

2021

SURE 2021 Undergraduate Science Conference Booklet

SURE Network

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Recommended Citation

SURE Network, "SURE 2021 Undergraduate Science Conference Booklet" (2021). *Group Reports*. 11. <https://arrow.tudublin.ie/totalarcprep/11>

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SURE



Science Undergraduate Research Experience

1st October 2021

Sharing Discovery



Waterford Institute of Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LAIRGE



NATIONAL FORUM

FOR THE ENHANCEMENT OF TEACHING AND LEARNING IN HIGHER EDUCATION

<http://sure-network.ie/conference>

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Welcome from the SURE Network

As recently elected chair of The SURE Network it is an honour to welcome scientists and students from around Ireland to the fourth series of the SURE Network's undergraduate research conference and our second online conference. This year, for the first time we have data presented almost exclusively from 'dry-lab' projects as students and supervisors responded to the challenge of Covid-19 public health restrictions in innovative and creative ways. As you will see, this has resulted in an impressive and diverse array of exciting research topics across our three host streams. I would therefore firstly like to congratulate the STEM graduates presenting today for sharing their thought provoking and meaningful research, which was carried out under such unusual if not difficult circumstances. I, as I am sure you do, look forward to an exciting day of virtual research, as we hear presentations from 10 different Higher Education Institutions around Ireland.

This year's virtual conference will be delivered across three parallel disciplinary streams, individually hosted by Waterford Institute of Technology (WIT), Athlone Institute of Technology (AIT) and Dundalk Institute of Technology (Dundalk IT). I therefore wish to thank the 2021 national Conference Coordinating Committee, co-chaired by Claire Lennon and Cormac Quigley, and its members - Anne Marie O'Brien, Anne Friel, Arjan Van Rossum and Helen Hughes, as well as all of the members of the three local organising committees for their hard work and dedication in bringing such a fantastic conference together. I would also like to thank the National Programme Committee co-chaired by Ciaran O'Leary and Laurence Fitzhenry, and members Cathy Brougham, Valerie McCarthy, Edel McNeela, Arjan Van Rossum, Claire Lennon and Anne Friel for their time and expertise. Each year, the programme committee work together to collate student abstracts and manage the extensive review process, this year involving the co-ordination of over 60 expert reviewers from all around Ireland.

Finally, on behalf of the network I would like to extend a sincere thank you to our previous network chair, Ciaran O'Leary, whose expert guidance and support over the last five years has resulted in the successful national partnership that you see evidenced here today. The SURE Network incorporates members from nine different Higher Education institutions around Ireland, working collaboratively together in a way that has never been done before and in a manner that simply would not have been possible without Dr O'Leary. So thank you Ciaran and we look forward to continuing to work with you in the future.



Have a great conference everybody!

Therese Montgomery

Therese Montgomery, SURE Network Chairperson



A note from the Local Organizing Committees

Waterford Institute of Technology

I would like to sincerely thank the members of the Local SURE Organising Committee from Waterford Institute of Technology (WIT), which includes Prof. Helen Hughes, Dr Tracey Coady, Dr Edel McNeela and Dr Larry Fitzhenry, and from Munster Technological University Dr Eileen O'Leary for all the hard work they have put into organising the conference stream. The team would like to thank Ken Mc Carthy and Peter Windle from the Centre for Technology Enhanced Learning at WIT, for supporting the conference and Dr Orla O'Donovan, Head of Department of Science for her continued support, organisation and promotion of this and other SURE Network Initiatives. We would like to extend our gratitude to the 3 keynote speakers who will bring innovative ideas and inspiration to the students and help develop a love of research which extends throughout their careers.

We would particularly like to thank all the students and their supervisors from across Ireland for their contributions to the Chemistry, Bio(Pharma), Computing and Physics Stream which has resulted in a very interesting, challenging and varied session.

Dr Claire Lennon, *On behalf of the WIT Local SURE Organising Committee*

Dundalk Institute of Technology

I would like to sincerely thank all the members of the Dundalk Institute of Technology Local Organising Committee for their time and involvement in the SURE network (chairs, judges, keynote speakers and postgraduate contributors). A special thank you as well to Dr. Valerie McCarthy and Dr. Sinead Loughran, who have been involved from the early days of the SURE network.

I would also like to thank all the students and their supervisors from across Ireland for their contributions to the *Biology and the Environment* Stream, we look forward to welcoming you (virtually) to DkIT!

Lastly, we are very grateful to the committees from the 2020 conference for their expertise in the migration of the SURE conference from a 'normal' conference setting to the virtual world, I think all of us now look at conferences and opportunities to collaborate differently!

We look forward to welcoming you to the *Biology and the Environment* Stream.

Arjan van Rossum, *Chair of the DkIT Local Organising Committee*

Athlone Institute of Technology

We express our gratitude to our fellow members of the Athlone Institute of Technology (AIT) Local Organising Committee, including Cathy Brougham and Dr. Fiona McArdle (IT Sligo). They have enthusiastically given their time throughout the past 12 months, have worked tirelessly with great dedication and overcome all of the extra challenges encountered with COVID-19, to organise this conference.

We particularly extend our thanks to the students and their supervisors from across Ireland who have contributed to the AIT Health, Sport and Nutrition Stream. The standard of work produced is a testament to their hard work during the year. A thank you also to our judges who have volunteered their time on the day.

We look forward to welcoming you all to the AIT Stream of SURE 2021.

Dr. Anne M. Friel & Dr. Anne Marie O'Brien, *Chairs of the Athlone Institute of Technology Local Organising Committee*

SURE Network Members

- Therese Montgomery, (Chair of the SURE Network)
Galway-Mayo Institute of Technology,
- Tanya Beletskaya, Limerick Institute of Technology
- Dina Brazil, Institute of Technology, Carlow
- Greg Byrne, Technological University Dublin
- Eva Campion, Institute of Technology, Sligo
- Emma Caraher, Technological University Dublin
- Tracey Coady, Waterford Institute of Technology
- Gordon Cooke, Technological University Dublin
- Geraldine Dowling, Institute of Technology, Sligo
- Julie Dunne, Technological University Dublin
- Karen Finn, Galway-Mayo Institute of Technology
- Laurence Fitzhenry, Waterford Institute of Technology
- Laura Keaver, Institute of Technology, Sligo
- Claire Lennon, Waterford Institute of Technology
- Sinead Loughran, Dundalk Institute of Technology
- Fiona McArdle, Institute of Technology, Sligo
- Margaret McCallig, Institute of Technology, Sligo
- Valerie McCarthy, Dundalk Institute of Technology
- Hugh McGlynn, Munster Technological University
- Anne Marie O'Brien, Athlone Institute of Technology
- Eileen O'Leary, Munster Technological University
- Ciarán O'Leary, Technological University Dublin
- Carloalberto Petti, Institute of Technology, Carlow
- Cormac Quigley, Galway-Mayo Institute of Technology
- Annamarie Rogers, Dundalk Institute of Technology
- Lisa Ryan, Galway-Mayo Institute of Technology
- Arjan van Rossum, Dundalk Institute of Technology
- Barry Ryan, Technological University Dublin
- Orla Slattery, Galway-Mayo Institute of Technology
- Matt Smith, Technological University Dublin
- Nicolas Touzet, Institute of Technology, Sligo
- Josephine Treacy, Limerick Institute of Technology
- Janette Walton, Munster Technological University

SURE Network virtual Conference 2021 Committees

SURE National Conference Committee

- Claire Lennon (Co-Chair, Waterford Institute of Technology)
- Cormac Quigley (Co-Chair), Galway-Mayo Institute of Technology
- Anne M. Friel, Athlone Institute of Technology
- Helen Hughes, Waterford Institute of Technology
- Anne Marie O'Brien, Athlone Institute of Technology
- Arjan Van Rossum, Dundalk Institute of Technology

SURE National Programme Committee

- Laurence Fitzhenry (Co-Chair), Waterford Institute of Technology
- Ciaran O'Leary (Co-Chair), Technological University Dublin
- Cathy Brougham, Athlone Institute of Technology
- Anne M. Friel, Athlone Institute of Technology
- Claire Lennon, Waterford Institute of Technology
- Valerie McCarthy, Dundalk Institute of Technology
- Edel McNeela, Waterford Institute of Technology
- Arjan Van Rossum, Dundalk Institute of Technology

SURE2021 Athlone Institute of Technology Local Organising Committee

- Anne M. Friel (Co-Chair)
- Anne Marie O'Brien (Co-Chair)
- Cathy Brougham
- Fiona McArdle (Sligo Institute of Technology)

SURE2021 Dundalk Institute of Technology Local Organising Committee

- Arjan van Rossum (Chair)
- Valerie McCarthy
- Sinead Loughran
- Ryan Smazal

SURE2021 Waterford Institute of Technology Local Organising Committee

- Claire Lennon
- Helen Hughes
- Tracey Coady
- Edel McNeela
- Larry Fitzhenry
- Orla O'Donovan
- Eileen O'Leary (MTU)

SURE2021 Network Virtual Conference - programme overview:

- 9:00 – 9:30** Zoom Registration
- 9:30** Opening by Dr Therese Montgomery, Chair of the SURE Network
- 9:35** Address by Dr Terry Maguire, Director of the National Forum for Teaching and Learning
- 9:45** SUREbyts - Engaging Students with Research from First Year
- 9:50** SURE Network National Student Survey
- 9:55** **Keynote 1: Dr Chris Edlin, Senior Director R&D, Teva Pharmaceuticals** Oral
- 10:15 - 11:35** Presentations - Three parallel sessions
- Stream 1: Chemistry, (Bio)Pharma, Computing and Physics
 - Stream 2: Biology and the Environment
 - Stream 3: Health, Sport and Nutrition
- 11:35 - 11:40** Audience Voting for Best Oral Presentation
- 11:40 - 12:00** *Break*
- 12:00 – 12:20** **Keynote 2: Dr Bernard Drumm, DKIT**
- 12:20 - 13:00** Online Posters - Three parallel sessions
- Posters will be presented as one minute flash presentations;*
- Stream 1: Chemistry, (Bio)Pharma, Computing and Physics
 - Stream 2: Biology and the Environment
 - Stream 3: Health, Sport and Nutrition
- 13:00 - 14:00** *Lunch and poster review*
- Posters boards online @ <https://gather.town/invite?token=lxbfdqLv>*
- 14:00** Audience Voting for Best Poster
- 14:10** **Keynote 3: Dr Sinead Farrell, University of Maryland**
- 14:30** Virtual Presentation of Prizes
- 15:00** Update from SURE Network Undergraduate research journal SURE-J
- 15:05** **Postgraduate Opportunities Workshop**
- Keynote 4: Dr Eoin Cullina, Head of Research, GMIT**

