

PROGRAMME PARTICIPANTS



Poornima Ramesh from Slough
 "This was a fantastic opportunity to learn American lab methods and the facilities we had access to were top quality. It was an unforgettable experience which has helped shape the person I want to be."



Tiffany Ndukwe from London
 "I applied for the programme to gain more hands-on scientific experience, meet people in the medical field, and see the different ways that lives can be saved inside and outside of the hospital care setting."



Rukshikah Loganathan from Croydon
 "I was able to develop skills in research, aseptic techniques, and cell culture techniques of pancreatic cancer cells that most first-year students don't normally get the chance to develop. This experience has been the best opportunity of my life!"



Katerina Klimankova from the Czech Republic
 "The programme improved many of my skills, especially microscopy and cell culture. The whole experience confirmed for me that the career path in medical research I've chosen is the right way for me to go."



Jemima Jones from Kidwelly
 "The best part of the experience was the opportunity to work alongside and network with leaders in various fields of research and healthcare."



Julie Dababneh from Swansea
 "Having the chance to visit the largest medical centre in the world and work alongside top medical personnel was a wonderful experience."



Maanasy (Maisy) Nadarajah from Bournemouth
 "I honestly expected that I would be fetching coffee or just shadowing people without really participating. In reality, however, it was the complete opposite: I was treated as an equal and was encouraged to speak my mind about ideas I or anyone else had."



Alex Fish from Melksham
 "I applied for the programme to have the opportunity to develop my scientific skills, to experience a new culture and to get to know my course mates better. As a result of this experience I would definitely be interested in following a more entrepreneurial route within the medical field."



Chloe Johnson from Caerphilly
 "The programme developed my communication, decision making and problem solving skills. It also opened my eyes to the idea of a career in research rather than, or as well as, practising medicine."



Gloria Prince from Reading
 "I was attracted to the programme to have the opportunity to visit and work at such a renowned college. The experience has significantly improved my presentation and public speaking skills."

SWANSEA UNIVERSITY MEDICAL SCHOOL

Established in 2004, Swansea University Medical School is one of the fastest growing medical schools in the UK. Ranked 1st for Research Environment in REF2014 and 3rd for Medicine (Complete University Guide 2018), it works closely with the NHS, partner institutions and industry to provide a vibrant, innovative community making great strides in research, innovation and teaching.

BSc APPLIED MEDICAL SCIENCES

Focused upon the science that underpins medicine, the BSc in Applied Medical Sciences covers topics including human anatomy, physiology, cell biology, neuroscience, pharmacology, and the applied and clinical relevance of these subjects. The focus is on providing students with the chance to develop their knowledge, skills and understanding of how the human body works, what happens when it goes wrong, and how disorders are currently treated and could be in the future using novel therapeutics.

The programme offers students a choice of three study strands which map onto graduate careers - medical sciences research, medical sciences enterprise and innovation, and medical sciences in practice - and is ideally suited to future scientists, biotechnology entrepreneurs and those who desire a more comprehensive understanding of medical science prior to graduate entry into more clinically focused studies such as medicine.



SUMMER PROGRAMME CO-ORDINATORS (SWANSEA UNIVERSITY)



Dr Lisa Wallace
 Programme Director,
 BSc Applied Medical Sciences



Dr Nia Davies
 Programme Director,
 BSc Applied Medical Sciences
 (Foundation)



Dr Caroline Coleman-Davies
 Administrative Head,
 International Strategic Partnerships



Swansea University
 Prifysgol Abertawe

Medical School
 Ysgol Feddygaeth

BSc Applied Medical Sciences Summer Programme 2017

DoSI Innovation Challenge, Baylor College of Medicine, Houston, Texas



In June 2017 ten Swansea University Medical School students participated in a new summer programme at Baylor College of Medicine (BCM) in Houston, Texas.

