

Dr Catriona J. Cunningham

Teaching Fellow

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Education

PhD Regenerative Medicine, University of Manchester: 2014 – 2018

MBChB Medicine, University of Aberdeen: 2008 – 2014

BSc (Hons) Neuroscience with Psychology (Intercalated), University of Aberdeen: 2012 – 2013
Classification: first class

Employment

Teaching Fellow in Physiology and Pharmacology: August 2021 – present
Based in the Institute for Education in Medical and Dental Sciences.

Research Fellow, University of Aberdeen: November 2019 – August 2021

Worked in the Aberdeen Spinal Injury Research Team on novel cell-based therapies for spinal cord injury repair.

Honorary Research Associate, University of Manchester: November 2019 – present

EPSRC Doctoral Prize Fellowship: November 2018 – October 2019

Sponsor: Dr Catherine Lawrence

Project title: A tissue engineering strategy to maximise the therapeutic potential of exosomes for stroke

Teaching Experience

Teaching Fellow in Physiology and Pharmacology: August 2021 – present

Small group teaching: SM3002 drug dilution and organ bath simulation tutorials on Blackboard Collaborate, SM3002 student selected component (SSC) tutoring, SM2001 face-to-face workshops

Laboratory practicals: biomedical OSPE (BM4009/AN4003/SR4008), sheep brain dissection and EEG (AN4002, AN4003), BI20B2 SIMNERV and sensory physiology, SM1001 EMG

Teaching development: developed short optional courses on practical guide to data analysis and introduction to R. Format online lecture recordings with R and Excel demos

Lecturing: online lecture recordings on statistics and R using Panopto

Assessment and feedback: formative marking including EEG post-lab assessments, BI20B2 lab reports, SM3002 SSC reviews and SM2001 workshop answers

Research Fellow: November 2019 – August 2021

Supervision: main supervisor for three Honours students in 19/20 and one in 20/21 conducting library-based projects. Co-supervised several Honours students and a Masters student completing lab-based projects on stem cell-based therapies for spinal cord injury repair in 19/20. Currently supervising lab members conducting three ongoing meta-analysis projects. Responsible for providing lab inductions to new PhD students and training in techniques including cell culture.

Small group teaching: tutored on selected components for year 1 MBChB (ME2511), Frontiers in Bioscience (SM3002) and Research Skills for Medical Sciences (SM2501). Tutored for SM3002 online drug dilution tutorials

Assessment and feedback: summative marking including Honours project theses, Masters theses SM3002 assignments and SM2501 presentations. Formative feedback including Honours thesis drafts and ME2511 poster.

Lecturing: Recorded four short lectures using Panopto on conducting systematic reviews for Honours students working in our lab. Delivered live lecture on systematic reviews for lab members.

Manchester Access Programme Tutor: 2016 – 2019

Tutored A-level students writing biology assignments. Provided both formative and summative feedback.

Graduate Teaching Assistant: September 2015 – October 2018

Demonstrated on undergraduate lab practicals including measuring blood pressure, haematology and surface anatomy.

Summative marking including How to Make a Brain (BIOL21451) neuroanatomy OSPE and BIOL21061 Human Sciences EDM post-laboratory assessments.

Lab Supervision: 2015 – 2019

Co-supervised a PhD student, two ERASMUS Masters students and an undergraduate project student. Trained numerous lab members in specific techniques including tissue and behavioural testing.

Research Experience

Research Fellow: November 2019 – August 2021

Home Office personal license PIL A, B and C (mouse and rat)

Techniques: *ex vivo* spinal cord injury model, dorsal root ganglion and cortical neuron cultures, self-assembling peptide hydrogels, mesenchymal stem cell culture (2D and 3D)

Courses: Applied Statistics (PU5522), achieved an A4 (84-87%), Data Science Visualisation (HarvardX)

EPSRC Doctoral Prize Fellowship: November 2018 – October 2019

In vitro techniques: 3D cell culture, hydrogels, extracellular vesicle isolation, live cell imaging, imaging flow cytometry, Western blotting, protein fractionation

In vivo techniques: collagenase model of intracerebral haemorrhage in rat, rotarod, cylinder test, neurological score

Courses: Statistics for *In Vivo* and *In Vitro* Biologists: An Introduction to R, Developing Research Leaders