SURE2021 Detailed Virtual Conference Schedule

9.00 – 9. 30	Zoom Registration
9:30 – 9:55	Opening Ceremony
9.30 - 9.35	Opening by Dr Therese Montgomery, Chair of the SURE Network
9:35 - 9:45	Address by Dr Terry Maguire, Director of the National Forum for Teaching and Learning
9:45 - 9:50	<i>SUREbyts - Engaging Students with Research from First Year</i> , Dr Ciarán O'Leary
9:50 - 9:55	Launch of the SURE Network National Student Survey, Dr Therese Montgomery
9.55 -10.15	WIT Keynote 1: Dr Chris Edlin , Senior Director R&D, Teva Pharmaceuticals
	Chair : Prof. Helen Hughes

Student Presentations:

Oral Presentations in Three Streams/breakout rooms

10.15 -11.35

	Chemistry, (Bio)Pharma, Computing and Physics WIT	Biology and the Environment DKIT	Health, Sport and Nutrition AIT
10:15	Chair: Dr Orla O'Donovan 1.1 The role of hydrogels in delivering bone marrow stromal cells for the treatment of Parkinson's Disease by Bardia Haghghirad (Athlone Institute of Technology), Clement L. Higginbotham	Chair: Dr Valerie McCarthy 2.1 The detection of CRFL2 overexpression in Philadelphia Like B-ALL using flow cytometry by Hannah Greene (Technological University Dublin), Claire Wynne, David O'Brien	Chair: Cathy Brougham 3.1 The Associations between Nutritional Status, Nutrition-Impact Symptoms, and Health-related Quality of Life in Oesophageal Cancer Survivors by Sarah Bennett (Technological University Dublin), Claire Donohoe, Michelle Fanning, Conor Murphy, Suzanne Doyle
10:25	1.2 Bioinformatic analysis of six Bifidobacterium breve prophages by Rachel Mc Lellan (Munster Technological University), Francesca Bottacini	2.2 The Use of Melittin: A Natural Component of Honeybee Venom, as a Potential Anti-Cancer Treatment in Human Carcinomas by Niamh Donnellan (Athlone Institute of Technology), Anne M Friel	3.2 Perceptions of Game Speed in Women's Rugby by Cathriona Heffernan (Athlone Institute of Technology), Robin Healy

10:35	1.3 An investigation into the use of gelatin from marine by-products to act as novel ingredients in cosmetic formulations by Siobhan Ward (Institute of Technology, Carlow), Adriana Cunha Neves, Brian O'Rourke	2.3 Cronobacter: an emerging opportunistic food-borne pathogen by Katie Phair (Athlone Institute of Technology), Damien Brady	3.3 Exploration of Health Behaviours and Experiences of Post-Menopausal Women Aged between 55 & 65 by Conor Lillis (Athlone Institute of Technology), Patricia Heavey
10:45	1.4 The Application of Chitosan-Metal Complexes to Wound Dressings: A Systematic Literature Review by David Hanley (Galway-Mayo Institute of Technology), Cormac Quigley	2.4 The antimicrobial peptide resistance mechanisms of Staphylococcal species by Beatrice Olayiwola (Institute of Technology, Carlow), Carla Surlis	3.4 Eating disorders and substance abuse in the Irish transgender population: Perspectives of healthcare professionals by Aideen McCann (Technological University Dublin), John Kearney, Nele Callewaert
10:55	1.5 A comparison of Deconvolution and Z-Stacking for microscopy by Jarni Braal (Munster Technological University), Natalia Rebrova, Milosz Przyjalowski	2.5 Identification of an exosomal miRNA expression signature in response to chemotherapy treatment in neuroblastoma by Christopher Sheridan (Technological University Dublin), Olga Piskareva	3.5 A Systematic Literature Review on The Benefit of Mirror Therapy in Stroke Rehabilitation: A Review and Meta-Analysis" by Charlene Gilmartin (Institute of Technology, Sligo), Kenneth Monaghan
11:05	1.6 SARS-CoV2 variants, spike mutations and computational prediction of their impacts by Lizaveta Kotsikava (Technological University Dublin), Fergus Ryan, Andrew Knox	2.6 Genetic mutational status and inflammatory response in metastatic cancer: New implications for immunotherapies by Brenna Daily (Institute of Technology, Sligo), Paul Hartel	3.6 The creation of novel honey-based alcohol beverages (HBABs)" by Paul Mc Namara (Institute of Technology, Carlow), Carloalberto Petti
11:15	1.7 Bioinformatic analysis of the GluN1 subunit of the NMDA receptor by Pasquinn Sida (Waterford Institute of Technology), David Scanlon	2.7 The Role of Temperature and Humidity towards Covid-19 Transmission Dynamics and Mortality Rate by Clement Sim Shi Jie (Munster Technological University), Jim O'Mahony, Helen O'Shea	3.7 To Investigate The Effect Of An Accessible 6-Week Aerobic Exercise Intervention On Health Markers And Submaximal Aerobic Fitness In Irish Female Nurses Aged Between 35 And 59 Years Old" by Rachael Maloney (Galway-Mayo Institute of Technology), Evelyn Hannon
11:25	1.8 Image-based Malware Classification using Feature Extraction and Computer Vision" by Josef Staubmann (Technological University Dublin), Stephen O'Shaughnessy	2.8 Stem Cell Technology and miRNA Communication in Ovarian Cancer by Nicola Bailey (Athlone Institute of Technology), Cathy Brougham	3.8 An audit of meat analogues on the island of Ireland" by Shaunagh Mulhall (Munster Technological University), Janette Walton

11:35 – 11.40 Voting ends for The SURE2021 Audience award for Best Science Communicator

11:40 – 12:00 Break

12:00-12:20 **DkIT Keynote 2: Dr Bernard Drumm**, Lecturer DkIT, Visiting Lecturer University of Nevada, Reno

Chair: Dr Arjan Van Rossum

12.20 – 1.00		
Poster Sessions in Three Streams		
Chemistry, (Bio)Pharma, Computing and Physics WIT	Biology and the Environment DKIT	Health, Sport and Nutrition AIT
Chair: Dr Edel McNeela	Chair: Dr Valerie McCarthy	Chair: Dr Nuala Harding
1.1 Systematic Review: Effectivity of cannabinoid receptor agonists in the reduction of intraocular pressure by Megan Doyle (Technological University Dublin), Matthew Sheehan	2.1 A study of the environmental impact of a water catchment area focusing on suspended solids and soil erosion by Shane Kennedy (Limerick Institute of Technology), Josephine Treacy	3.1 The fate of AMR bacteria in seafood and impact on human health by Bozena McCarthy (Technological University Dublin), Michelle Giltrap, Furong Tian
1.2 Examination of some common fingerprinting methods for the recovery of latent fingerprints from non-porous substrates immersed in water by Leanne Walsh (Technological University Dublin), Shane Murphy	2.2 Microbial diversity of digestate from commercial biogas plants by Jordan Kervick (Waterford Institute of Technology), Nabla Kennedy	3.2 A person-based approach to the exploration of lay perspectives on weight management programmes by Orlaith Cahill (Technological University Dublin), Annemarie Bennett
1.3 Examination and Comparison of Various Ink and Printer Marks on Paper Using Scanning Electron Microscopy by Roza Paterek (Technological University Dublin), Shane Murphy	2.3 The Study of Gut Microbiome and Gut Microbiome Mapping Kits by JinYi Chia (Dundalk Institute of Technology), Orla Sherlock	3.3 Physical Activity Behavior Patterns of third level students during the COVID19 lockdown in January and February 2021 by Sinead Larkin (Technological University Dublin), Mairead Stack
1.4 Investigation on the Role of Surface Treatments on the Anticorrosion Properties of Sol-Gel Coatings on Stainless Steel by Niamh Farnham (Technological University Dublin), Declan McCormack, Mohamed Oubaha	2.4 The prevalence of liver fluke within equines in Ireland by Mairead Quinn (Athlone Institute of Technology), Sile O'Flaherty	3.4 Good Practices in Treating Eating Disorders Combined with Substance Abuse: A Focus on an Integrated Treatment Approach by Orla Curtis-Davis (Technological University Dublin), Martina Rooney, Nele Callewaert
1.5 E-Vita: An accessible patient medical record by Taif Al Beedh (Technological University Dublin), Emma Murphy	2.5 Investigating the optimum conditions for bacterial biofilm formation by Megan Joyce (Technological University Dublin), Emma Caraher	3.5 Impact of COVID - 19 confinement measures on dietary intake, dietary habits and lifestyle of the Irish population (COVIDiet study) by Laura Molloy (Institute of Technology, Sligo), Irina Uzhova
1.6 'AstroEvolution': The Use of Genetic Algorithms to Master a Self-Programmed Video Game by Patrick Whelan (Technological University Dublin), Patrick Brady	2.6 The Effects of Air Quality on Wildflower Pollen by Emma Lalwani (Institute of Technology, Sligo), Paul Hamilton	3.6 Irish Consumers' Understanding of Sustainable Diets by Aaron Donohoe (Institute of Technology, Sligo), Maria Dermiki

<p>1.7 Understanding the potential of Mesenchymal Stem Cells as a therapeutic for Covid19 induced lung injury by Aoife McGuinness (Athlone Institute of Technology), Emma J. Murphy, Bianca Simonassi Paiva</p>	<p>2.7 A comparison of the quality of silage with and without the use of starters by Kate Devereux (Waterford Institute of Technology), Nabla Kennedy</p>	<p>3.7 Investigation into the knowledge, perceptions, and adherence of the physical activity guidelines among third level students currently studying in Ireland by Kathleen McNally (Institute of Technology, Sligo), Irina Uzhova</p>
<p>1.8 Irish Sign Language: An Avatar-Based Approach by Leonardo Maurins (Technological University Dublin), Matt Smith</p>	<p>2.8 Review of Global Antimicrobial Resistance and Development of Novel Antimicrobials by Orlaith Plunkett (Athlone Institute of Technology), Andy Fogarty</p>	<p>3.8 Understanding the prevalence, diversity, and impact of food intolerances in the Irish adult population by Chynese McTiernan (Institute of Technology, Sligo), Richéal Burns</p>
<p>1.9 Complex Analysis Applied to Potential Theory by Conor Curtin (Technological University Dublin), Rossen Ivanov</p>	<p>2.9 The design and creation of a digital pathology teaching resource for cervical histopathology training of obstetrics and gynaecology specialists by Rebecca Robinson (Technological University Dublin), Alison Malkin, Helen Keegan</p>	<p>3.9 Factors Influencing the Consumption of Dietary Supplements amongst Undergraduate Students in Ireland by Niamh Cully (Institute of Technology, Sligo), Owen Kenny</p>
<p>1.10 A study of the antimicrobial and antioxidant activity of Schiff base ligand complexes by Ilaha Rizaei (Athlone Institute of Technology), Ann O'Malley</p>	<p>2.10 An analysis of social media content on organ donation by Karine Eposi Ekema (Athlone Institute of Technology), Gary Stack</p>	<p>3.10 An Investigation of the Knowledge and Perceptions of Arthritis amongst the Student Population by Laura Dunleavy (Institute of Technology, Sligo), Máire Mc Callion</p>
<p>1.11 Simulation of Quantum Computers by Joseph Butler (Waterford Institute of Technology), John Houlihan</p>	<p>2.11 PCR design to detect bacteriocins in Lactic Acid Bacteria (LAB) and a review of screening studies in LAB by Sallyanne Tully (Technological University Dublin), Mary Logue</p>	<p>3.11 Obesogenic Risk Factors, Glycaemic Profile and Ischemic Heart Disease by Sinead Hogan (Technological University Dublin), Oscar Mac Ananey</p>
<p>1.12 An investigation into the use of natural mistletoe extracts and their formulations as potential anti-cancer treatments in human carcinomas by Rebecca Healy (Athlone Institute of Technology), Anne M Friel</p>	<p>2.12 Detection of Influenza A Virus through Quantitative Reverse Transcriptase Polymerase Chain Reaction for Wastewater-Based Epidemiology by Angelina Jong (Dundalk Institute of Technology), Bridget Kelly</p>	<p>3.12 Evaluation of the role and impact of government interventions in modifying unhealthy eating behaviours: A pragmatic literature review by Padraic Óg Horan (Institute of Technology, Sligo), Richeal Burns</p>
<p>1.13 Orai Channels as Potential Therapeutic Targets in Asthma by Yong Syuen Chee (Dundalk Institute of Technology), Bernard Drumm</p>	<p>2.13 Quantitative diagnostics of coronavirus proteins and immune responses to SARS-CoV-2 by Jack Bollard (Trinity College Dublin), Martin Hegner, Giulio Brunetti</p>	<p>3.13 An Oral Health Promotion Intervention on the Creation of Public Awareness Surrounding the Negative Effects of Excessive Alcohol (Wine) Consumption on Oral Health by Jacinta Sutton (Athlone Institute of Technology), Eileen Lane</p>

