Workshops

- Irish Thoracic Society meeting (2018), Belfast, Antrim, Northern Ireland.
- The FASEB Science Research Conference on Smooth Muscle (2019), West Palm Beach, Florida, USA.
- Irish Thoracic Society meeting (2019), Galway, Ireland.
- TEVA industry training event, Queen's University, Belfast, Northern Ireland (2019).
- Cheisi ENGAGE event , Queen's University, Belfast, Northern Ireland (2019).
- BREATH covid pneumonia seminar series hosted by respiratory consultants (2020).
- DkIT virt2ue blended learning programme on research integrity (2021).

Additional skills that were developed through BREATH:

- Interpersonal skills developed through the collaboration involved in the BREATH program.
- Communication skills refined by the national, international and internal conferences | attended.

My most memorable BREATH moment:

The FASEB conference in Florida. This trip was a unique opportunity to meet and discuss my findings with experts in the field from around the globe.

My current & future plans:

Currently, I am lecturing in biology and biochemistry in the school of health and science, DkIT, which I am thoroughly enjoying. I hope to remain in academia in the future.





Kaneez E Rabab

DkIT PhD Student

Personal profile

- **Home town:** Hyderabad, India
- **Interests:** Hiking, Travelling

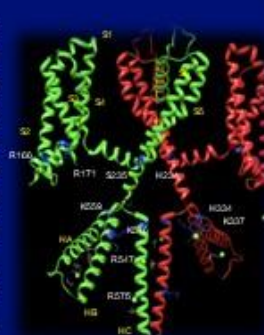
Academic background

- *M.Sc - Biotechnology (Osmania University, Hyderabad, India)*
- *Awarded with Industrial Training Fellowship by Department of Biotechnology (DBT), Govt of India*
- *Previously a Junior Research Fellow at Centre for Cellular and Molecular Biology, Hyderabad, India*



Mechanism of action of GoSlo-SR-5-6 on K_v7 ion channels

In Airway Smooth Muscle Cells (ASMC), K_v7.4 and K_v7.5 are predominantly expressed and play a key role in the regulation of airway diameter. K_v7 activators have been shown to induce relaxation of the airways and consequently, may provide an important tool to help reverse airway hypercontractility. A compound developed and patented in the lab, GoSlo-SR-5-6 (SR-5-6), was found to be an effective and potent activator of K_v7 channels. Nonetheless, its molecular mechanism was unclear. In this study, site-directed mutagenesis, cloning and electrophysiology tools were used to establish the molecular determinants involved in the activation of K_v7 channels upon SR-5-6 administration. The important finding of this project was establishing the role of K_v7.4 residue L249 in bringing the shift in activation V_{1/2} by SR-5-6 in K_v7 channels. Furthermore, PIP₂ was identified to contribute to increase in G/G_{max} by SR-5-6 in K_v7.4 channels.



Key workshops, courses and conference attendance



- Poster presentation at Irish Thoracic Society Meeting, Belfast, Northern Ireland, 2018
- Poster presentation at "International Kv7 Channels Symposium", Naples, Italy, 2019
- TEVA industry training event, Queen's University, Belfast, 2019
- Chiesi ENGAGE event, Queen's University, Belfast, 2019
- Visit to GlaxoSmithKline house, Stevenage, London, 2019
- Virtual TEVA industrial workshop, 2020
- Virtual industrial day by Almac, pHion Therapeutics, Axis Bioservices, Causeway Sensors, 2021

Additional skills that were developed through BREATH

- Presentation of scientific data to researchers and laypeople through participation in conferences and BREATH outreach program.
- Networking and collaboration with researchers in QUB and UWS

My most memorable BREATH moment:

- It was an amazing experience to develop friendships with the other SMRC PhD's, postdoc's and BREATH students, whose support made the PhD journey enjoyable.

My current & future plans:

- I am thrilled to be a postdoctoral researcher at the National Institute of Cellular Biotechnology (NICB), DCU. In the future, I hope to contribute successfully to research projects, publish more research, and establish myself as an independent researcher.