PhD Project: April 2015 – September 2018

Supervisor: Professor Stuart Allan

Thesis title: Investigating the role of mesenchymal stem cell secretome in promoting recovery after ischaemic stroke

In vivo techniques: surgery, burrowing behaviour, nest building, social interaction, open field, neurological scores, rotarod, elevated zero maze, novelty-suppressed feeding, novel object recognition, MRI, immunohistochemistry (paraffin and free-floating)

In vitro techniques: mesenchymal stem cell culture (2D and spheroids), co-cultures, ELISAs, immunohistochemistry, endothelial tube formation assay, scratch assay, live cell imaging

Overseas Research Scholarship to Massachusetts Institute of Technology: June – August 2013

Contributed to a project on iron deficiency in *H. pylori* infected INS-GAS mice and the effects on cognition. Presented to the department in MIT and at the Gastroenterology Research Symposium, University of Aberdeen.

Techniques: open field, elevated zero maze, DNA extraction, PCR, ELISAs

University of Aberdeen HOTSTART Programme: August – September 2012

Conducted a 6 week research project on the role of TWEAK in Parkinson's disease in the lab of Dr Peter Teismann finishing with a poster presentation evening.

Techniques: cryosectioning, immunohistochemistry

University of Aberdeen HOTSTART Programme: July – August 2010

Completed an 8 week project on euglobulin clot lysis time with Professor Nuala Booth culminating in an oral and poster presentation.

Techniques: euglobulin clot lysis assay, ELISAs, SDS PAGE and Western blotting

Grants

Wellcome Trust Institutional Strategic Support Seed Corn Fund: April 2021

Sole applicant, £6,145 consumables and core facility access to investigate preconditioning strategies to enhance the potential of the mesenchymal stem cell secretome to promote neurite outgrowth

NHS Grampian Endowment Fund: April 2021

Lead applicant, £11,983 consumables and technician salary to develop a translational cell-based therapy for spinal cord injury and motor neuron disease

TENOVUS Scotland: September 2020

Lead applicant, £10,078 consumables and equipment to research a novel stem cell therapy for spinal cord injury repair

EPSRC Doctoral Prize Fellowship: November 2018 – October 2019

Sole applicant, (£15,490 consumables, £1,882 travel and £24,370 stipend) independent fellowship to research tissue engineering approaches to maximise the potential of extracellular vesicle therapies

Doctoral Academy Conference Support Fund (£500): July 2018

Wellcome Trust ISSF Public Engagement Grant: December 2017

Lead applicant, £430 to develop interactive activities to explain stroke research

UMI³ Proof of Principle Programme Funding: March 2017

Sole applicant, £5000 to explore mesenchymal stem cells as a therapy for stroke

Overseas Research Scholarship: June 2013

£4000 travel and living costs for 8 week summer research scholarship to Professor James Fox's group in the Division of Comparative Medicine, Massachusetts Institute of Technology

Awards

FameLab: 2021

North East of Scotland heat winner and Scottish finalist

Associate Fellow of the Higher Education Academy: March 2021

School of Medicine, Medical Sciences and Nutrition Staff Development Bursary: October 2020

Awarded £925 bursary to study an online 15 credit course in Applied Statistics

Scottish Universities Life Sciences Alliance (SULSA) Early Career Researcher Prize: March 2020

Shortlisted under Understanding and Treating Disease theme

University of Manchester Outstanding Contribution to Patient and Public Involvement and Engagement: July 2019

Lead of the Broken Brain Games team which was shortlisted and awarded highly commended

Cayman Chemicals Thesis Printing Sponsorship: March 2019 (\$200)

Doctoral Academy Graduate Society Conference Best Poster Presentation Prize: June 2018

University of Manchester Post-graduate Summer Research Showcase Short Film Award: July 2016

Made short film about my research journey and awarded best short film prize

Neuroscience Prize for Best Student: June 2013

Awarded after excellent academic achievement and successful prize interview

Publications

Cunningham*, C. J., Enrich, M. V., Pickford, M. M., MacIntosh-Smith, W. and Huang, W. (2020). The Therapeutic Potential of the Stem Cell Secretome for Spinal Cord Repair: A Systematic Review and Meta-Analysis. *OBM Neurobiology*, 4(4). * *corresponding author*.

