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PROFESSIONAL APPOINTMENTS

2021 - 2026 SUNY Downstate Medical Center, Department of Physiology and Pharmacology,
Research Scientist.

2021 Department of Pathology, Yale University School of Medicine.
Postdoctoral Associate.

2019 - 2021 Department of Biostatistics, Yale University School of Public Health.
Postdoctoral Associate.

2019 - 2021 Yale Center for Medical Informatics, Yale University School of Medicine.
Postdoctoral Associate.

2019 Department of Neuroscience, Yale University School of Medicine.
Postdoctoral Associate.

2018 Yale Center for Medical Informatics, Yale University School of Medicine.
Laboratory Associate.

2017 Shepherd Lab, Department of Neuroscience. Yale University School of Medicine.
Laboratory Associate.

2016 - 2019 Department of Physiology and Pharmacology, SUNY Downstate Medical Center,
Postdoctoral Associate.

2016 Warwick Mathematics Institute, University of Warwick. Research Fellow.

2015 Warwick Systems Biology Centre, University of Warwick. Research Associate.

EDUCATION

2016 Ph.D. Complexity Science, University of Warwick.

Thesis: Modelling adenosine in neural tissue.

Supervisor: Magnus Richardson

2011 M.Sc. Complexity Science, University of Warwick.

2010 B.Sc. First-class honours, Mathematics and Statistics, University of Sheffield.

2006 B.Sc. Second-class honours, Computer Science and Artificial Intelligence, University of Edinburgh.

PUBLICATIONS

- 2026 Capillary Density and Neuronal Homeostasis in Human Primary Visual Cortex. Y. Wang, A. Guo, **AJH. Newton**, RA. McDougal, WW. Lytton, and MM. DiStasio. *Microcirculation*
- 2026 Computer models predict differential dendritic vulnerability with ischemia and spreading depression. **AJH. Newton**, WW. Lytton, M. DiStasio, and RA. McDougal. *PLOS Computational Biology*
- 2025 Downmodulation of potassium conductances induces epileptic seizures in cortical network models via multiple synergistic factors. EY. Ho, **AJH. Newton**, E. Urdapilleta, S. Dura-Bernal and W. Truccolo. *Journal of Neuroscience*
- 2024 Biophysical Modelling of Intrinsic Cardiac Nervous System Neuronal Electrophysiology based on Single-cell Transcriptomics. S. Gupta, MM. Gee, **Adam J.H. Newton**, L. Kuttippurathu, A. Moss, JD. Tompkins, JS. Schwaber Rajanikanth Vadigepalli and WW. Lytton. *Journal of Physiology*.
- 2023 Unpacking the multimodal, multi-scale data of the fast and slow lanes of the cardiac vagus through computational modelling MM Gee, E Hornung, S Gupta, **AJH Newton**, Z Cheng, WW Lytton, AM Lenhoff, JS Schwaber and R Vadigepalli. Unpacking the multimodal, multi-scale data of the fast and slow lanes of the cardiac vagus through computational modelling. *Experimental Physiology*.
- 2023 A pipeline for the retrieval and extraction of domain-specific information with application to COVID-19 immune signature. **AJH. Newton**, D. Chartash, SH. Kleinstein and RA. McDougal. *BMC Bioinformatics*.
- 2022 Modernizing the NEURON simulator for sustainability, portability, and performance. O. Awile, P. Kumbhar, N. Cornu, S. Dura-Bernal, JG. King, O. Lupton, I. Magkanaris, RA. McDougal, **AJH. Newton**, F. Pereira, A. Savulescu, NT. Carnevale, WW. Lytton, ML. Hines and F. Schürmann. *Frontiers in neuroinformatics*.
- 2022 Multiscale computer modeling of spreading depolarization in brain slices. C. Kelley, **AJH. Newton**, S. Hrabetova, RA. McDougal, WW. Lytton. *eNeuro*.