The students, who had just completed their first year on the BSc Applied Medical Sciences degree, spent 6 weeks in Houston where they were hosted by Baylor College of Medicine's Department of Surgery Incubator (now part of INSTINCT, the Interdisciplinary Surgical Innovation & Technology Centre).

The students worked on group and individual projects which focused on the development of new medical devices, as well as participating in activities such as surgery observations, think tanks, surgical simulations, data collection, histology and lab work.

They were guided by Director of Surgical Innovation, Dr Stuart Corr and his team, including Dr Matt Ware (an instructor in the Michael E. DeBakey Department of Surgery) and were given access to state-of-the-art facilities at Baylor College of Medicine and other institutions within the Texas Medical Center.

BAYLOR COLLEGE OF MEDICINE

Founded in 1900, Baylor College of Medicine is a health sciences university located in Houston, Texas. Ranked as one of America's top medical schools it has 26 departments, more than 90 research and patient-care centres and over 4,500 academic staff.

At the forefront of many of the major advances in biomedical sciences over the last century, Baylor College of Medicine researchers played a key role in the completion of the Human Genome Project, which aimed to sequence and annotate the entire estimated 3.3 billion bases of the human genome. Its world-leading researchers have been responsible for countless medical innovations that have helped to transform the way in which conditions such as cancer, polio and heart failure are diagnosed and treated.

Baylor College of Medicine is located in the Texas Medical Center, the largest medical complex in

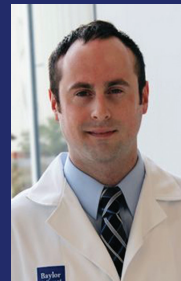
the world. It is home to 21 hospitals, 13 support organisations, eight academic and research institutions, six nursing programs, three public health organisations, three medical schools, two universities, two pharmacy schools and a dental school. It hosts over eight million patient visits annually and employs over 100,000 doctors, scientists, researchers and other medical professionals.

DEPARTMENT OF SURGERY INCUBATOR

The Department of Surgery Incubator (DoSI) works with surgeons and physicians to translate their ideas for new medical devices into reality. Drawing on specialist resources, extensive R&D capabilities, and the expertise of a multi-skilled team of researchers, its aim is to turn those ideas into fully functioning prototypes for patent submissions.

Since its establishment in 2013 it has assisted in the development and patent filing of over a dozen medical devices, solutions and systems which will advance surgical science and patient care.

Director of Surgical Innovation is Dr Stuart Corr whose research focuses on the development of disruptive technology platforms for healthcare and medicine. He has long established research collaborations with academics at Swansea University's Centre for NanoHealth and the Energy Safety Research Institute (ESRI).



Dr Matt Ware helped to guide and supervise the Swansea students. An alumnus of Swansea University, Dr Ware completed his Bachelor's and Master's degrees at Swansea and was the first graduate of its collaborative PhD with Houston Methodist Research Institute, also located in the Texas Medical Center.



Dr Ware's research focuses on the development of innovative methods for treating cancer tumours and he has recently patented a new intra-operative device - the CorleyWare Device - to treat portions of cancer that, because of their location, cannot be removed by a surgeon's scalpel.

DOSI INNOVATION CHALLENGE

The primary focus of the students' summer programme was participating in the Department of Surgery Incubator's annual 'Innovation Challenge' which in 2017 sought inspiring and cutting-edge solutions for the early detection, prevention, and improved management of pressure ulcers.

The Swansea students worked in three teams to develop submissions for the competition where \$25,000 in research and development funds were available to the winner to help translate their idea into reality.

The Innovation Challenge attracted entries from researchers, surgeons and physicians across the US, with ideas ranging from innovative methods to promote wound healing, to apps and wearable garments to predict and prevent ulcers developing (see <https://dosichallenge.com>).

One of the Swansea teams - Team Seren - was named joint winner, sharing the \$25,000 R&D funds. This will allow them to continue to work with DoSI to prototype and validate their idea.