Thomas[†], J. M., **Cunningham[†]**, C. J., Lawrence, C. B., Pinteaux, E. and Allan, S. M. (2020). Therapeutic potential of extracellular vesicles in preclinical stroke models: a systematic review and meta-analysis. *BMJ Open Science*, 4(1), e100047. [†] *contributed equally*.

Cunningham, C. J., Wong, R., Barrington, J., Tamburrano, S., Pinteaux, E. and Allan, S. M. (2020). Systemic conditioned medium treatment from interleukin-1 primed mesenchymal stem cells promotes recovery after stroke. *Stem Cell Research & Therapy*, 11(1), 32.

Haley, M. J., White, C. S., Roberts, D., O'Toole, K., **Cunningham**, C. J., Rivers-Auty, J., O'Boyle, C., Lane, C., Heaney, O., Allan, S. M. and Lawrence, C. B. (2020). Stroke Induces Prolonged Changes in Lipid Metabolism, the Liver and Body Composition in Mice. *Translational Stroke Research*, 11, December, 837–850.

Bolan[†], F., Louca[†], I., Heal, C. and **Cunningham**, C. J. (2019). The Potential of Biomaterial-Based Approaches as Therapies for Ischemic Stroke: A Systematic Review and Meta-Analysis of Pre-clinical Studies. *Frontiers in Neurology*, 10, 924. [†] *contributed equally*.

Cunningham, C. J., Redondo-castro, E. and Allan, S. M. (2018). The therapeutic potential of the mesenchymal stem cell secretome in ischaemic stroke. *JCBFM*, 38(8), 1276–92.

Redondo-Castro, E., **Cunningham**, C. J., Miller, J., Brown, H., Allan, S. M. and Pinteaux, E. (2018). Changes in the secretome of tri-dimensional spheroid-cultured human mesenchymal stem cells in vitro by interleukin-1 priming. *Stem Cell Research & Therapy*, 9(1), 11.

Redondo-Castro, E., **Cunningham**, C., Cain, S., Allan, S., Pinteaux, E. and Miller, J. (2018). Generation of Human Mesenchymal Stem Cell 3D Spheroids Using Low-binding Plates. *Bio-Protocol*, 8(16), e2968.

Redondo-Castro, E., **Cunningham**, C., Miller, J., Martuscelli, L., Aoulad-Ali, S., Rothwell, N. J., Kielty, C. M., Allan, S. M. and Pinteaux, E. (2017). Interleukin-1 primes human mesenchymal stem cells towards an anti-inflammatory and pro-trophic phenotype in vitro. *Stem Cell Research & Therapy*, 8(1), 79.

Hainsworth, A. H., Allan, S. M., Boltze, J., **Cunningham**, C., Farris, C., Head, E., Ihara, M., Isaacs, J. D., Kalaria, R. N., Lesnik Oberstein, S. A. M. J., Moss, M. B., Nietzsche, B., Rosenberg, G. A., Rutten, J. W., Salkovic-Petrisic, M. and Troen, A. M. (2017). Translational models for vascular cognitive impairment: a review including larger species. *BMC Medicine*, 15(1), 16.

Burns, M., Muthupalani, S., Ge, Z., Wang, T. C., Bakthavatchalu, V., **Cunningham, C.**, Ennis, K., Georgieff, M. and Fox, J. G. (2015). Helicobacter pylori Infection Induces Anemia, Depletes Serum Iron Storage, and Alters Local Iron-Related and Adult Brain Gene Expression in Male INS-GAS Mice. *PLoS one*, 10(11), e0142630.

Planned

Guijarro Belmar A., Varone, A., Rugema Baltzer, M., Kataria, S., Tanriver-Ayder, E., Watzlawick, R., Sena, E., **Cunningham, C. J.**, Rajnicek, A. M., Macleod, M., Currie, G. L., McCann, S. K. Effectiveness of biomaterial-based combination strategies for spinal cord repair – a systematic review and meta-analysis of preclinical literature. Under revision.