<p>1.14 Determining the binding affinity of the antineoplastic agent BP-C1 by Megan Westbury (Institute of Technology, Sligo), Nikolay Solovyev</p>	<p>2.14 Examining the expression of pro-inflammatory adipocytokines in relation to blood pressure and adiposity, and their prevalence in cardiovascular disease by Amy Kennedy (Technological University Dublin), Oscar MacAnaney</p>	<p>3.14 Nutrition and Cardiovascular Health: Effectiveness of Healthy Dietary Interventions in Reducing the Risk of Heart Diseases by Sinead Mc Guirk (Institute of Technology, Sligo), Sasirekha Palaniswamy</p>
<p>1.15 Scoping review of the potential for green synthesis of Carbohydrate Fatty Acid based antimicrobials by Nelvea Grace Osorio (Technological University Dublin), Julie Dunne</p>	<p>2.15 The antioxidant and anti-inflammatory effects of natural compounds on RAW 264.7 macrophage cells by Tegan Owen-Pelly (Waterford Institute of Technology), Edel McNeela, Amruta Deshpande</p>	
<p>1.16 Anticancer Activity of Schiff Base Metal Complexes: A review by Tricia Mondala (Technological University Dublin), Denis O'Shea</p>	<p>2.16 Plant DNA extraction by Gergely Antal (Institute of Technology, Carlow), Carloalberto Petti</p>	
<p>1.17 Mutation Profiling Irish Colorectal Cancer Patients via Next-Generation Sequencing by Laoise Geraghty (Technological University Dublin), Kathleen Brosnan, Robert Cummins, Tony O Grady</p>		
<p>1.18 Stem Cells as Drug Delivery Vehicles and its Potential Future in Treatment of Prostate Cancer by Sarah Ingram (Athlone Institute of Technology), Cathy Brougham</p>		
<p>1.19 Review of the chlorate analysis in milk production by Devon Gabriel (Munster Technological University), Ambrose Furey, Michael McAuliffe</p>		
<p>1.20 Stem Cell Technology by Sorina Amarculesei (Athlone Institute of Technology), Cathy Brougham</p>		

1.21 Enhancement of a UVC LED product by Caolan Shorten (Munster Technological University), AnneMarie McCarthy

- 1:00 – 2:00** **Lunch and Poster Session.**
Poster session online at <https://gather.town/invite?token=lxbfdqLv>
- 2.00 – 2.10** **Voting ends for SURE2021 Audience award for Best Scientific Poster**
- 2.10 – 2.30** **AIT Keynote 3:** Prof. Sinéad Louise Farrell, University of Maryland, USA and National Oceanic and Atmospheric Administration Laboratory
- 2:30 – 3:00** **Virtual Prize Presentation** chaired by Therese Montgomery, Chair of the SURE Network
- Conference prizes:**
SURE Network Award for Best Scientific Poster
SURE2021 Audience award for Best Scientific Poster
SURE Network Award for Best Oral Presentation
SURE2021 Audience award for Best Science Communicator
- 2:30** **Professor Willie Donnelly, President of Waterford Institute of Technology** presents awards for the Chemistry, (Bio)Pharma, Computing and Physics Stream
- 2:40** **Dr Michael Mulvey, President of Dundalk Institute of Technology** presents awards for the Biology and the Environment stream
- 2:50** **James Maloney, Senior Regional development Executive for Enterprise Ireland** presents awards for the Health Science and Nutrition stream
- 3:00 – 3:05** Update from SURE Network Undergraduate research journal SURE-J by SURE-J editor Dr. Barry Ryan
- 3:05 – 4:00** Postgraduate Opportunities Workshop, chair: Dr Cormac Quigley
- Invited speaker :** **Dr Eoin Cullina**, Head of the Research, GMIT.
 Title of talk: **'Pathways to Research'**
- Postgraduate Panel:** **Ciara Buckley**, AIT, **Dan (ChauThuy) Nguyen**, WIT, **Ryan Smazal**, DKIT

SURE2021 Keynote Profiles

Keynote 1 WIT:



Dr Chris Edlin started his career by studying chemistry at the University of Durham where he stayed on to gain his PhD in organic chemistry. Following a passion to use science to improve healthcare he joined the pharmaceutical industry working in medicinediscovery creating and developing novel therapies to enter clinical trials. He worked for Sanofi Aventis, Roche and GSK and contributed toand led discovery programs in Arthritis, HIV, Asthma and COPD. After this he worked for a medical research charity in the UK with the aimof developing basic medical research into commercial leads before heading to South Africa to lead a start-up company, iThemba. iThemba pharmaceuticals in Johannesburg was established to provide international chemistry service in order to fund neglected disease research. Under Chris' stewardship the company grew to over 25 staff with contracts from multiple international clients. After South Africa

Chris moved back to Europe and spent some time in the academic sector, founded a small company and moved to Ireland to lead the PMTC and completed an MBA. In 2018 Chris joined Teva to lead the pharmaceutical sciences group which has responsibility for materials science, developing formulation and process plus extractable and leachable activities for all respiratory products. He is currently Senior Director R&D.

Keynote 2 DkIT:



Dr. Bernard Drumm graduated from DkIT with a 1st class honors degree in Applied Bioscience and Biopharmaceutical Science and the Presidents Prize for Academic Excellence in 2008. He then pursued a PhD program with Professor Noel McHale within the DkIT Smooth Muscle Research Centre (SMRC), examining intracellular calcium (Ca^{2+}) signalling in specialised cells of urinary tract smooth muscle using confocal laser microscopy and Ca^{2+} imaging approaches. This included spending his final year working in the Royal College of Surgeons in Ireland (RCSI) Molecular Medicine research laboratory at Beaumont Hospital Dublin.

Dr. Drumm completed post-doctoral studies with Professor Kenton M. Sanders in the Department of Physiology & Cell Biology, University of Nevada, Reno (UNR) School of Medicine, U.S.A. During this time, Dr. Drumm used transgenic animal models and optogenetic imaging to study neural regulation and pacemaking systems, and was awarded the Outstanding Postdoctoral Scholar Award from the Society of Pelvic Research and the Barcroft Early Career Medal from the Royal Academy of Medicine in Ireland. Dr. Drumm was promoted to Research Assistant Professor at UNR, continuing his research on smooth muscle Ca^{2+} signalling mechanisms. Dr. Drumm is currently a Lecturer in Molecular Biology in DkIT. His research continues within the SMRC. Dr. Drumm has remained a visiting lecturer to the UNR Physician Assistant Studies Program and is an Editorial Board Fellow of The Journal of Physiology.

Keynote 3 AIT:

Sinéad Louise Farrell, Ph.D., is an Associate Professor at the University of Maryland, USA, with the Departments of Geographical Sciences and Atmospheric and Oceanic Science. She is also a visiting scientist at the National Oceanic and Atmospheric Administration Laboratory for Satellite Altimetry. Dr. Farrell studied at University College London where she earned her M.Sci. in Earth and Space Science in 2002, and a Ph.D. in Space and Climate Physics in 2007, for her dissertation on satellite laser altimetry over sea ice. Dr. Farrell's areas of interest include earth system science, climate change and remote sensing technology. She has over a decade of experience in remote sensing of the polar oceans using satellite techniques for marine geophysics and cryospheric science investigations. She is a principal investigator on both the NASA ICESat-2 and the NASA/NOAA Ocean Surface Topography Science Teams. She is also a member of the Mission Advisory Group for the

proposed European Union Copernicus Polar Ice and Snow Topography Altimeter (CRISTAL) satellite mission. Her work includes fieldwork deployments to the polar regions to calibrate and validate satellite sensor measurements.

Postgraduate Opportunities Workshop, Invited Guest Speaker:

Dr. Eoin Cullina is the Head of Research at Galway-Mayo Institute of Technology (GMIT). Prior to taking up this role previously worked in the Department of Enterprise and Technology as a lecturer and researcher. Having completed a Bachelor of Civil Law at University College Cork, Eoin worked as a lawyer and mediator prior to entering academia. Eoin completed a MSc in Information Systems Management at NUI Galway in 2013. He finished first place in his class and completed his PhD under scholarship from Science Foundation Ireland (SFI) with Lero, the Science Foundation Ireland Research Centre for Software. Eoin subsequently completed postdoctoral research funded by SFI at the Whitaker Institute, NUI Galway in the area of Science Policy prior to joining GMIT. Eoin has won awards for his research and teaching and has presented his research at leading conferences and workshops around the world. Eoin is a committee member of Open Scholarship Community Galway, an organisation committed to promoting open science and open scholarship in research and education.

Title of Talk: 'Pathways to Research'.