Dr James Reihill

QUB Senior Research Fellow



Personal profile

- From: County Fermanagh, NI
- Hobbies: several sports- more of a watching brief these days... (football, NFL)

Academic background

- B.Sc. Biomedical Science (QUB)
- Ph.D. Biochemistry and Cell Biology (University of Glasgow)

Key Role:

- Contribute to post-graduate training and development across the partner Institutes.
- Develop links with relevant research groups & industries to facilitate technology transfer opportunities.
- Contribute to interactions with industry to further opportunities for collaboration and commercialisation.



Key workshop, courses and conference attendance:

- Oral presentation: European Respiratory Society Congress (Milan, 2017)
- Oral presentation: Irish Thoracic Society Conference (Belfast, 2018)
- Training course: Advanced *in vitro* lung models (Epithelix, Geneva, 2017)
- Equipment training: Port-a-Patch Technology (Nanon, Munich, 2017)
- Training course: Epithelial Systems Workshop (University of Lisbon, 2018)
- Shortlisted for the Postdoctoral Development Centre (QUB) Exceptional Support Prize (2018)
- Research visit: to the laboratory of Professor Chris Brightling (University of Leicester, 2019)
- Oral presentation: Experimental Biology (Orlando, 2019)
- Shortlisted for the Postdoctoral Development Centre (QUB) Outstanding Engagement Prize (2019)
- Finalist QUB Vice-Chancellors Post Doctoral Researcher Prize (2021)



Lisbon, 2018

Additional skills that were developed through BREATH:

- Afforded excellent opportunity to develop leadership skills and work independently

My current & future plans:

- In 2021 I was successful in applications as Principal Investigator to the UKRI/MRC Innovation Scholarship programme and the Cystic Fibrosis Trust Venture and Innovation Award Scheme providing £120K in funding to facilitate a 2 year secondment with Almac Discovery.

My most memorable BREATH moment: seeing the full group together for the first time!



Emma Carroll

QUB PhD Student

Personal profile

- Home town: Keady, Co. Armagh
- Interests: Music, charity work, hiking, travelling

Academic background

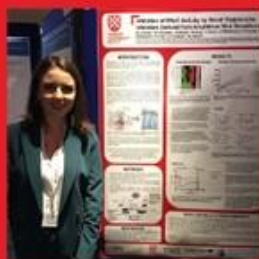
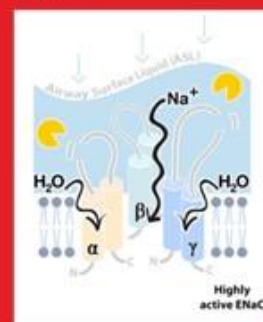
- PhD, School of Pharmacy, QUB
- MPharm (hons), School of Pharmacy, QUB



Project Title: 'The Development of Novel Strategies to Modulate Epithelial Sodium Channel (ENaC) Activity in Chronic Obstructive Pulmonary Disease (COPD)'

Overall Aim: To investigate the potential of two different approaches, one channel-activating protease (CAP) inhibitor-based and the other a molecular strategy, to modulate ENaC activity and assess the feasibility of these as therapeutic options in the management of the chronic bronchitis (CB) phenotype in COPD.

Final Conclusions: This work has not only unveiled the previously untapped potential of amphibian peptides to assist in the design of novel ENaC modulators but alternatively, evaluated for the first time a novel QUB-patented RALA peptide-based delivery system as an opportunity to also take a genomic approach to ENaC inhibition. Future work to develop a more optimised airway epithelial cell-targeted version of RALA nanocomplexes for the effective targeting of ENaC via local airway delivery holds significant potential.



Key workshops, courses and conference attendance:

- BREATH Annual Conference (2018-2021)
- Application to the Queen's Merit Award for Associate Fellowship was approved at the Recognition Panel in June 2021
- Degree Plus Award in February 2020
- QUB School of Pharmacy Postgraduate Research Day (June 2019)
- All-Ireland School of Pharmacy Conference (April 2019)
- Experimental Biology Conference (April 2019)
- Emily Sarah Montgomery Travel Scholarship (April 2019)
- NI Science Festival (February 2019 & 2020)
- Irish Thoracic Society Conference (November 2018)

Additional skills that were developed through BREATH:

- Teaching
- Project Management

My most memorable BREATH moments:

- GSK trip, ITS Conference and friendships made with other BREATH PhD students.

