

ANNA HARUTYUNYAN

Postdoctoral Research Fellow | Monash University | Melbourne, VIC | +61 466 413 270



I am a recent PhD graduate with over seven years of professional research experience. My research employs network-based computational models and high throughput "omics" technology to investigate the molecular mechanisms underlying pathology, develop reliable disease biomarkers and identify targets for precision medicine.

EDUCATION

- **Doctor of Philosophy (2019 – 2023), VIC, Australia**

Department of Medicine, Faculty of Medicine, Dentistry and Health Sciences
University of Melbourne, Royal Melbourne Hospital

Thesis title: Investigating the synergy between Alzheimer's Disease and epilepsy through data-driven molecular networks

Honours: Awarded RTP fee remission and Melbourne Research scholarships

- **Bachelor of Science (2013 – 2017), PA, United States of America**

Department of Physical and Life Sciences, Wilson College

Pennsylvania State University College of Medicine, Hershey Medical Center

*(Joint degree, equiv. of Honours, GPA: 3.87/4.0 – equiv. of H1)

Majors: **Inorganic Chemistry, Molecular Biology** (dual major),

Thesis title: Synthesis of Iron (III) Azidothymidine and its effects on human hepatocytes and hepatocellular carcinoma cells

Honours: Magna Cum Laude (latin, "High Honours"), Phi Beta Kappa, Disert scholar of 2017, awarded a full academic scholarship (2013-2017)

PROFESSIONAL RESEARCH APPOINTMENTS

- **Research Fellow**, Dept. of Neuroscience, Central Clinical School, Monash University, Alfred Hospital, VIC, Australia (present)
- **PhD candidate/Graduate researcher**, Dept. of Medicine, Royal Melbourne Hospital University of Melbourne, VIC, Australia, (2019-2023)
- **Research Officer**, Western Centre for Health Research and Education University of Melbourne, Sunshine Hospital, VIC, Australia (2021-2022)
- **Research Technician**, Dept. of Biology and Biological Engineering, California Institute of Technology (Caltech), CA, United States (2017-2019)
- **Research Assistant**, Dept. of Molecular Biology and Biochemistry, Pennsylvania State University College of Medicine, PA, United States (2016-2017)

CORE COMPETENCIES

* for a more detailed list of competencies in specific techniques please refer to the last page of this document

- **Analytical:** high throughput data analysis (microarray/RNAseq, proteomic, metabolomic) in RStudio environment, network analysis and visualization, image analysis with FIJI/ImageJ, comfortable with standard statistical methods and software such as Prism and SPSS.
- **Laboratory research:** 7 years of research experience working with various transgenic rodent and avian models, including health management, behavioural experiments, surgery and perfusion; 6 years of experience in molecular biology, biochemistry and histology techniques including plasmid construction, viral vector generation/transfection, PCR/genotyping, tissue fixation and cryosectioning, immunostaining, widefield and confocal microscopy
- **Communication:** lead author and co-author of multiple high impact peer-reviewed research articles, presented research findings at various conferences;
- **Teamwork:** was involved in a total of 12 collaborative research projects at the University of Melbourne, Monash University, California Institute of Technology and Pennsylvania State University;
- **Administrative:** 3 years of laboratory management experience including design and optimisation of standard operating protocols, data management/record keeping, laboratory organization and maintenance, purchasing of consumables and equipment.

SELECTED PEER-REVIEWED PUBLICATIONS

*for a full list of publications please refer to my Google Scholar page

- **Harutyunyan, A.,** Chong, D., Li, R., *et al.*, An Integrated Multi-Omic Network Analysis Identifies Seizure-Associated Dysregulated Pathways in the GAERS Model of Absence Epilepsy. *International Journal of Molecular Sciences* 23 (11), 2022 <https://doi.org/10.3390/ijms23116063>
- **Harutyunyan, A.,** Jones, N.C., Kwan, P., & Anderson, A. Network preservation analysis reveals dysregulated synaptic modules and regulatory hubs shared between Alzheimer's Disease and temporal lobe epilepsy. *Frontiers in Genetics, Computational Genomics*, Vol 13, 2022 <https://doi.org/10.3389/fgene.2022.821343>
- Casillas-Espinosa, P. M., Anderson, A., **Harutyunyan, A., et al.** Disease-modifying effects of sodium selenate in a model of drug-resistant, temporal lobe epilepsy. *Elife*, Vol 12, 2023 <https://doi:10.7554/eLife.78877>
- Dejakaisaya, H., **Harutyunyan, A.,** Kwan, P. & Jones, N.C., 2021. Altered metabolic pathways in a transgenic mouse model suggest mechanistic role of amyloid precursor protein overexpression in Alzheimer's disease. *Metabolomics* 17, 42 <https://doi.org/10.1007/s11306-021-01793-4>
- Gonzalez W.G., Zhang H., **Harutyunyan A.,** Lois C. Persistence of neuronal representations through time and damage in the hippocampus. *Science*. 2019 <https://doi.org/10.1126/science.aav9199>
- Buckwalter, J.M., Norouzi, D., **Harutyunyan, A., et al.** Regulation of chromatin folding by conformational variations of nucleosome linker DNA. *Nucleic Acids Research*, 2017 <https://doi.org/10.1093/nar/gkx562>