Postgraduate panel - A five-minute snapshot of 'A day in the life' of three different postgraduate researchers pursuing PhDs in each of our three SURE Conference host institutions (AIT, DkIT and WIT), followed by an open questions and answer session, led by invited guest speaker Dr Eoin Cullina

SURE2021 Postgraduate Speaker Profiles



Athlone Institute of Technology: Ciara Buckley

Ciara Buckley is in the final year of her PhD in Athlone Institute of Technology, under the supervision of Dr. Therese Montgomery of GMIT and Dr. Ian Major, AIT. Her research involves chemical modification of the biopolymer, hyaluronic acid, to enable 3D printing of nerve conduits for peripheral nerve repair. This multidisciplinary project combines the knowledge from her undergraduate degree in biotechnology and her love for chemistry and is funded under the Irish Research Council's Government of Ireland Postgraduate Scholarship. Ciara is the winner of an institute wide poster competition 2020 and an institute wide multidisciplinary 3 minute thesis competition, 2020.



Waterford Institute of Technology: Dan (Chau Thuy) Nguyen

After graduating with a BSc(Hons) in Pharmaceutical Science at WIT in 2017, Dan Nguyen is currently a 4th year PhD researcher in the Ocular Therapeutics Research Group within the Pharmaceutical & Molecular Biotechnology Research Centre in WIT. Her PhD is funded by the Irish Research Council-Enterprise Partnership Scheme with Bausch+Lomb Ireland Ltd. Dan's PhD research is carried out under the supervision of Dr. Laurence Fitzhenry, Dr. Richie Ryan, Prof. Peter McLoughlin and Dr. Joseph Dowling. Dan's project focuses on the development and characterisation of pharmaceutical-loaded hydrogel contact lens for the treatment of ocular diseases. Her research interests include material science, surface chemistry, polymer chemistry, ocular drug delivery, controlled release and targeted delivery, contact lenses, and nanotechnology.



Dundalk Institute of Technology: Ryan Smazal

Graduating from the University of Wisconsin-Madison (USA) with a BSc, majoring in History and Political Science and receiving certificates in European Studies and Environmental Studies in 2019, Ryan Smazal completed his MSc (1.1) in Coastal and Marine Environments at NUI-Galway in 2020. Now in his second year at Dundalk Institute of Technology, Ryan is a PhD researcher within the Centre for Environmental and Freshwater Studies (CEFS). His PhD project is co-funded through the Higher Education Authority's Landscape Funding and Dundalk Institute of Technology. As part of the Marine Institute's BEYOND 2020 project, Ryan is investigating environmental change at centennial/millennial time-scales in the Burrishoole Catchment, Co. Mayo. Using palaeolimnological techniques, this project will advance the understanding of important climate change responses and aquatic sediment sinks, providing context for environmental conditions over millennial timescales.

SURE2021 Sponsors

The SURE Network would like to thank The National Forum for Teaching and Learning.



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The **National Forum for the Enhancement of Teaching and Learning in Higher Education** is the national body responsible for leading and advising on the enhancement of teaching and learning in Irish higher education. We work with those who teach, learn and shape policy and practice to ensure a valued and informed teaching and learning culture in Irish higher education. We focus on the professional development of all those who teach, teaching and learning in a digital world, teaching and learning within and across disciplines, and student success.



LAMS is a web-based application for designing, managing and delivering online collaborative learning activities. It provides teachers with a highly intuitive visual authoring environment for creating sequences of learning activities. These activities can include a range of individual tasks, small group work and whole class activities based on both content and collaboration. Teachers drag and drop activities into the authoring interface and then join the activities together to produce a learning sequence. LAMS have a wide range of tools designed to be used for a range of pedagogical approaches, by teachers and students with varying levels of technical expertise.

We are delighted that Ernie Ghiglione ernieg@lamsinternational.com from Lams International [<https://www.lamsinternational.com/>] supported this year's conference by affording us with free licences and technical support for the "Creating effective presentations workshop" that was offered to all oral presenters and delivered remotely using Team-Based learning (TBL) via Lams.

SURE2021 Book of Abstracts (Oral Presentations)

Stream 1: Chemistry, (Bio)Pharma, Computing and Physics



Waterford Institute of Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LAIRGE



Stream 2: Biology and the Environment



Stream 3: Health, Sport and Nutrition



Abstracts: Chemistry, (Bio)Pharma, Computing and Physics Stream

1.1 The role of hydrogels in delivering bone marrow stromal cells for the treatment of Parkinson's Disease by Bardia Haghighirad (Athlone Institute of Technology), Clement L. Higginbotham

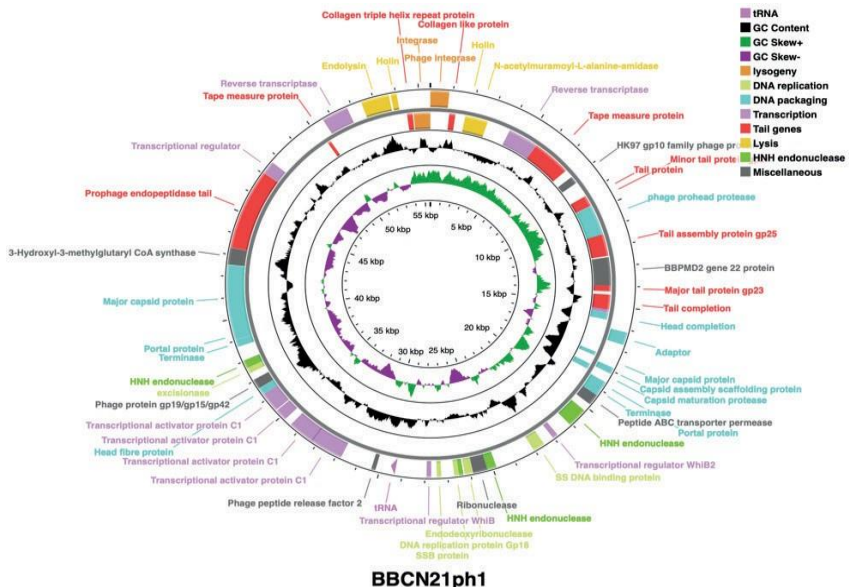
Recent surge in the prevalence of progressive neurodegenerative disorders such as Alzheimer's disease, Huntington's disease and Parkinson's disease have increased the demand for creating an effective treatment for these neurodegenerative disorders. Bone marrow stromal cells (BMSCs) show promise for treating neurodegenerative disorders, in particular Parkinson's disease (PD). Novel Gelatin-PANI (polyaniline) hydrogels have been developed over the past three years in order to be engulfed with BMSCs and to enhance their efficacy in PD MPTP (prodrug of neurotoxin MPP⁺)-induced mouse model. Furthermore, due to their tuneable physique, Gelatin-hydrogels can cross the blood-brain barrier (BBB) and can preclude the degradation of the drug molecules, when used as a transport mechanism. To assess their efficacy, BMSC-engulfed Gelatin-PANI hydrogels were stereotactically injected to the substantia nigra pars compacta of the PD MPTP-induced mouse model. The results obtained from the novel treatment showed that upon the administration of the BMSCs via Gelatin-PANI hydrogels in PD mice, there was an increase in the amount of tyrosine hydroxylase dopaminergic fibers and neurons in the striatum and in the substantia nigra pars compacta. As a result, there was a significant increase in the motor function and motor capacity of the PD MPTP-induced mouse model. Furthermore, for this research two research articles were reviewed. Consequently, it is suggested that BMSC-engulfed Gelatin-PANI hydrogels can be used as a treatment for PD in vivo, with no toxicity or adverse reactions in comparison with traditional treatments available for PD.

1.2. Bioinformatic analysis of six *Bifidobacterium breve* prophages by Rachel Mc Lellan (Munster Technological University), Francesca Bottacini

Bifidobacterium are one of the earliest colonisers of the gut, with *B. breve* being most dominant in the infant microbiome (Mahony *et al.*, 2018) (Bozzi Cioci *et al.*, 2018). Due to its health promoting benefits *B. breve* may be used as an infant probiotic especially in preterm babies (Wong, Iwabuchi and Xiao, 2019). Bifidophages are maternally inherited and abundant with at least one per *B. breve* genome and their presence in the infant gut is considered essential in the development of the gut microbiome (Mahony *et al.*, 2018) (Bottacini *et al.*, 2014).

The purpose of this project was to perform functional characterisation of six novel *B. breve* prophages. All six phages were automatically annotated with RASTK and the annotations were manually refined using several data bases. Following analysis, all characterised phages are lysogenic, have a *Siphoviridae* morphology, target actinobacteria hosts and display a modular gene organisation. BB01ph1 was identified as a conjugative element during functional annotation, most likely to be a mega plasmid due to a genome size of 180kb and appears to be distantly related to phages based on phylogenetic analysis, possibly due to the presence of phage remnants.

A novel element predicted to be a diversity generating retroelement (DGR) was identified in BBCN21ph1 due to the presence of a reverse transcriptase gene, possibly representing a globally distributed phage in *Bifidobacterium*. During phylogenetic analysis all five phages cluster into two main groups, suggesting there is two evolutionary distinct families of bifidobacterial phages, with BB01ph1 falling within the first group. Bifidophages are currently under characterised and further functional experimental characterisation will be necessary to determine phage susceptibility in *Bifidobacterium* strains and improve probiotic design.



1.3 An investigation into the use of gelatin from marine by-products to act as novel ingredients in cosmetic formulations by Siobhan Ward (Institute of Technology, Carlow), Adriana Cunha Neves, Brian O'Rourke

Large quantities of marine by-products such as the skin, viscera, bones, head, and fins are generated from fish processing industries (FAO 2020). Historically, by-products were largely disposed of through incineration, landfill disposal or by returning it back to the sea (Norris, Harnedy and FitzGerald, 2013, Arvanitoyannis & Kassaveti 2008). All of which contribute negatively to environmental pollution. In the last decade, recent studies have identified a range of bifunctional proteins and peptides which can be extracted from marine by-products and processed into products of economic value. (Venkatesan et al., 2017, Martins et al., 2014).

In this study, gelatin from the skin of *Salmo salar* was formulated into a cosmetic emulsion. The gelatin emulsion was assessed based on physical characteristics and microscopic examination. The chemical, structural and antioxidative properties of marine gelatin was investigated and compared to that of bovine and porcine gelatin, which are the most prevalent in industry today (Coppola *et al.*, 2020). The DPPH antioxidant test was performed and found the MG (16.61 %) had a lower but comparable antioxidant ability to both BG (19.60 %) and PG (18.27 %). RP-HPLC was used to assess the hydrophilicity of the gelatins. All gelatins showed a homogenous mixture of hydrophobic and hydrophilic peptides. Hydrophilic peptides are known to strengthen gel formation and stabilise emulsions. ATR-FTIR analysis found MG to have lower intensities of the major peaks associated with gelatin than BG and MG. An online survey was conducted on google forms and assessed through SPSS which found the population had a high interest in sustainable (35.4 %) and ethically sourced (25.4 %) products. Based on the information obtained in this study, it can be suggested that MG may be of use to the cosmetic industry as an alternative excipient to BG and MG. Due to its comparable physiochemical properties with added antioxidative abilities and consumer interest.

