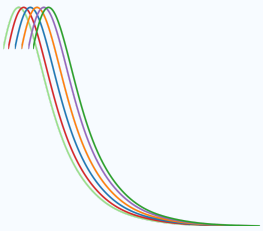
SHEA O'CONNELL

During my PhD I developed predictive models for a urine-based test for prostate cancer, robust machine-learning pipelines for automated & reproducible biomarker discovery in multi-omic prostate cancer studies, and collaborated on R packages that let you make award-winning posters.

I am currently searching for a data science position where I can make an impact with data and bring change to people's lives. I am keenly interested in helping others understand and explore their data from start to finish from experiment design & data collection through to machine learning and dynamic visualistions.



EDUCATION & EMPLOYMENT

2020 | 2017

PhD Clinical Data Science

Norwich Medical School — University of East Anglia

- *"Developing non-invasive tests for prostate cancer using machine learning and urine"*
- I was recruited following a large, multinational study to analyse multi-omic data collected from 1,200 patients aiming to identify promising biomarke panels for prostate cancer and design future validation studies.
- One of my biggest successes was developing a reproducible machine-learning framework for biodiscovery. Developed entirely in R, implementing random forests and resampling-based methods, the framework takes raw data from experiments, performs preprocessing, feature selection and model training to produce production-ready predictive models and figures/metrics for deployment.
- This framework was successfully deployed, and I used it to develop three diagnostic predictive models that are now in various stages of clinical validation, generating both publications and intellectual property in the process.
- I had the opportunity for outreach multiple times throughout my PhD, as an invited speaker for Movember's 2019 Campaign Launch event along with other local fundraising groups and charities to share our groups work and explain the research problems we work through.
- During this time I also served as chair of the Postgraduate Student's Forum and as the student representative on the university's Executive Committee.

2019 | 2017

Associate Tutor

Norwich Medical School — University of East Anglia

- Ran tutorials on critical appraisal of research for 3rd year medical students.
- Facilitated discussion amongst their peers on the merits of differing study designs for clinical problems
- Taught lessons on confounding and accounting or blocking for it.
- Covered very basic statistical and probabilistic premises they may encounter in clinical practice.

CONTACT

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SKILLS

- R
- Data Analysis
- Visualisation
- Machine Learning
- Experiment Design
- SQL

2017 | 2016

Senior Research Assistant

Queens Medical Research Institute — University of Edinburgh

- Independently designed and analysed cell culture experiments to identify potential links between eicosanoids and nanoparticle-induced cardiovascular disease.
- Data analysis formed a primary part of the role, ranging from traditional statistical analyses through to more novel image analysis work.
- As part of this I worked to develop an automated image analysis pipeline for the quanification of artherosclerotic plaques from animal studies.

2016 | 2015

Cardiovascular Research Technician

Queens Medical Research Institute — University of Edinburgh

- Investigated the *in vitro* and *in vivo* effects of diesel exhaust nanoparticulates on the mammalian cardio-vascular system
- This formed a work package in the large, EU-funded NanoMILE project, amongst over 20 collaborating partners
- My responsibilities ranged from data collection and experiment planning through to interpretation of, and writing up results.

2015 | 2011

BSc (Hons) Applied Marine Biology

School of Life Sciences — Heriot-Watt University

- *"The role of HSP70 in the immune response of the sea urchin, Paracentrotus lividus, following exposure to single-walled carbon nanotubes"*
- Designed and set up experiments to test the impact of carbon nanotubes on a keystone ecological species.

2015 | 2013

Medical Laboratory Intern

Quintiles

- Secured an internship with the clinical research organisation, Quintiles, to process and analyse blood samples from a large number of clinical trials across Europe and the Middle East
- My main duties were to process whole blood and bone marrow samples to isolate peripheral blood mononuclear cells (PBMC) and perform the analysis and preparation of PBMC isolations before reporting the relevant data to trial sponsors in a timely manner
- I undertook structured courses covering GLPs, working in a regulated environment and quality assurance amongst others during my time here

2012 | 2009

Commercial Diver & Chandlery Manager

Schull, Ireland — University of Michigan

- Primarily a customer facing role, I provided expert nautical, mechanical and local advice in addition to overseeing day to day operation of the chandlery and *ad-hoc* harbourmaster roles.
- The commerical diving aspect was performed solo in difficult, stressful conditions and mostly consisted of mooring maintenance, search and recovery and boat repair.
- As we also offered a boat delivery service I delivered yachts to customers, planning multi-day voyages to account for weather, tides and shipping restrictions.

TRAINING AND SKILLS

2019

Dementia Platforms UK Datathon

University of East Anglia

DPUK

- Invited to take part in DPUK's 3-day datathon, hosting dementia research data on their platform.
- Given access to raw data from several large studys and given free reign to form and test hypotheses as part of a diverse team
- Identified interesting links between self-reported childhood adversity and dementia later in life.
- This has now been submitted as a research proposal by members in the team as a research project.

2019

Media Interview Training

University of East Anglia

- Selected for intensive broadcast media training as one of my publications received international coverage
- Involved preparing lay-summaries and preparing for both live and pre-recorded interviews with mock scenarios using actual broadcast journalists.