My current & future plans:

- Currently hold a PDRF position at pHion Therapeutics and hope to continue my career as an R&D scientist in the biotech industry.





Stephen Carson

QUB PhD Student

■ Personal profile

- *PhD student from Armagh, Northern Ireland.*
- *Interest in the effect of pathogenic stimulus on host innate immune responses*

■ Academic background

- *BSc (Hons) Biomedical Science (2:1): 2014-2017 – QUB.*



Project Title: An Investigation of the Response of Airway Epithelial Cells to Pathogens Associated with Acute Exacerbations of Chronic Obstructive Pulmonary Disease (AECOPD)

Introduction: COPD patients suffer from acute periods (exacerbations), often caused by airway infections, that are characterised by an increase in symptoms and a reduction in lung function.

Project aim: To gain a further understanding of the role infection plays in airway inflammation within COPD.

Results

- A greater understanding on the inflammatory effect of bacterial infection within COPD has been gained.
- In collaboration with Boston Pharmaceuticals the effect of novel furin inhibitors on innate immune responses relevant to COPD exacerbations were investigated.



Key workshops, courses and conference attendance:



Conference presentations

- BREATH annual conferences from 2018-2022
- Irish Thoracic Society (ITS) conference: November 2018
- EB conference: April 2019
- All-Ireland Schools of Pharmacy conference: April 2019

Key workshops

- GSK industry visit: March 2019
- Chiesi ENGAGE events: November 2018/June 2019
- TEVA pharmacy in action workshop: June 2019/June 2020

Awards

- Best conference presentation: BREATH conference 2018

Additional skills that were developed through BREATH:

Scientific communication, project management, organisational and team skills were developed through media appearances, conference presentations, the BREATH schools' outreach project and through collaborative engagement with other partners.

My most memorable BREATH moment:

- Attendance of the ITS conference in November 2018.

My current & future plans:

- Research assistant within the LAMP lab, providing COVID-19 testing.
- Aim to secure a post-doc position in the near future.





Niall Downey

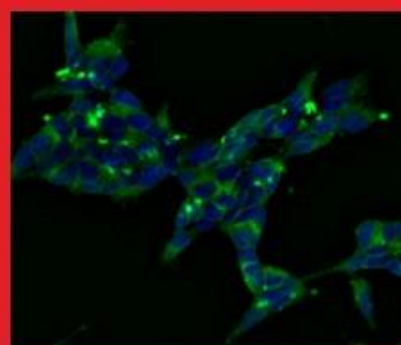
QUB PhD Student

- **Personal profile**
 - *Banbridge, County Down*
 - *Travel, Music, Gaming*
- **Academic background**
 - *MPharm (Hons), QUB*
 - *Associate Fellow on the Higher Education Authority*



Isolation, Characterisation and Effects of Airway Irritant-Induced Exosomes on Neuronal Cells

- Developed a protocol for the isolation of exosomes from human primary bronchial epithelial cells.
- Characterised and visualised exosomes isolated using this protocol, and elucidated the nature of their physical interaction with recipient neuronal cells.
- Investigated how exposure to Cigarette Smoke Extract and Diesel Exhaust Particulate influences exosomal content, and how these exosomes can modulate neuronal growth.



Key workshops, courses and conference attendance:

- American Cough Conference 2019 (Oral Presentation)
- Irish Thoracic Society Meeting 2018 (Oral and Poster Presentations)

Additional skills that were developed through BREATH:

- Teaching and Educational Skills, Critical Thinking, Lab Skills, Peer Mentoring

My most memorable BREATH moment:

- Attending the American Cough Conference and travelling with Orla & Nicola.

My current & future plans:

- I am currently working in Pharmacy and providing private bespoke tutoring for Pharmacy students. I intend to return to QUB in the future to complete a Master in Advanced Pharmacy Practice (with Independent Prescribing), specialising in respiratory care. Ideally, I would love to teach Pharmacy Practice at QUB.