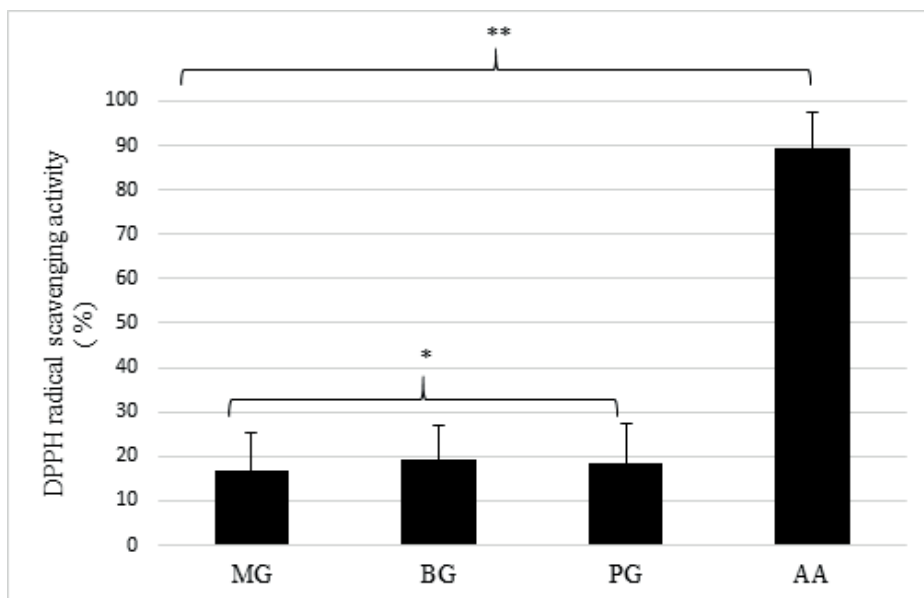


Figure 1 DPPH antioxidant assay Values represent mean + STD.

*indicates $p > 0.05$ and ** indicated $p < 0.05$.

MG, BG and PG stand for marine, bovine and porcine gelatin respectively. AA refers to ascorbic acid (positive control)

1.4 The Application of Chitosan-Metal Complexes to Wound Dressings: A Systematic Literature Review by David Hanley (Galway-Mayo Institute of Technology), Cormac Quigley

Chitin is the second most common occurring biomass in nature, found primarily in Crustacean Shells and Fungi. For this project, Chitosan, a Chitin derivative, was investigated for its intrinsic physicochemical characteristics, including antibacterial properties, and a high chelating capacity. These properties have led to chitosan being used in variety of biomedical applications. This project aims to investigate research done on the application of chitosan-metal chelates to different types of wound dressings and observe their antibacterial properties.

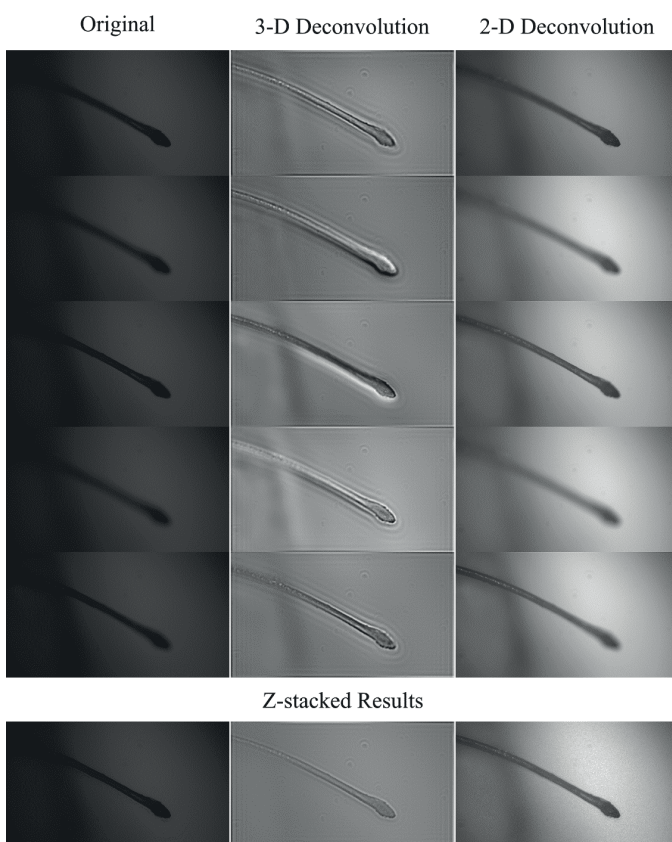
This research was conducted as a Systematic Literature Review. This type of review involves clinically and critically reviewing research related to a clearly defined aim. To compile the research papers related to the aim, online libraries were searched. 510 papers were acquired and sorted using Microsoft Excel. Exclusion and Inclusion criteria were then applied to find publications directly related to the aim. After application of these criteria, 62 papers were reviewed. It was observed that the four most common metals chelated with chitosan were Silver, Copper, Gold, and Zinc.

From this research, it is clear that Chitosan-Silver and Zinc Oxide nanoparticle chelates applied to wound dressings provided the best antibacterial effect. Comparisons between the other metals used with Chitosan, show in all cases, the Chitosan-Silver chelates demonstrated the highest antibacterial efficacy. While Copper and Gold also display antibacterial effects with chitosan, the results were inconsistent, and the effects were not as pronounced as Silver or Zinc. *In vivo* testing also showed positive results regarding the wound healing properties of Chitosan when combined with metals.

1.5 A comparison of Deconvolution and Z-Stacking for microscopy by Jarni Braal (Munster Technological University), Natalia Rebrova, Milosz Przyjalowski

Images produced in microscopy are imperfect and often need to be processed. Two methods were chosen in this project, deconvolution, and Z-Stacking. Comparisons were made between different alignment algorithms and different methods for deconvolution were investigated using known point spread functions. The two methods (deconvolution and Z-stacking) were also compared and combined for sets of real data.

The input data used was a set of 3-D data captured by varying the focal length of the microscope, focusing on different elements of the object. This resulted in a set of focal planes, containing more information than a singular image.



Deconvolution is a mathematical technique that seeks to invert the blurring caused by the inherent imperfections in the optical imaging system. (1) Two methods were investigated: layer-by-layer 2-D deconvolution and 3-D deconvolution. Z-stacking is a computational technique that seeks to combine the sharpest elements of each input image into a singular output. This may accentuate detail that is otherwise hard to see by effectively increasing the depth of field. (2) Wavefront coding is an alternative technique for increasing the depth of field.

The results showed that Z-Stacking is an effective technique for presenting 3-D data, whilst 3-D deconvolution showed promise but required an accurate PSF to noticeably improve image quality. A combination of Z-stacking and layered 2-D deconvolution was shown to be a very capable method for enhancing and presenting 3-D data in a simple manner and may be a simpler, faster, alternative to 3-D deconvolution.

Fig.1 | Outputs of the different algorithms, with the Z-stacked results

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1.6 SARS-CoV2 variants, spike mutations and computational prediction of their impacts by Lizaveta Kotsikava (Technological University Dublin), Fergus Ryan, Andrew Knox

In 1918, the most severe influenza pandemic in recent history occurred claiming an estimated 50 million lives and infecting approximately 500 million people. The H1N1 virus responsible rapidly lost its virulence through antigenic drift and became 100 times less lethal by 1920. A trade-off emerged with lower virulence being compensated by more efficient spreading and overall survival of both virus and host. The emergence of Severe Respiratory Syndrome Coronavirus (SARSCoV-1) in 2003 showed clearly however that not all RNA viruses are equal and no correlation between disease severity or transmissibility could be made. Since the first reported cases of Covid-19 infection in Wuhan, China caused by SARS-CoV-2, scientists have been closely monitoring evolution of the virus via genome sequencing on an unprecedented scale worldwide. To date, SARS-CoV-2 has steadily evolved mutations in its genome which have produced novel variants (e.g. Lineage B.1.1.7 or variant Alpha, Sub-lineage B.1.617.2 or variant

Delta), with those providing advantage being selected. The SARS-CoV-2 viral particle surface harbours Spike Glycoproteins that drive interaction with the ACE2 receptor on human endothelial cells of alveolar macrophages in the respiratory tract and arterial and venous endothelial cells resulting in subsequent cellular entry and viral replication. This study focused on applying state-of-the-art computational protein design methods to investigate the possibility of predicting; 1) new mutations of the Spike glycoprotein that may confer enhanced binding affinity for human ACE2 and 2) the combination of mutations of the Spike glycoprotein, that were they to occur, would result in the most efficient variant (*Figure 1*).

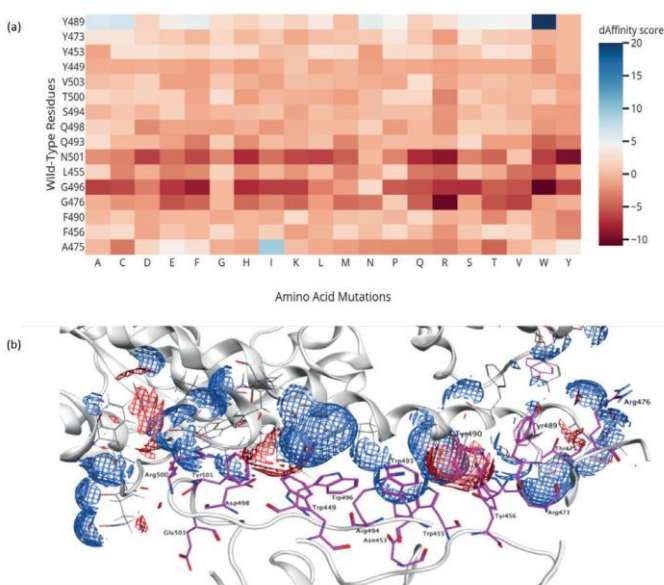


Figure 1. (a) HeatMap depicting calculated dAffinity scores (MOE v2020.09, Chemical Computing Group ULC) for all mutated residues of the spike glycoprotein located at the interface with the ACE2 receptor. X-axis and y-axis represent wild-type residues and single letter amino acid codes for mutations respectively. The more negative dAffinity scores are shown in dark red, these are more favorable for the spike glycoprotein. (b) Interface between the ACE2 receptor and the Spike Glycoprotein. Residues of the Spike Glycoprotein that have been mutated are labelled and those residues represented are considered optimal at this position as calculated by dAffinity score (MOE v2020.09, Chemical Computing Group ULC). Red contours = acceptor regions, Blue contours = donor regions, white contours = hydrophobic regions. In cyan labelled are those amino acids present on the Spike glycoprotein which are likely to mutate.