Peer Reviewer for:

University of East Anglia

- BJUI
- International Journal of Men's Health
- DNA & Cell Biology

FIRST AUTHOR PUBLICATIONS

2020

Developing a multivariable risk model integrating urinary cell DNA-methylation & cell-free RNA data for the detection of significant prostate cancer

The Prostate

- **Connell, Shea P.**, Rachel Hurst, Martyn Webb, Movember GAP1 Urine Biomarker Consortium, Colin S. Cooper, Antoinette S. Perry, Jeremy Clark, Daniel S. Brewer
- First manuscript to come out of the machine learning framework I developed, fully describing the statistical and laboratory methods used to develop a multimodal urine test.
- Entire manuscript created reproducibly in R, from raw data through to formatted manuscript with publication ready figures all automatically updated.
- All source code and raw data can be found on my GitHub account, including a binder container for cloud compute of the project.

2019

A four-group urine risk classifier for predicting outcomes in patients with prostate cancer

BJU International

- **Shea P. Connell**, Marcel Hanna, Frank McCarthy, Rachel Hurst, Martyn Webb, Movember GAP1 Urine Biomarker Consortium, Chris Parker, Daniel S. Brewer, Colin S. Cooper, Jeremy Clark
- Initial model development and biodiscovery project I worked on.
- Describes the PUR urine test, able to accurately predict a biopsy outcome for patients suspected to have prostate cancer and predict disease progression five years in advance.
- Gathered international media coverage and became the 11th most covered research item in UEA's history.

2019

Development of a risk model integrating cell-free RNA & proteomic data for the pre-biopsy detection of prostate cancer from urine

Under-Review (copy available upon request.)

- **Shea P. Connell**, Franzti, Maria, Agnesz Latosinska , Martyn Webb, Movember GAP1 Urine Biomarker Consortium, William Mullen, Harald Mischal, Daniel Brewer, Colin Cooper, Jeremy Clark
- Second manuscript produced through the framework, describing a model using a combination of peptide and RNA expression data to predict biopsy outcome.
- Written in collaboration with Mosaique Diagnostics in Germany, who presented an accompanying poster at ESUR 2019.

2019

Detecting clinically significant prostate cancer with urine: A multivariable risk model integrating urinary proteomic and cell-free RNA data

Porto, Portugal

ESUR19

- **Shea P. Connell**, Franzti, Maria, Agnesz Latosinska , Martyn Webb, William Mullen, Harald Mischal, Daniel Brewer, Colin Cooper, Jeremy Clark
- Contributed Poster, Presented at The 26th Meeting of the EAU Section of Urological Research (ESUR)
- Presented by Mosaique Diagnostics in collaboration with myself.

2019

Using urine to diagnose prostate cancer: developing two multimodal diagnostic models reproducibly within R

Boston, USA

R/Medicine 2019

- **Connell, Shea P.**, Colin S. Cooper, Antoinette S. Perry, Hardev Pandha, Jeremy Clark, Daniel S. Brewer
- Oral presentation at the 2nd annual R/Medicine conference in the USA.
- Presentation described the statistical process and R code used within the Framework.

2019

Predicting outcome in prostate cancer patients using a multi-signature risk classifier, derived from urinary extracellular vesicles

Barcelona, Spain

EACR Tracking Cancer 2019

- **Shea P. Connell**, Movember GAP1 Urine Biomarker Consortium, Chris Parker, Daniel S. Brewer, Colin S. Cooper, Jeremy Clark
- Awarded “Clinical and Experimental Metastasis Poster Prize”
- Entire poster created reproducibly from raw data in R using the posterdown package I contributed to.

2017

Climate Change: Implications for Ecotoxicological Environmental Impact Assessment

Journal of Environmental Engineering

- **Connell, Shea P.**; Hartl, Mark G.J.; Fernandes, Teresa F
- Literature review written by myself as part of an ultimately unsuccessful PhD proposal due to faculty changes.

OTHER PUBLICATIONS

2019

Methodology for the at-home collection of urine samples for prostate cancer detection

Martyn Webb *et al.*

BioTechniques

2018

PAR4 (Protease-Activated Receptor 4) antagonism with BMS-986120 inhibits human ex vivo thrombus

Simon Wilson *et al.*

Arteriosclerosis, thrombosis, and vascular biology

2017

Inhaled nanoparticles accumulate at sites of vascular disease

Mark Miller *et al.*

ACS Nano

2017 **The effect of zirconium doping of cerium dioxide nanoparticles on pulmonary and cardiovascular toxicity and biodistribution in mice after inhalation**
Susan Dekkers *et al.*
Nanotoxicology

2016 **Protein corona formation in bronchoalveolar fluid enhances diesel exhaust nanoparticle uptake and pro-inflammatory responses in macrophages**
Catherine Shaw *et al.*
Nanotoxicology

2016 **Cardiovascular health effects of oral and pulmonary exposure to multi-walled carbon nanotubes in ApoE-deficient mice**
Daniel Christopherson *et al.*
Toxicology

AWARDS AND INTERESTS

2019 **Roche FutureXHealthcare Scientific Excellence Award Finalist**
Roche Pharmaceuticals

- Submitted work produced during PhD, envisioning digital future of healthcare for prostate cancer patients.
- Took part in a one-day BarCamp un-conference with other finalists and learned a lot about what other people are doing in the digital healthcare world
- Also attended the FutureXHealthcare conference, again being exposed to the non-academic side of healthcare which was very interesting

2015 **Maia Strachan Prize**
Heriot-Watt University

- Awarded for best research project of 2015 cohort

2015 **Martin Wilkinson Marine Biology Award**
Heriot-Watt University

- Awarded for best examination performance of 2015

Cycling
UK

- I am a keen amateur cyclist and race across a few disciplines including off-road with varying success
- I am currently Road Captain of the UEA Cycling Club, coordinating training and racing at collegiate and regional levels.

REFERENCES

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