Orla Dunne

QUB PhD Student

Personal profile

- Castledermot, Co. Kildare
- Horses and GAA

Academic background

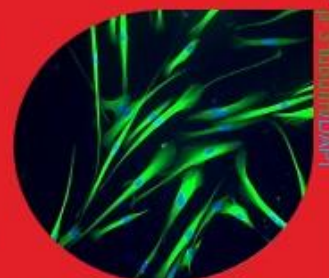
- *BSc (Hons) Physiology from the UCD School of Medicine. Awarded best undergraduate research project by the Physiology Society of the UK and Ireland.*
- *Summer studentships in the Conway Institute at UCD and the TBSI in TCD.*



ATP, TRP Channels and Airway Neuronal Sensitisation:

This project was focused on gaining a deeper understanding of the roles of adenosine triphosphate (ATP) and transient receptor potential (TRP) channels in chronic cough, by working with primary bronchial epithelial cells and an *in-vitro* human sensory neuronal model differentiated from human dental pulp stem cells termed peripheral neuronal equivalents.

It was found that primary bronchial epithelial cells release ATP with mechanical stimulation and that ATP can evoke hyperresponsiveness of TRPV4 channels in peripheral neuronal equivalents. This hyperresponsiveness could be prevented using a P2X3 inhibitor (AF-353), currently in clinical trials for the treatment of chronic cough.



Peripheral neuronal equivalents stained with a neuronal marker (β-3 tubulin/DAPI)

Key workshops, courses and conference attendance:



Presenting at the UK Purine Club meeting, Sheffield 2019

- Awarded a graduate student fellowship for alternatives to the use of animals in science from the International Foundation of Ethical Research (IFER) with \$12,500 funding in 2020.
- Won best abstract award at the London Cough Conference in 2021.
- Awarded the Postgraduate Hatton prize at the Irish division of the International Association of Dental Research (IADR) in 2021, and I will represent the Irish division at the IADR meeting in June 2022.

Additional skills that were developed through BREATH:

- In addition to developing new lab skills, I have gained experience in grant writing and in presenting my research to both the scientific community and general public.

My most memorable BREATH moment:

- Attending the American Cough Conference with Nicola and Niall in 2019.

My current & future plans:

- Currently working as a postdoctoral researcher in the WWIEM at QUB.



American Cough Conference, Virginia 2019



Nicola Roe

Personal profile

- *Castleblayney, Co. Monaghan, Ireland*
- *Baking, travelling, hiking, reading*

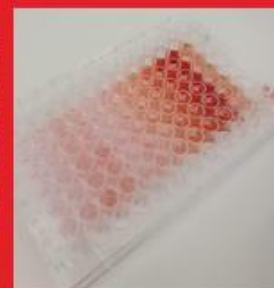
Academic background

- *BSc Physiology from University College Dublin*



Neuroinflammatory Consequences of Rhinovirus Infection in the Human Airway:

Rhinovirus (RV) is the leading cause of exacerbations of airway disease, during which the airways become hypersensitive and manifests clinically with troublesome bouts of cough. The mechanism responsible for respiratory virus induced cough in humans is unknown. My research aimed to determine whether RV directly infects and alters neural function or exerts its effect indirectly via the release of inflammatory mediators from infected airway epithelium. My research illustrated for the first time the susceptibility of an airway neuronal model to RV infection. Findings confirm RV-A16 entry and replication in PNE, as well as a pro-inflammatory cytokine release.



Key workshops, courses and conference attendance:

- Poster presentation at Irish Thoracic Society 2018
- Oral Presentation at American Cough Conference 2019
- Poster presentation at London Cough Symposium 2021
- Awarded highly commended for poster presentation at the Annual REMERGE Symposium at QUB



My most memorable BREATH moment:

- Making lifelong friends

My current & future plans:

- Senior Associate in Global Scientific Communications at Eli Lilly, currently based in Cork.