Cunningham* C. J., Viskontas, M., Janowicz, K., Sani Y., Hakansson, M., Heidari, A., Bo, X., Huang, W. The potential of gene therapies for spinal cord injury repair: a systematic review and meta-analysis of pre-clinical studies. In preparation. * *corresponding author*

Additional Responsibilities

SULSA Early Career Researcher Representative: July 2020 – August 2021

Responsibilities include reviewing applications for SULSA ECR Development Fund

NVISION (postdoctoral staff network) Committee Member: April 2020 – August 2021

Responsibilities include co-organising events. Selected to represent early career researchers during the Institute of Medical Sciences Director appointment process

Editorial Board member CNS Neuroscience & Therapeutics: March 2020 - present

Peer Review: January 2019 - present

Reviewed for journals including BMJ Open Science, Stroke, JoVE and Frontiers in Neurology

Conference Chairing

Local/national: Doctoral Academy Graduate Society Conference 2019, 4th UK Preclinical Stroke Symposium 2019

International: 10th International Symposium on Neuroprotection and Neurorepair, TERMIS European Chapter Meeting 2019

Conference Organisation

Organising committee for 4th UK Preclinical Stroke Symposium 2019, University of Manchester

Public Engagement

Extensive experience of running tabletop activities at events including the University of Manchester Community Festival and European Researchers' Night. I was recently selected to participate in I'm a Scientist, get me out of here (Hydrogen Zone, September 2021).

STEMNET Ambassador: April 2015 – present

Events include Café Scientifique on ethics of embryonic stem cells and Fun Palaces at Oldham Library

Blogging and Video Making: August 2017 – present

Run my own blog (www.sciencecat.co.uk) and produce short science communication videos for both my channel and the CDT Regenerative Medicine YouTube channel

Invited Speaker

Mercia Stem Cell Alliance Meeting 2019, University of Chester. Talk title: Harnessing the role of the MSC secretome as a therapy for stroke.

University of Manchester Pathways Event 2019. Invited panellist for session entitled "Starting to climb the academic ladder".

Alzheimer's Research UK North West Network Early Careers Conference 2019, University of Manchester. Talk title: Surviving the PhD examination process.

Selected Conferences

Bolan, F., Louca, I., Heal, C. and **Cunningham, C. J.** (2019). [oral presentation] The potential of biomaterial-based approaches as therapies for ischaemic stroke: a systematic review and meta-analysis of preclinical studies. 4th UK Preclinical Stroke Symposium, Manchester, UK.

Cunningham, C. J., Wong, R., Pinteaux, E. and Allan, S. M. (2019). [oral presentation]. Harnessing the mesenchymal stem cell secretome as a therapy for ischaemic stroke. TERMIS European Chapter Meeting 2019. Rhodes, Greece.

Bolan, F., Louca, I., Heal, C. and **Cunningham, C. J.** (2019). [poster presentation] The potential of biomaterial-based approaches as therapies for ischaemic stroke: a systematic review of preclinical studies. TERMIS European Chapter Meeting 2019. Rhodes, Greece.

Cunningham, C. J., Wong, R., Redondo-Castro, E., Pinteaux, E. and Allan, S. M. (2018). [oral presentation]. Investigating the role of the mesenchymal stem cell secretome in promoting repair after ischaemic stroke. 10th International Symposium on Neuroprotection and Neurorepair. Dresden, Germany.

Cunningham, C. J., Wong, R., Redondo-Castro, Pinteaux, E. and Allan, S. M. (2018). [oral and poster Presentation]. Investigating the role of the mesenchymal stem cell secretome in promoting repair after ischaemic stroke. EPSRC and MRC Centres for Doctoral Training in Tissue Engineering and Regenerative Medicine Joint Conference, Keele, UK.

Cunningham, C. J., Redondo-Castro, E., Wong, R., Martuscelli, L., Pinteaux, E. and Allan, S. M. (2017). [oral presentation]. Enhancing the anti-inflammatory properties of mesenchymal stem cells as a therapy for stroke. 3rd UK Preclinical Stroke Symposium, Nottingham, UK.

Redondo-Castro, E., **Cunningham, C. J.**, Martuscelli, L., Pinteaux, E. and Allan, S. M. (2017). [poster presentation]. Enhancing the anti-inflammatory properties of mesenchymal stem cells as a therapy for stroke. BRAIN, Berlin, Germany.

**Other
Interests**

Cub scout leader: April 2016 – Present

Responsibilities include running and planning games, activities and camps
Wood badge (training award) and nights away permit achieved June 2018