1.7 Bioinformatic analysis of the GluN1 subunit of the NMDA receptor" by Pasquinna Sida (Waterford Institute of Technology), David Scanlon

N-methyl-D-aspartate receptors (NMDARs) are ionotropic glutamate receptors that mediate slow and long-lasting calcium influx in excitatory neurons. NMDARs are thought to play a critical role in learning and memory formation by strengthening nerve impulses during synaptic transmission. The receptors are heterotetramers and are commonly composed of two GluN1 subunits and two GluN2 subunits. The receptor requires concurrent binding of its ligands L-glutamate (which binds to GluN2 subunits) and glycine (which binds to the GluN1 subunit) for its activation. In this study, bioinformatics based analysis of the GluN1 subunit was carried out across 23 animal species. Critically important glycine binding residues were found to be highly conserved among vertebrates such as *H. sapiens* and *R. norvegicus* in comparison to invertebrates such as *C. elegans*. This suggests that the vertebrate animal species share many pharmacological and kinetic properties of NMDARs, especially slow activation of the receptor due to possible magnesium blockade. The GluN1 amino acid sequences for *D. melanogaster* and *A. mellifera* were very similar, suggesting that the NMDA receptor role in these species might be the same. Additionally, the effect of missense mutations in various domains of the human GluN1 subunit was analysed using online tools such as PolyPhen2, SIFT, and PROVEAN. Nine out of the ten mutations analysed were predicted to be deleterious and would substantially impact the functional activity of the GluN1 subunit. It is hoped that this analysis could help to inform the development of future treatments for a range of neurological pathologies such as Alzheimer's disease.

1.8 Image-based Malware Classification using Feature Extraction and Computer Vision" by Josef Staubmann (Technological University Dublin), Stephen O'Shaughnessy

The rapid growth of malware attacks has seen anti-virus (AV) vendors report receiving upwards of 350,000 samples per day, making manual analysis methods infeasible. Automated tools can alleviate the processing burden but are limited to mainly distinguishing between benign and malicious programs, so do not necessarily classify malware into their correct taxonomic classes. Traditional approaches to malware classification, such as n-gram analysis [1] or API call sequence analysis [2] generally require invasive data acquisition methods to extract salient features for classification. This research presents a malware classification framework for rapid and accurate classification of malware to help alleviate the manual processing classification limitations associated with such methods. While similar image-based malware classification approaches exist [3][4][5], the dataset predominantly used for testing and evaluating these methods was *Malimg* [5] which was constructed in 2011. Owing to the advances in malware complexity in recent years, this dataset cannot be considered indicative of today's modern malware landscape; therefore, a labelled dataset of recent malware strains was constructed for the purposes of this research. The framework incorporates malware represented as 2-dimensional images through a byte-to-pixel mapping procedure, where each byte in the malware binary file is converted to an equivalent grayscale pixel value in the resulting image. Image feature extraction through the Local Binary Patterns (LBP) algorithm is then used to obtain salient features that can be used as characteristics to classify each malware sample. Random Forests and K-Nearest Neighbours classification algorithms were trained and tested on the resulting image feature data. Extensive parameter tuning was incorporated to ensure the optimal performance of the algorithms. As there were some imbalances in the dataset, with the highest family count being 675 and the lowest being 100, efforts were taken to minimise bias, such as cross-validation and the use of several performance metrics, i.e., precision, recall, accuracy, and f1-score. Results show that, on a dataset of almost 4,000 samples from 10 malware families, the Random Forests classifier achieved average precision, recall and accuracy performance of 98.4%, 98.0% and 99.7% respectively.

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Abstracts: Biology and the Environment

2.1 The detection of CRFL2 overexpression in Philadelphia Like B-ALL using flow cytometry by Hannah Greene (Technological University Dublin), Claire Wynne, David O'Brien

Philadelphia Like B Lymphocyte-Acute Lymphoblastic Leukaemia (Ph Like B-ALL) is a rare subset of B-ALL only first described in 2009. It contributes to approximately 30% of young adult B-ALL cases. The use of thymic stromal-derived lymphopoietin receptor (TSLPR) antibody picks up overexpression of the protein Cytokine Receptor Like Factor 2 (CRLF2) which is present in half of Ph Like B-ALL. There is currently no immunophenotyping available for CRLF2 for the diagnosis of Ph Like B-ALL in Ireland despite its unfavourable outcome.

The aim of this study was to validate this antibody and add it to a B-ALL panel for use in St James' Hospital by using flow cytometry. Analysis was performed on the BDFACSCanto™ II flow cytometer. There were 44 samples used which included B-ALL samples, negative controls which were haematogones. and positive controls. The positive controls being tested included elevated monocyte samples, infectious mononucleosis samples, Acute Myeloid Leukaemia (AML) and Acute Myelomonocytic Leukaemia (AMML) samples as CRLF2 is expressed on activated monocytes. Two sample also had their monocytes activated using Phorbol 12-myristate 13-acetate (PMA) to activate the monocyte and look for expression of CRLF2.

The results of this study showed that none of the positive controls being used showed CRLF2 expression and the B-ALL cases were shown to not be Ph Like B-ALL. Difficulty in finding appropriate samples limited this study and therefore, this antibody could not be validated for use.

This study showed that more research is needed in this new but significant B-ALL. Finding a positive Ph Like B-ALL is essential for the antibody to be validated for use and be implemented into a B-ALL panel.

2.2 The Use of Melittin: A Natural Component of Honeybee Venom, as a Potential Anti-Cancer Treatment in Human Carcinomas" by Niamh Donnellan (Athlone Institute of Technology), Anne M Friel

Chemotherapy, the main approach to cancer treatment has many negative associations - lack of selectivity, side effects and drug resistance. Hallmarks of cancer are a fundamental concept which aids the development of new means of treatment through the understanding of the acquisition of these hallmarks from cells.

Melittin is a major peptide component of bee venom, an efficacious anticancer agent in preclinical and animal models. It has many biological functions including pore formation in the phospholipid bilayer causing cell permeability and lysis. Melittin interacts with biological signalling pathways, supressing tumour cells.

The aim was to investigate the effects of melittin on cancer and was carried out by gaining a strong understanding of cancer hallmarks; consideration of the structural properties of melittin; assessing anti-cancer effects of melittin and establishing mechanisms which melittin elicits an anti-cancer response.

Despite convincing data presented, its pertinency to human studies has been met with challenges - non-specific cytotoxicity and haemolytic capabilities. Optimisation techniques for melittin have been developed including the use of gene therapy, co-delivery and nanoparticles.

Gene therapy allows efficient delivery of melittin to target cells and selective expression to cancer tissues when gene expression is highly regulated. Synergistic and additive anticancer effects have been reported between docetaxel and bee venom or melittin. Current literature strongly suggests nanoparticles are an attractive mode of delivery, can enhance the therapeutic efficacy of melittin and provide excellent systemic delivery to target tumours with minimal damage to normal cells.

2.3 Exploring the willingness of Irish farmers to use insects as feed for their animals” by Felicity Downes (Institute of Technology, Sligo), Maria Dermiki

Due to world population growth, there is an increasing demand for animal protein as food, and in turn there is an increasing demand for protein in feed to produce animals. Insects may prove a more sustainable protein source for animal feed as they generate lower greenhouse gas emissions and can be produced using minimal resources compared to conventional protein sources. However, research into farmers’ attitudes towards the use of insects as feed is lacking.

The aim of this study is to determine the willingness of Irish farmers to use insects as feed for their animals, in order to design policymaking, education strategies and to establish the market. To achieve this aim, five semi-structured interviews with farmers of different animals (Beef Cattle, Dairy Cattle, Sheep, Poultry and Fish) were carried out using video conferencing. Interviews were transcribed and coded and analysed using thematic analysis.

The findings showed that overall, farmers were willing to use insects as feed. The most common themes or factors affecting the willingness of farmers were research and approval, environmental impact, safety, naturalness of insects in the diet, profitability and consumer opinion. The participants had mostly a positive attitude towards the possibility of using insects as feed, showing that there is potential for its use in Ireland. However, further studies with larger participant numbers as well as participants from all farming industries are recommended.

2.4 The antimicrobial peptide resistance mechanisms of Staphylococcal species" by Beatrice Olayiwola (Institute of Technology, Carlow), Carla Surlis

Staphylococci are known to be responsible for a large range of infections at different levels due to their resistance mechanisms that they possess to combat the innate immune defence in the host. Most of these resistance mechanisms render the components of the innate immune system partially inactive and this includes antimicrobial peptides (AMP's) e.g., the multifunctional cathelicidin LL-37.

The resistance mechanisms became more virulent due to genetic variations in found in certain staphylococci that evolved due to natural selection. Some of these genes e.g., genes of the *icaADBC* operon are present in extremely virulent strains yet absent in less infectious strains e.g., *S. epidermidis* (strain 12228).

The analysis of a select few strains was carried out to determine the difference in the expression and the regulation of the genes that contained virulent factors. Finally, it was evident that the genes investigated had variations present which differed from the less virulent strain. These variations were seen to enable the virulent species the ability to avoid the cationic and anionic AMP's regardless of charge. A potential diagnostic test hypothesised to illustrate that a collection of primers can be used in PCR techniques to identify between the staphylococcal species to classify them and their mechanisms.

2.5 Identification of an exosomal miRNA expression signature in response to chemotherapy treatment in neuroblastoma" by Christopher Sheridan (Technological University Dublin), Olga Piskareva

MicroRNAs (miRNAs) are a group of small, non-coding RNAs that regulate gene expression through silencing and post-translational modification of target mRNA. miRNAs play major roles in cell differentiation, and tumorigenesis in many cancers. miRNAs are transported in membrane-derived vesicles called exosomes. Most cell types secrete exosomes and so they are considered a novel mode of intercellular communication. Neuroblastoma (NB) is an embryonal tumour of the sympathetic nervous system, responsible for a disproportionate percentage of paediatric cancer deaths.

Clinical behaviours of NB strongly correlate with specific genetic and epigenetic abnormalities. It is believed that some of these abnormalities can be linked to or with the underexpression or overexpression of certain miRNAs. A bioinformatics analysis of qPCR data was conducted quantifying exosomal miRNA expression derived from sensitive and drug resistant neuroblastoma microtissues bioengineered in 3D invitro in response to cisplatin treatment. Change in expression of exosomal miRNA was determined using the comparative cycle threshold method.

The primary hypothesis for this analysis was that exosomal miRNA can represent potential markers of responsiveness to chemotherapy in neuroblastoma cells and may be used to predict resistance to certain forms of chemotherapy. This analysis concluded that the expression of three miRNAs; miR-1290, miR-483-3p and miR-29a were all significantly altered ($P \text{ Value} \leq 0.05$) in response to cisplatin treatment in both cell lines. Each of these miRNAs provide an insight into possible mechanisms of cisplatin resistance in neuroblastoma, opening potential avenues of research with a view to establishing a reliable biomarker for personalized therapeutic strategies.

2.6 Genetic mutational status and inflammatory response in metastatic cancer: New implications for immunotherapies by Brenna Daily (Institute of Technology, Sligo), Paul Hartel

Introduction

Metastatic cancer poses great challenges in oncologic treatment. While metastatic tumours with specific genetic mutations can be treated with targeted therapy, no such treatment exists for those without these mutations.