Gillian Kelly-Robinson

QUB PhD Student

- **Personal profile**
 - **Hometown:** Larne, NI
 - **Interests:** baking, gardening, reading
- **Academic background**
 - *1st class BSc (Hons) Physiology, University of Liverpool, 2013-2016.*
 - *MRes in Translational Medicine with distinction, Queen's University Belfast, 2016-2017.*
 - *PhD, Queen's University Belfast, 2017-2021.*



Project Title: Proteases, Antiproteases and Other Inflammatory Mediators Associated with Chronic Obstructive Pulmonary Disease (COPD)

The presence of a protease-antiprotease imbalance within the airways contributes to the chronic inflammation and proteolytic destruction of the lung tissue observed in COPD. The most defined example of the protease-antiprotease imbalance within COPD occurs between the neutrophil serine protease, neutrophil elastase, and its endogenous serine protease inhibitor (serpin), alpha1 anti-trypsin. This protease-antiprotease imbalance can be a result of a genetic deficiency of alpha1 anti-trypsin, however, less than 5% of COPD patients possess the deficiency suggesting that other protease-antiprotease imbalances may be at play. The overarching aim of this research project was to identify novel proteins that may contribute to the protease-antiprotease imbalance within COPD.



Key workshops, courses and conference attendance:



- Irish Thoracic Society Conference, Belfast, 2018.
- Experimental Biology Conference, Florida, 2019.
- All Ireland School of Pharmacy Conference, Dublin, 2019.
- Associate Fellow of the Higher Education Academy (AFHEA).
- Spin up Science training programme.

Additional skills that were developed through BREATH:

- Presentation skills, scientific writing skills, problem solving skills.

My most memorable BREATH moment:

- The special friendships gained during this PhD.

My current & future plans:

- I am currently working as a project lead at Axis BioServices Ltd, with discussions of transitioning into the role of study director within months of my return to work following my maternity leave.





Mariarca Bailo

UWS PhD Student

Personal profile

- Torre del Greco (Naples), Italy
- Family, cooking and travelling

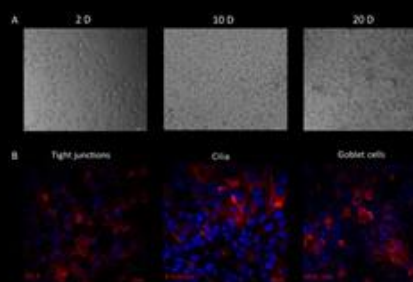
Academic background

- BSc Health Biotechnologies - Federico II University, Naples
- MSc Medical Biotechnologies - Federico II University, Naples
- MRes Biomedical Sciences - University of Glasgow, Glasgow



SERINE PROTEASES MODULATING PAR2 AND ION CHANNEL IN COPD

My project has been focused on understanding the cellular and molecular pathways driving inflammation in COPD. I established a role for the G-protein coupled receptor, PAR2, in the pathogenesis of the COPD. My research has highlighted a novel molecular axis involving the potential activation of PAR2 by the serine protease matriptase, driving the release of inflammatory mediators IL-6 and IL-8 from human bronchial epithelial cells, known to have a role in COPD pathology.



Key workshops, courses and conference attendance:



- ScotPil course
- Conferences: ITS 2018 / 2019, BALR 2018, BTS 2019, ERS 2020
- Travel Grants: £100 from BALR and £500 for BTS
- Industry trainings: GSK, Chiesi, Teva
- Glasgow Science festival and D&G Science festival
- Dumfries hospital clinical workshop

Additional skills that were developed through BREATH:

- Personal: autonomy, problem solving, resilience
- Interpersonal: communication, team work

My most memorable BREATH moment:

- Every single moment spent with my fellow students has been memorable

My current & future plans:

- Current plan: Technical Specialist (Thermo Fisher Scientific)
- Future plan: Postdoctoral fellowship