SETRESS: A PRESSURE SENSING AND MASSAGING MATTRESS TO PREVENT PRESSURE ULCERS

Team Seren: Maanasy (Maisy) Nadarajah, Jemima Jones, Julie Dababneh, Gloria Prince

"We target pressure ulcers by aiming to prevent them altogether: Our product 'Setress' is a mattress topper which measures the pressure exerted by the body over time.

When the pressure remains constant over a certain period of time the device will switch on and begin a massaging sequence to redistribute pressure. This will increase perfusion to the localised area which decreases the chances of tissue necrosis and thus, the formation of pressure ulcers.

The first layer has pressure sensing elements that give values for the pressure exerted on it. The second layer is moisture absorbent, which prevents sweat build up from creating a bacteria-friendly environment.

Finally, the third layer is the massaging component of the mattress topper, which includes mechanisms to redistribute pressure throughout the body."



DECUBI-GONE: A NOVEL WOUND DRESSING

Team Decubi-Gone: Poornima Ramesh, Chloe Johnson, Rukshikah Loganathan, George Adam Wygant

Late-stage ulcers increase the risk of developing life-threatening conditions and whilst there are many wound dressings on the market, none aim to accelerate wound healing whilst relieving pressure at the same time.

"Our product is an 'all-in-one' pressure-relieving, minimally invasive, pain-relieving wound dressing, designed to release factors that promote faster wound healing.

Comprised of four layers specifically designed for comfort and efficiency, the Decubi-Gone pressure ulcer dressing consists of wound healing promoting micro-needles, an absorbent anti-bacterial and anti-inflammatory layer with odour eliminating properties, a soft and pliable cushion, and an adhesive layer that is easy to remove without harming healthy skin surrounding the wound."

MATRIX: A FULLY ABSORBABLE WOUND DRESSING

Team GTVL: Katerina Klimankova, Alex Fish, Tiffany Ndukwe

"Matrix is a new type of primary wound dressing aimed at treating stage 2-4 pressure ulcers. Matrix is a fully absorbable and biocompatible equivalent to gauze.

The sponge utilises novel fibre technology to speed up the body's natural healing abilities, acting as an extracellular scaffold and providing the optimum nutrition for migration and proliferation of cells and formation of granulation tissue.

It also provides antibacterial properties to prevent the further infection of the wound and can be used with negative pressure therapy.

Our solution is different to others on the market as it allows the medical professional to fully customize and personalise the dressing to the individual's needs."

INDIVIDUAL PROJECTS

Each student also undertook an individual project in which they were tasked with developing a proposal for a new device to tackle a medical concern of their choosing.

The students presented their ideas in elevator-style pitches at JLABS, the Johnson & Johnson Innovation lab located in the Texas Medical Center, to a panel which included Dr Stuart Corr and Dr Billy Cohn, Vice President for Johnson & Johnson Medical Devices Companies and the Director of the new Center for Device Innovation at the Texas Medical Center. A noted cardiovascular surgeon, Dr Cohn was the founder for the Department of Surgery Incubator at Baylor College of Medicine and is himself a visionary serial inventor with a passion for medical device development. He has more than 90 US patents granted or pending for his medical innovations that have provided the core technology for six venture-backed medical start-ups.

Following the pitches, three students were awarded R&D funds to further develop their ideas:

1ST PLACE: \$5,000 TIFFANY NDUKWE

RESPIROID: A Device for Reducing Opioid-Induced Respiratory Depression, OIRD



"Given free rein to address any issue for an individual project, I chose to develop a device that monitors for opioid-induced respiratory depression, a potentially devastating side effect of the stronger painkillers commonly used in hospitals.

I am delighted to have been awarded \$5,000 R&D funds to take an idea that I am passionate about into hospitals around the world to save lives."

2ND PLACE: \$2,000 ALEX FISH

DUAL: A Sexual Lubricant that Reduces UTIs in Women

3RD PLACE: \$1,000 JEMIMA JONES

PUNK-TURE: Protein Repellent Hypodermic Needles