Methods

Anonymised histopathology data from clinical audit of 56 needle biopsies of metastatic lesions were reviewed. Results from molecular studies for EGFR, KRAS, BRAF, N-RAS, and ROS-1 genetic mutations and ALK-rearrangements were compared with inflammatory response surrounding metastases. Inflammation grading was by light microscopic slide review as 'brisk' or 'weak'. Polymerized chain reaction gene mutation analysis was performed at molecular laboratory, Royal College of Surgeons in Ireland.

Results

Of these metastatic tumours, all were adenocarcinomas from primary sites including 22 colorectal, 12 pancreatic, 7 lung, 7 breast, 4 upper gastro-intestinal, 3 gallbladder, and 1 prostate. When reported, tumors were poorly(15), moderately(29) and well(1) differentiated. Of 24 cases tested ,13 tumours had genetic mutations identified including EGFR, KRAS, N-RAS, and BRAF. Twice as many tumours **without** genetic mutations(6) had brisk inflammatory response compared to tumours with genetic mutations(3). Similarly, twice as many tumours **with** genetic mutations(10) had weak inflammatory response compared to tumours without mutations(5).

Conclusion

For some patients, cancer treatment options are limited depending on genetic mutation status. Approaches that bolster tumour-reactive inflammatory response may limit tumour progression and improve treatment response with drugs such as pembrolizumab. Although larger samples are needed, following our findings of an association between genetic mutation status and inflammatory response, we propose further exploration into the utility of immunotherapies, particularly in patients with tumours lacking genetic therapeutic targets.

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2.7 The Role of Temperature and Humidity towards Covid-19 Transmission Dynamics and Mortality Rate by Clement Sim Shi Jie (Munster Technological University), Jim O'Mahony, Helen O'Shea

This research paper aims to investigate the relationship between environmental factors and Covid-19 transmission dynamics and mortality rate. More specifically, this research study focuses on assessing temperature and humidity in four countries with different climates, Poland (temperate), Malaysia (tropical), Ukraine (continental), and Iraq (dry). The countries were selected based on their different climate and similar population size and density. Using epidemiology and meteorological data extracted from the Johns Hopkins Centre for Science and Engineering and European Centre for Medium-Range Weather Forecasts (ECMWF), the four countries were analyzed for average temperature and average humidity against COVID-19 monthly cases and death counts between April 2020 to December 2020. Using Minitab 19, a quadratic regression analysis was performed and fitted line and residual plots were created to determine the sample variances and analysis accuracy. The results demonstrated that temperature has a positive correlation in transmission and mortality count, especially in cooler climate countries with temperature ranges between 0°C and 15°C. However, there is insufficient evidence to prove that higher humidity levels increase transmission and mortality rates.

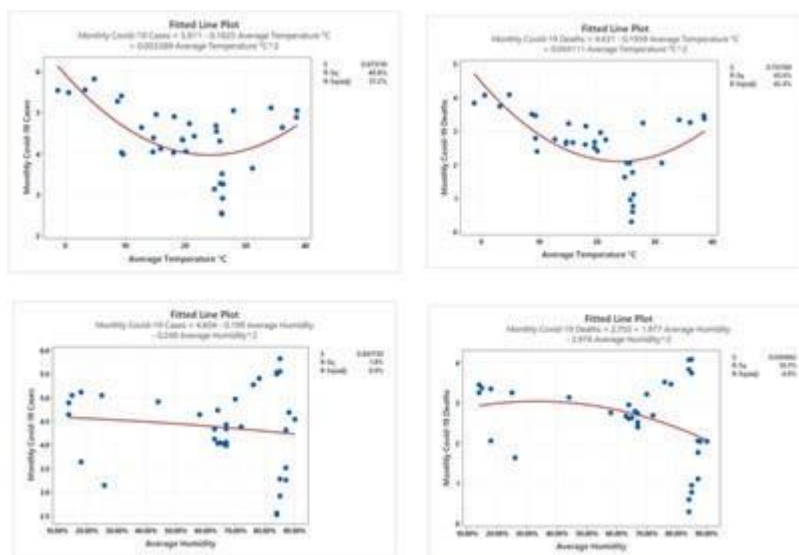


Figure 4: (a) The non-linear relationship between the average temperature and Total Cases of COVID-19 transmission rate in Poland, Malaysia, Ukraine, and Iraq; (b) The non-linear relationship between the average temperature and Total Deaths of COVID-19 mortality rate in Poland, Malaysia, Ukraine and Iraq; (c) The non-linear relationship between the average humidity and Total Cases of COVID-19 transmission rate in Poland, Malaysia, Ukraine, and Iraq; (d) The non-linear relationship between the average humidity and Total Deaths of COVID-19 mortality rate in Poland, Malaysia, Ukraine, and Iraq

External non-environmental factors such as government policies, healthcare infrastructure, and human social behaviors played a larger role in the transmission and mortality rate of Covid-19. With a larger data set, a model can be built to analyze the Covid-19 transmission and mortality trend in real-time to create analytics-based predictions which could potentially curb the spread of Covid-19 or identify seasonal variations of the disease. It is concluded that countries with lower temperatures must take more stringent precautions and control measures to reduce Covid-19 transmission as their specific climate may be favorable for the spread of the virus.

2.8 Stem Cell Technology and miRNA Communication in Ovarian Cancer by Nicola Bailey (Athlone Institute of Technology), Cathy Brougham

MicroRNAs (miRNAs) are short non-coding RNA between 20 to 26 nucleotides in length (Yao, 2016). They are involved in regulating gene expression by silencing specific regions of mRNA of stem cells (Shcherbata, 2019). Stem cells are undifferentiated cells found in the body which are associated with characteristics such as self-renewal, differentiating into several cell lineages and are prolific (Klimanskaya, 2019). Stem cells have characteristically been used in the past for stem cell transplants, however they have potential to be used in regenerative medicine, cancer treatments, and metabolic diseases and disorders.

The current mode of treatment for ovarian cancer is debulking surgery and chemotherapy, however there are several clinical trials which have been carried out which have used adipose derived stem cells as drug delivery vehicles or chemo-immunotherapy (Munteanu *et al.*, 2020; Nishio and Ushijima, 2020). There is a need for alternative treatment options as there is currently an increase of chemoresistance to be seen in ovarian cancer (Pokhriyal *et al.*, 2019).

There is an ongoing trial using mesenchymal stem cells which are engineered to express interferon-beta at the tumour site. The results have indicated that these new potential therapies have potential, however, require further research and clinical trials prior to being used in medicine on a wide scale (ClinicalTrials.gov, 2019). While the research carried out was a secondary analysis, potential complementary laboratory work could include the isolation of miRNA from stem cells by using miRNA isolation kits such as MirVana kit (Researchgate, 2018).

Abstracts: Health, Sport and Nutrition

3.1 The Associations between Nutritional Status, Nutrition-Impact Symptoms, and Health-related Quality of Life in Oesophageal Cancer Survivors by Sarah Bennett (Technological University Dublin), Claire Donohoe, Michelle Fanning, Conor Murphy, Suzanne Doyle

Background/Objectives: Oesophagectomy is the primary curative treatment for oesophageal cancer and is associated with considerable postoperative morbidity and health-related quality of life (HR-QOL) decline¹. Understanding the aetiology of this decline facilitates implementation of evidence-based treatment protocols in survivorship care of oesophageal cancer survivors. Accordingly, this study sought to determine the longitudinal changes in nutritional status, nutrition-impact symptoms (NIS), and HR-QOL in this cohort, and to determine which variables have the greatest impact on postoperative HR-QOL.

Subjects/Methods: Oesophageal cancer patients who underwent curative oesophagectomy between October 2017 and May 2019 in St James' Hospital, Dublin, and attended a Nutrition and Survivorship clinic preoperatively and 6 months postoperatively were included in the present study. A subset attended a further 12-month clinic appointment. Data was previously collected by trained clinicians and included anthropometric/nutritional measures, gastrointestinal symptom scores, and validated HR-QOL scales². This data was rigorously analysed using SPSS software.

Results: Malnutrition remained prevalent pre- and postoperatively, although rates did not significantly change longitudinally. This was similarly found for NIS, however the prevalence of malabsorption ($P<0.001$) and dumping syndrome ($P=0.003$) increased with increasing time post-oesophagectomy. NIS were significantly associated with impaired HR-QOL and were independent predictors of global QOL score postoperatively. A diagnostic threshold of gastrointestinal symptom severity (>11.5) that identifies those at risk of impaired global QOL was therefore reported.

Conclusion: Malnutrition and NIS are prevalent post-oesophagectomy, the latter significantly associated with reduced HR-QOL. Targeted intervention in those with severe NIS could, therefore, be highly valuable and supports the need for specialist dietetic input in this cohort.

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3.2 Perceptions of Game Speed in Women's Rugby by Cathriona Heffernan (Athlone Institute of Technology), Robin Healy

Women's Rugby Union is a physically demanding full contact team-based invasion sport. Game speed is a multi-faceted, complex, and critical element of a game comprising of acceleration, deceleration, max speed, speed endurance and change of direction. The aim of this study was to explore the perception of female rugby players on game speed in their sport.

A questionnaire was developed and validated which included both open and closed ended questions and comprised of four sections: (a) participant characteristics e.g age (25 ± 6), (b) players' perception of game speed qualities, (c) players' perception of speed training, and (d) players' perception of speed testing. One hundred and sixty-six players ($n = 33$ international, $n = 28$ provincial, $n = 25$ college, $n = 83$ club) completed the questionnaire on Microsoft Forms, a response rate of 61.4%.

Acceleration and change of direction were rated the most important speed qualities. Deceleration, despite its potential to cause self-injury, rated least important. Most players believed there was a lack of focus towards game speed training and testing by both coaches and players, stating very little was done to educate players on the importance of game speed.

Further studies focused solely on the female game are required primarily on the factors conducive to female participation in the game in addition to factors which inhibit females' players from reaching their athletic potential. More communication between players and coaches regarding game speed training, testing and the nature and importance of speed training qualities is of the utmost importance.

3.3 Exploration of Health Behaviours and Experiences of Post-Menopausal Women Aged between 55 & 65 by Conor Lillis (Athlone Institute of Technology), Patricia Heavey

Introduction: Post-menopause is the cessation of a women's menstrual periods followed by a year of amenorrhoea. Women frequently report a wide and diverse array of symptoms leading up to and post-menopause, however, we have limited understanding of the experiences of women living in Ireland. This study aims to explore health behaviours and experiences of post-menopausal women.