Kimberly Black

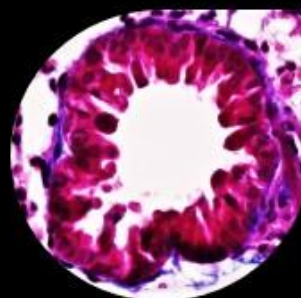
UWS PhD Student

- **Personal profile**
 - *Blantyre, Scotland*
 - *Travel & Sports*
- **Academic background**
 - *First Class (Hons) Applied Bioscience with Forensic Investigation (UWS)*
 - *STEM Ambassador*



Project Title: Elucidating the BSM Role of PAR2 in COPD

The main areas investigated within this project include the role of PAR2 in bronchial smooth muscle (BSM) by measuring PAR2 expression and BSM response to receptor activation. This study confirms important functional roles for PAR2 in murine airways, specifically in mediating airway relaxation. Importantly, this relaxation was enhanced in oxidative stress conditions, but decreased in aged tissue. Considering the impact of PAR2 deficiency on key functional lung proteins such as collagen and SMA, these novel insights may have important implications informing future potential therapeutic directions for COPD.



Murine Small Airway



Key workshops, courses and conference attendance:

- ScotPIL course
- UWS Health Symposium (Poster commendation prize winner)
- British Association for Lung Research Conference
- Irish Thoracic Society Conference (Runner up best Oral presentation)
- European Respiratory Society Conference
- Breath Annual Conference (Prize for Oral Presentation)
- GSK Training Event
- DkIT Placement

Additional skills that were developed through BREATH:

- Presentation skills
- Independence

My most memorable BREATH moment:

- Sharing the experience and building a unique friendship with my fellow PhD students across the partnership

My current & future plans:

- To develop in my new role as a Field Account Manager at Sartorius





Kirsty McCallum

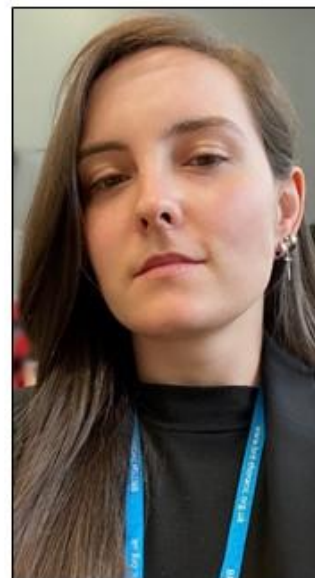
UWS PhD Student

Personal profile

- *Kilwinning, Scotland*
- *Competitive cycling, Art, Sport*

Academic background

- *First Class Honours in Biomedical Science – University of the West of Scotland*



Project Title: Pulmonary Ageing in COPD

The aim of the project was to establish whether a potential relationship exists between the pro-inflammatory receptor PAR2 and disruption of ageing control mechanisms:

- PAR2 induced bronchodilation was found to be significantly decreased in 'Aged' murine bronchial rings compared with 'young'.
- Classical senescence markers were overexpressed in *F2RL1^{-/-}* murine tissues
- Macroautophagy markers were overexpressed in *F2RL1^{-/-}* murine tissues.
- Activation of PAR2 via a synthetic peptide 2-FLIGRLO-NH₂ disrupted macroautophagy
- Activation of PAR2 resulted in disruption of mitochondrial membrane potential in the airway epithelia.

PAR2 was identified to be a potential modulator of ageing via disruption of the mitochondrial/macroautophagy control pathways.



Key workshops, courses and conference attendance:

- British Association for Lung Research (BALR) 2018
- Irish Thoracic Society (ITS) 2018 (Oral presentation)
- Irish Thoracic Society (ITS) 2019
- British Thoracic Society (BTS) 2019 (Oral presentation)
- European Respiratory Society LSC 2020

Additional skills that were developed through BREATH:

- Public Speaking
- Problem Solving
- Independence

My most memorable BREATH moment:

- Developing friendships with the 4 other UWS students – Mari Bailo, Kimberly Black, Carly Woods and Fawziye Tarhini. They made this PhD a life-changing event for me.