- 2022 Conditions for synaptic specificity during the maintenance phase of synaptic plasticity. MA. Huertas, **AJH. Newton**, RA. McDougal, TC. Sacktor, and HZ. Shouval. *eNeuro*.
- 2020 Modeling of Disease: Physical and Molecular Level, Overview. **AJH. Newton**, WW. Lytton. *Encyclopedia of Computational Neuroscience*.
- 2019 Neuron names: a gene-and property-based name format, with special reference to cortical neurons. GM. Shepherd, L. Marenco, M. Hines, RA. McDougal, NT. Carnevale, **AJH. Newton**, M. Surles-Zeigler, and G. Ascoli. *Frontiers in Neuroanatomy*.
- 2019 Brain Ischemia and Stroke. **AJH. Newton**, A. Seidenstein SA. Neymotin, Z. Taxin, A. Mohan, and P. Lipton. *Encyclopedia of Computational Neuroscience*.
- 2018 Using NEURON for reaction-diffusion modeling of extracellular dynamics. **AJH. Newton**, RA. McDougal, ML. Hines, and WW. Lytton. *Frontiers in neuroinformatics*.
- 2016 Computer modeling of ischemic stroke. **AJH. Newton**, WW. Lytton. *Drug Discovery Today: Disease Models*.
- 2016 Modelling microelectrode biosensors: free-flow calibration can substantially underestimate tissue concentrations, **AJH. Newton**, MJ. Wall and MJE. Richardson. *Journal of Neurophysiology*.

AWARDS AND HONOURS

- 2018 Downstate Research Day Poster Presentation Prize Fellowship.
- 2017 Yale Neuroscience Retreat Poster Prize.
- 2013 Okinawa Institute of Science and Technology Computational Neuroscience Course Sponsorship.
- 2010 Engineering and Physical Sciences Research Council Studentship.
- 2010 Sir Edward Collingwood Prize (University of Sheffield).
- 2010 Institute of Mathematics and its Applications Prize (University of Sheffield) .
- 2009 Sir Edward Collingwood Prize (University of Sheffield).

CONFERENCES

- 2026 Organization for Computational Neuroscience. Modeling spreading depolarization in neocortical microcircuits
- 2026 Organization for Computational Neuroscience. Variability and Degeneracy In Simulations of Primary Motor Cortex Pyramidal Tract Neurons
- 2025 Organization for Computational Neuroscience. Modeling spreading depolarization in control and ischemic neocortical microcircuits using immunostained identified capillaries.
- 2024 Society for Neuroscience. Human capillary identification used to simulate spreading depression in control and ischemic neocortical microcircuits.
- 2024 Interagency Modeling and Analysis Group Multiscale Modeling consortium. Human capillary identification used to simulate spreading depression in control and ischemic neocortical microcircuits.
- 2024 Virtual Physiological Human. Multiscale simulations of spreading depolarization and ischemia.
- 2024 Aligning Science Across Parkinson's Celebration of Scientific Achievement. Simulating Changes In Primary Motor Cortex Pyramidal Tract Neurons Variability In Mouse-Model Parkinsonism.
- 2023 IBRO World Congress of Neuroscience. Subcellular to tissue scale modeling of ischemia and spreading depolarization.
- 2023 Interagency Modeling and Analysis Group Multiscale Modeling consortium. The brain as tissue -- simulation of ischemic effects in single cell and in networks.
- 2023 International Conference on Systems Biology. Multiscale modeling of ischemia and spreading depolarization.
- 2023 Organization for Computational Neuroscience. Modeling hypoxia and spreading depolarization at the subcellular, population, and network scales.
- 2023 Organization for Computational Neuroscience. Biophysically Detailed Cellular and Network Models of Right Atrial Ganglionic Plexus.