Methodology: A questionnaire was adapted from Marlatt, *et al*, (2018) and Harington, *et al*, (2008) for the Irish context to assess menopausal symptom experience alongside demographics. Symptom ratings were scored and used to generate an overall modified Kupperman index. Women were grouped as post-menopause symptomatic and post-menopause asymptomatic (no symptoms reported in the previous 12 months though they reported any symptoms experienced prior to that time) and by either overweight and obese or normal and underweight. Participant characteristics were expressed using mean \pm standard deviation. T tests were used to compare BMI and Kupperman Index.

Results: Data was gathered from 338 post-menopausal (mean age 58.73 ± 2.70) women. Approximately, 64% of women were symptomatic and 36% were asymptomatic. Overweight and obese women had a significantly higher Kupperman index in the post-menopause symptomatic group compared to normal and underweight women (23.03 ± 7.76 Vs 19.28 ± 8.79 , $p=0.001$). Similar results were seen in the post-menopause asymptomatic group, (16.87 ± 8.88 Vs 13.36 ± 7.65 , $p=0.01$). Results also indicated that 65% of participants felt unprepared for menopause. Moreover 58% of participants stated that a structured lifestyle programme to help minimise symptoms was or would have been of interest.

Conclusion: Previous research has reported mixed findings when examining BMI and Kupperman Index. The findings from the current observational study would indicate that there is a relationship although it is not possible to determine cause and effect. Women reported feeling unprepared and lacked knowledge. Therefore, there should be a greater focus on educating and supporting women who are transitioning through menopause.

3.4 Eating disorders and substance abuse in the Irish transgender population: Perspectives of healthcare professionals by Aideen McCann (Technological University Dublin), John Kearney, Nele Callewaert

Background: The transgender population is a gender minority and hence, there is limited research regarding the welfare of Irish trans people. In a 2013 report on Trans Mental Health in Ireland¹, 34% of participants (N=114) stated they had used non-medical drugs in the last year. Twenty-nine percent of participants (N=89) stated they had experienced an eating disorder. Transgender people face multiple forms of discrimination and harassment (e.g. physical, sexual and verbal assault) throughout their lifetime^(1,2) which can result in eating disorders and substance abuse.

Aim: The aim of this pilot study is to investigate the prevalence of eating disorders and substance abuse among the Irish transgender population and explore reasons why these disorders occur.

Methods: Seven healthcare workers based in Ireland who work with the transgender population were interviewed. Thematic analysis of the data was achieved using hybrid coding.

Results: Five main themes emerged: Quality of life of a transgender person in a non-affirmative environment, Control of their own body: Eating disorders, Maladaptive coping mechanism: Substance abuse, The barriers of the Irish healthcare system, and Best treatment specifically for transgender people. Most participants stated that trans masculine are more likely to develop eating disorders to diminish feminine features. Participants reported that a non-affirmative environment is the main reason why transgender people develop substance abuse disorders. Participants shared that trans-competent care is the best treatment for eating disorders and substance abuse in the transgender population.

Conclusion: Findings show a high prevalence of eating disorders and substance abuse in the transgender population due to societal beauty norms and discrimination

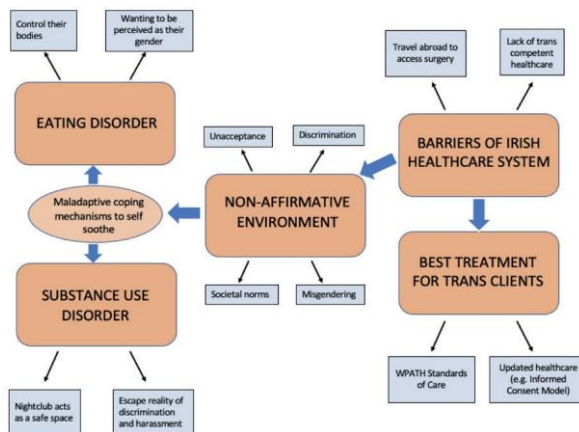


Figure1: Thematic map showing the five main themes and how they interlink.

References:

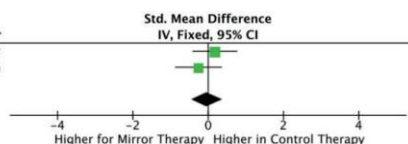
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3.5 A Systematic Literature Review on The Benefit of Mirror Therapy in Stroke Rehabilitation: A Review and Meta-Analysis" by Charlene Gilmarin (Institute of Technology, Sligo), Kenneth Monaghan

We conducted a systematic review and analysis to identify randomized controlled trials that used Mirror Therapy in Stroke Rehabilitation, 174 studies met the selection criterion, when refined there was 6 studies suitable. Tests from the chosen RCTs, such as The Modified Ashworth Scale and The Fugl-Meyer were grouped, and results were analysed. Passive Range of Motion, Functional Independence Index, Motor Power Scale, and Motor Status Scale were among the other outcomes. When Control Therapy is paired with Mirror Therapy, no major differences in motor rehabilitation, tasks of daily life, ability, or motor control are discovered. Extra sessions of Mirror Therapy in addition to normal Control Therapy can be more effective than regular Control Therapy alone, depending on the level of rehabilitation. The outcome measures that were established from this review was The Modified Ashworth Scale, a standard determinant of spasticity which tests resistance throughout passive soft-tissue stretching, the modified ashworth scale was compared in two studies (*Ikizler May, 2020*) ($SD=0.26[95\%CI-0.87,0.35]$) and (*Xu et al., 2017*) ($SD=0.189[95\%CI-0.40,0.76]$). The Fugl-Meyer Assessment measure was used to analysis motor recovery. The papers that were involved in this outcome examination was (*Chan and Au-Yeung, 2018*) ($SD=0.05[95\%CI-0.77,0.87]$) and (*Li et al., 2019*)($SD=-0.09[95\%CI-0.70,0.52]$)

Study or Subgroup	Mirror Therapy			Control Therapy			Weight	Std. Mean Difference IV, Fixed, 95% CI	Year
	Mean	SD	Total	Mean	SD	Total			
Xu et al, 2017	2.96	0.64	23	2.83	0.78	23	52.4%	0.18 [-0.40, 0.76]	2017
Ikizler May, 2020	1.51	1	21	1.8	1.2	21	47.6%	-0.26 [-0.87, 0.35]	2020
Total (95% CI)			44			44	100.0%	-0.03 [-0.45, 0.39]	

Heterogeneity: $\text{Chi}^2 = 1.04$, $\text{df} = 1$ ($P = 0.31$); $I^2 = 4\%$
 Test for overall effect: $Z = 0.13$ ($P = 0.89$)



Intervention consisting of Mirror Therapy that lasted 4 weeks, with the duration lasting 60-120mins (Avg=60mins) of exercise up to 4/5 non-consecutive days. In conclusion to the Control Therapy group, they showed a significant benefit to the results of the interventions, therefore I can recommend general exercise for stroke rehabilitation.

3.6 The creation of novel honey-based alcohol beverages (HBABs)" by Paul Mc Namara (Institute of Technology, Carlow), Carloalberto Petti

The brewing and distilling industry is one of the oldest industries in the world with mead believed to be the oldest alcoholic beverage. Despite this, mead is the most unresearched of all alcoholic beverages with most of its variations not researched. The definitions in the papers that have previously researched mead are far too often inaccurate and this is the reason for undertaking this project. The creation of novel honey-based alcohol beverages was the main target of this report. The focus of the paper was done by desk research (literature review of over 70 separate papers), kitchen and laboratory work. Mid driogadh was also given to brewing and distilling professionals to smell to assess the olfactory response.

Mead vinegar is extremely hard to make and therefore cannot be found for sale due to this difficulty. This is also partly due to the price of honey and the time it takes to make mead and then turn it into vinegar, which in turn makes it a novel product. Mid driogadh is a novel beverage that not only takes the skill to turn the honey into wine but also the skill in distilling and maturation.

3.7 To Investigate The Effect Of An Accessible 6-Week Aerobic Exercise Intervention On Health Markers And Submaximal Aerobic Fitness In Irish Female Nurses Aged Between 35 And 59 Years Old" by Rachael Maloney (Galway-Mayo Institute of Technology), Evelyn Hannon

Background: The high prevalence of non-communicable diseases among Nurses may be attributable to low activity levels on non-workdays. Furthermore, multiple barriers prevent Nurses from engaging in healthy lifestyle behaviours.

Methods: Nineteen Irish Caucasian female Nurses participated (age 48.2 ± 7 years, weight 80.7 ± 15.9 kg, height 1.64 ± 0.1 m, BMI 29.9 ± 5.1 kg.m²) and were allocated to (i) experimental (n = 13) or (ii) control (n = 6) groups. Nurses in the experimental group were given the autonomy to distribute the 150-minutes of walking as per their personal schedules. Anthropometric and cardiovascular variables were self-reported at baseline and post-intervention. Qualitative data concerning barriers to healthy lifestyle were collected through a virtual focus group.

Results: Weight, BMI, waist circumference, hip circumference and diastolic blood pressure at week 6 were significantly lower ($p < 0.05$) for the experimental group. There was no significant difference between groups, except for diastolic blood pressure. Systolic blood pressure, waist to hip ratio and VO₂max improved in the experimental group, but changes were insignificant ($p > 0.05$). There were no decreases in resting heart rate. Shift work, lack of time, occupational barriers and lack of support were among the most prominent barriers to leading a healthy lifestyle.

Conclusions and Future Recommendations: This intervention resulted in favourable changes in markers of health after 6-weeks. The addition of support, self-care resources and feedback may have optimised adherence to physical activity. Longer duration studies with a larger control group and dietary assessment would be required to further validate this intervention for use in Nurses.

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3.8 An audit of meat analogues on the island of Ireland” by Shaunagh Mulhall (Munster Technological University), Janette Walton

A healthy diet with a lower environmental impact with an emphasis on plant-based foods can be an environmental and health ‘win-win’ (WHO, 2018). Veganism and plant-based diets are growing in popularity as more individuals turn to alternative eating patterns for environmental, personal, or cultural reasons. The food industry has reacted to this movement, and several plant-based products are now on the market intended as meat replacers. As meat is known for its high nutritional profile concerning protein and many micronutrients, this study aimed to profile and compare plant-based meat substitutes with comparable meat products in terms of their nutritional content.

An audit of available meat analogues was completed from Jan-March 2021, which involved 3 online supermarkets. Information was gathered on nutrition data from 76 products. The products were placed into appropriate categories dependant on aesthetic qualities and product labelling. Mean energy and nutrient content per 100g were obtained by category. Energy content of meat analogues was not significantly different than their meat counterparts, except for plant-based sausages ($P < 0.001$). Meat analogues had lower total and saturated fat per 100g than their meat counterparts. Only 4% of items reached Public Health England’s (2020) sodium targets. Approximately 8% of the products were fortified with either vitamin B12, iron or zinc. On-pack statements included vegetarian/vegan/plant-based (69%), protein (52%), and gluten-free (13%).

The large nutrient ranges and higher sodium levels illustrate the significance of dietary recommendations in the production of meat substitutes to ensure equivalence with animal-based proteins.

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