My current & future plans:

- Develop as a digital account manager at Sartorius

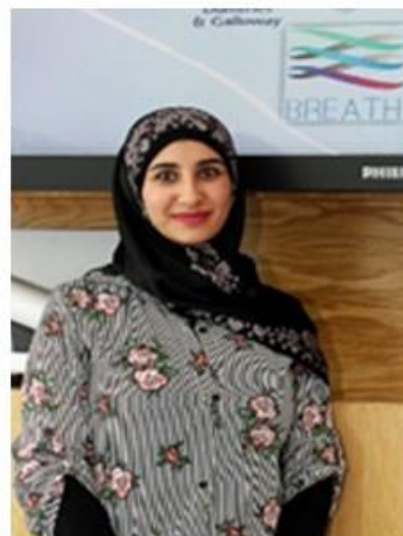




Fawziye Tarhini

UWS PhD Student

- **Personal profile**
 - *Beirut/Lebanon*
 - *Husband and three kids*
 - *Swimming, reading & cooking*
- **Academic background**
 - *Degree in Biochemistry - Lebanese University in Beirut*
 - *Masters in Biomedical Sciences Distinction - Salford University Manchester*



Project Title: Role of chronic oxidative stress on *F2RL1* promoter methylation and PAR2 receptor expression in BEAS-2B and primary human airway epithelial cells

Overall aim/brief lay synopsis/key conclusion(s):

- The aims of the project are to better understand the effect of epigenetic modifications in COPD specifically to identify how environmental challenges such as oxidative stress (OS), modelled by H_2O_2 , affect the methylation levels of the PAR2 promoter region, with potential implications for inflammation and COPD development; for this reason, *in-vitro* cell culture airway models exposed to oxidative stress and inflammatory stimuli was analysed for molecular identification of epigenetic modifications (mainly methylation) in the PAR2 promoter region and outcomes linked to the contribution of oxidants in pathologic scenarios.
- **Conclusions:**
 - Two CpG islands were detected in the PAR2 promoter region, one overlapping with PAR2 coding sequence.
 - H_2O_2 did not have any effect alone, but synergistically enhanced LPS-dependent production of cytokines.
 - Oxidative stress alone or in combination with inflammatory stimuli significantly enhanced PAR2 gene expression

Key workshops, courses and conference attendance:



Workshops/courses

BREATH launch, COPD symposium, Glasgow Science Festival, Astra Zeneca visitor presentation, Super Science Festival, GSK training event, TEVA/NICE Pharmaceutical industry training event, Chiesi ENGAGE educational meeting event, PDRA-Led training session. BREATH seminars mini-series, BREATH webinar series, BREATH training program in collaboration with TEVA UK limited: Almac Discovery industry presentations.

Conferences

Oral Conference presentation to British Thoracic Society. My abstract was selected to win an attendance bursary covering registration fees.

Poster presentation at European Respiratory Society (ERS)

Learning, Teaching & Research conference at UWS: winner of the best lay summary

Additional skills that were developed through BREATH:

- Data analysis Collaboration
- Work as a team Critical thinking
- Research skills Public Speaking

My most memorable BREATH moment:

- GSK Training event
- Friendship (UWS colleagues)

My current & future plans:

- Working in industry or any research based-institute, and if possible, I would like to do some teaching. My future work will be mainly based in the UK, however, some short-term teaching opportunities can take place abroad (in Lebanon, as a collaborated work)

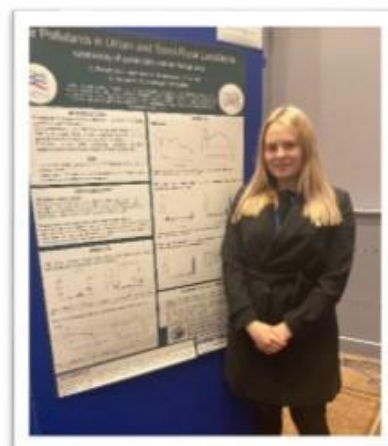




Carly Woods

UWS PhD Student

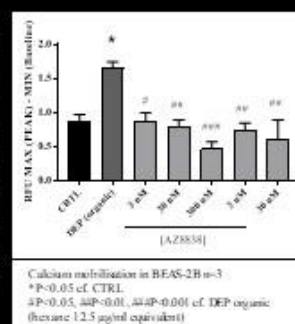
- **Personal profile**
 - *West Dunbartonshire, Scotland*
 - *Interests: hillwalking, running, reading.*
- **Academic background**
 - *BSc (Hons) Applied Bioscience, University of the West of Scotland (1:1)*



Project Title: Particulate Matter and Potential Health Impacts in a Semi-Rural Environment

Air pollution is one of the greatest environmental threats currently facing the global population with those with respiratory conditions being most at risk. Current studies focus on urban locations to determine the correlation between air pollution and COPD exacerbation and pathogenesis.