- 2022 Society for Neuroscience. Multiscale simulations of spreading depolarization with ischemic effects.
- 2020 Organization for Computational Neuroscience. Multiscale simulations of ischemia and spreading depolarization with NEURON.
- 2019 Society for Neuroscience. Homeostasis and spreading depolarization in multiscale simulations of ischemic stroke.
- 2018 Yale Neuroscience Research In Progress Report. Using reaction-diffusion modeling to study ischemic stroke.
- 2018 Society for Neuroscience. Multiscale simulation of spreading depolarization in ischemic stroke.
- 2018 Organization for Computational Neuroscience. Extracellular reaction-diffusion in the NEURON simulator: modeling ischemic stroke.
- 2018 Federation of European Neuroscience Societies Forum. Extracellular reaction-diffusion in the NEURON simulator.
- 2018 Interagency Modeling and Analysis Group Multiscale Modeling consortium. Expanding NEURON extracellular reaction-diffusion support: simulation of ischemic stroke.
- 2017 Society for Neuroscience. Modeling electrodiffusion with the NEURON reaction-diffusion module.
- 2017 Organization for Computational Neuroscience. Multiscale modeling of ischemic stroke with the NEURON reaction-diffusion module.
- 2017 Interagency Modeling and Analysis Group Multiscale Modeling consortium. Expanding NEURON to bridge electrophysiology, chemical, and network scales: simulations of ischemic stroke.
- 2016 Society for Neuroscience. Free-flow calibration of microelectrode biosensors substantially underestimates analyte concentration in tissue.
- 2014 Society for Neuroscience. Modelling the spatiotemporal dynamics of adenosine in neural tissue.

TEACHING AREAS

- 2026 Building mechanistic biophysical models using NEURON and NetPyNE: from molecules to circuit dynamics to LFP/EEG measures

- 2026 Guest Lecture: SUNY Downstate NBS Computational Neuroscience
- 2025 Tutorial presentation. Organization for Computational Neuroscience. Building mechanistic multiscale models with NEURON and NetPyNE
- 2024 Tutorial presentation. Organization for Computational Neuroscience. Building mechanistic multiscale models using NEURON and NetPyNE to study brain function and disease
- 2021 Tutorial presentation. Organization for Computational Neuroscience. Building biophysically detailed neuronal models from molecules to networks with NEURON and NetPyNE.
- 2021 Guest lecturer at Yale Center for Medical Informatics. Bioinformatics: Practical Application of Simulation and Data Mining. FAIR Data Sharing.
- 2020 Guest lecturer at Yale Center for Medical Informatics. Bioinformatics: Practical Application of Simulation and Data Mining. FAIR Data Sharing.
- 2019 Completed a teacher training course. An Introduction to Evidence-Based Undergraduate STEM Teaching.
- 2019 Guest lecturer at Yale Center for Medical Informatics. Bioinformatics: Practical Application of Simulation and Data Mining. FAIR Data Sharing.
- 2018 Tutorial presentation. Organization for Computational Neuroscience. Multiscale modeling from molecular level to large network level.
- 2016 Teaching assistant at Warwick University. Introduction to theoretical neuroscience.
- 2012 Teaching assistant at Warwick University. Introduction to theoretical neuroscience.

PROFESSIONAL SKILLS

Computational Tools: BluePyOpt, C/C++, COMSOL, CUDA, FEniCS, FiPy, Java, JavaScript, Julia, MATLAB, Mathematica, MCell, MPI, NEST, NEURON, NetPyNE, Numpy, Pandas, Perl, Python, R, REDCap, SciPy, scikit-learn, STAN, SQL and VCell.

Communication and Presentation: Presented at many conferences to demonstrate the utility of our software for both experimental and computational neuroscientists. Presented over 25 times during my doctoral training within the group and department.

Leadership and Teamwork: Worked with the team of programmers and scientists developing NEURON's reaction-diffusion capabilities. Collaborated with experimental laboratories (Wall and Hong-Yuan) on both developing and validating mathematical and computational models.

SERVICE TO PROFESSION

2026- Board of Directors - Organization For Computational Neurosciences

2017 Section editor. Modeling of Disease - Physical and Molecular Levels of Encyclopedia of Computational Neuroscience.

Manuscript reviewer; Advanced Science, Drug Discovery Today, Communications Biology, Frontiers in Neuroinformatics, Nature Communications, PLOS Computational Biology, PLOS ONE, Simulation Modelling Practice and Theory.

MEMBERSHIPS

2014- Member, Society for Neuroscience

2017- Member, Organization for Computational Neuroscience