This study focussed on determining the potential for airborne pollutants to contribute to COPD pathogenesis through air monitoring. We found that levels were not elevated above EU and WHO health regulations. Additionally, current studies suggest that air pollution within different areas indicate different source apportionment and therefore altered biological effects. We confirmed this by finding particulate matter sampled from a typical urban and semi-rural area differed in metal composition. Further, when studying the effects of a common ubiquitous pollutant (diesel engine particulates) organic but not aqueous extract activated COPD relevant pro-inflammatory cell surface protein PAR-2 indicated by calcium mobilisation in human bronchial epithelial cells. This was inhibited by a PAR-2 antagonist AZ8883.



Key workshops, courses and conference attendance:

- Society for Environmental Geochemistry and Health conference (2019)
- 'The 35th International Conference on Geochemistry and Health'
 - **Award for excellence in oral presentation**
 - Irish Thoracic Society Meeting (2019 & 2020)
- BREATH annual conference (2019, 2020 & 2021)
 - **Award for excellence in oral presentation (2020)**
- European Respiratory Society International Congress (2021)
- Clean air day triple win webinar event – Environmental Protection Scotland
 - Invited speaker

Additional skills that were developed through BREATH:

- Data analysis – analysis of large air pollution data sets
- Effective communication – production of newsletters and input to project specific interviews.

My most memorable BREATH moment:

- The shared time and experience with my BREATH colleagues.

My current & future plans:

- Completion of PhD programme and progression into industry



In Memory of Fionntán McGarvey

We want to bring to your attention this Just Giving page in support of 'We are Donors', who work to raise awareness about organ donation. Fionntán, the 18 year old son of our QUB colleague and BREATH Clinical Lead, Professor Lorcan McGarvey died tragically on 20th January 2022. His family made the decision to donate his organs so that others could be given the gift of life. Please take a couple of minutes to read the note from the family.

"Fionntán McGarvey died tragically on the 20th January 2022. He was just 18 years old. We, as his family, will always be so proud of the beautiful son and brother we had for much too short a time. During life, Fionntán's decision to join the Organ Donor Register meant that in death he gave the gift of life to two people in need. In Fionntán's memory and reflecting his generosity of spirit, we, along with his family and friends are taking part in the Belfast City Marathon on the 1st May 2022, running in team relays or completing the 8-mile walk in support of 'We Are Donors', a charity we know would have been important to him.

'We Are Donors' mission is to increase the number of organ and blood donors across the UK through student led education at schools and universities. They aim to 'change minds about saving lives'. 'We Are Donors' has a network of sites throughout the UK, but currently there is no provision for this locally. Our aim is to raise funds for We Are Donors to support their ongoing work and to kick start this wonderful initiative within our community.

Fionntán's bright light continues to shine in our hearts and knowledge of his generous gift of life brings comfort to all who love and miss him, helping us smile again because Fionntán would like that. Live life and then give life.



We ask that you give generously in support of 'We are Donors'.

You can donate to their Team Fionntan Belfast City Marathon 2022 JustGiving page by Googling 'Team Fionntan Belfast City Marathon 2022'.

Donating through JustGiving is simple, fast and totally secure. Once you donate, they'll send your money directly to We Are Donors, so it's the most efficient way to give - saving time and cutting costs for the charity."

Thank you.



Contact:

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Professor Lorraine Martin

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Queen's University Belfast
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Professor John Lockhart

Institute of Biomedical and
Environmental Health Research (IBEHR)
University of the West of Scotland
Paisley, Scotland

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