SELECTED CONFERENCE PRESENTATIONS

- Kindling-induced expression of immediate early genes is associated with increased seizure severity and neuroinflammation in Alzheimer's Disease. *13th FENS Forum of Neuroscience*, France, 2022
- Identification of seizure-associated modules in rodent models of epilepsy. *Asian and Oceanian Epilepsy Congress*, Japan, 2021
- Integrative multi-omic approaches for identification of seizure-associated modules. *Translational Neurogenetics Conference*, VIC, Australia, 2021
- Network view of disease. *Epilepsy Society of Australia Annual Conference*, Virtual, 2020
- Epilepsy in Alzheimer's disease. *Students of Brain Research Symposium*, VIC, Australia, 2019
- Persistence of neuronal representations through time and damage in hippocampus. California Institute of Technology, CA, United States, 2018
- Synthesis and effects of Fe-AZT on viability of hepatocytes and hepatocellular carcinoma cells. *Pennsylvania Academy of Science Annual Conference*, PA, United States, 2017
- Design and construction of nucleosome arrays to determine linker accessibility of compact chromatin fibres. Pennsylvania State University College of Medicine, PA, United States, 2016

SELECTED GRANTS AND AWARDS

- Hagop Bogigian Scholarship (Hagop Bogigian Fund USA, 2013-2017)
Total value of ~200.000 USD, duration 4 years
- E. Grace White Summer Scholarship (Wilson College, PA, USA, 2016)
- NOVA Student Research Grant (Nova Corporation USA, 2016)
- Pennsylvania Academy of Science Outstanding Research Grant (PAS, 2017)
- Varter Derarian Scholarship (Wilson College, 2013-2017)
- Melbourne Research Scholarship (University of Melbourne, 2019-2022)
- AusBiotech Student Scholarship (AusBiotech/AusMedtech, 2020)
- European Molecular Biology Laboratory travel grant (EMBL Australia, 2020)
- ILAE Epilepsy Congress Bursary (ILAE, 2021)
- MDHS Graduate Student Support Grant (University of Melbourne, 2022)
- Best Platform Presentation Award (Asian & Oceanian Epilepsy Congress, 2021)
- Special Commendation Award for best poster (Epilepsy Society of Australia, 2021)
- Margaret Criswell Disert Honours Award (Wilson College, 2017)
- Davison Grove Award for Excellence in Senior Research (Wilson College, 2017)
- Edward McElwain prize for the best student in Mathematics (Wilson College, 2014)

PRESS RELEASE

- <https://www.monash.edu/medicine/news/latest/2022-articles/link-between-alzheimers-disease-and-epilepsy-explored>
- <https://www.sciencedaily.com/releases/2019/08/190823140729.htm>
- <https://www.wilson.edu/research-role-model>
- <https://www.heraldmillmedia.com/story/news/local/2017/04/25/student-research-day-set-for-friday-at-wilso/44617613/>

PROFESSIONAL AFFILIATIONS

- Invited member, Phi Beta Kappa honours society (2016-present)
- Member, Epilepsy Society of Australia (2020-present)
- Member, Society for Neuroscience USA (2022-present)
- Member, American Epilepsy Society (2022-present)
- Member, Federation of European Neuroscience Societies (2022-present)

EXTENDED LIST OF SKILLS AND COMPETENCIES

Data analysis

- Proficient in bioinformatic methods of analysis of omics data such as:
 - Proteomics
 - Metabolomics
 - Transcriptomics (Bulk RNAseq and microarray)
 - Single-cell RNAseq
- Comfortable with all aspects of efficient data carpentry
- Programming in R/RStudio and MatLab environments
- Proficient in linear models and network-based models
- Extensive experience and expertise in correlation network analyses using various Bioconductor packages and plugins in RStudio and Cytoscape
- Image analysis with FIJI/ImageJ (e.g. cell counts, thresholding, 3D reconstruction)
- Data visualization via Adobe Illustrator (*follow the [link](#) for examples of recent figures*)
- Electroencephalography and EEG data analysis

Live animal research (surgical and behavioural)

- Animal surgery survival rate of 96%, conducted over ~300 stereotaxic surgeries on mice including:
 - Intracranial injections
 - Implantation of mini scopes for calcium imaging
 - Implantation of EEG electrodes for electroencephalography
- Extensive experience in rodent behavioural assessment
 - Simultaneous behavioural assessment (maze) and calcium imaging of freely moving mice
 - Various behavioural tests (e.g. Morris water maze, Y maze, novel object recognition, sucrose preference, olfactory discrimination)
 - Colony management (up to ~200 cages) and general health monitoring

Molecular biology

- DNA/RNA recombinant techniques
- Histology, immunohistochemistry and microscopy (e.g. tissue dissection, fixation and cryopreservation, sectioning, immunohistochemical staining, confocal/fluorescent imaging)
follow the [link](#) for examples of my work
- Aseptic technique, extensive experience in cell culture work
- Chromatography and spectrometry (HPLC, MALDI-TOF, IR)
- Designed and constructed over 100 plasmids
- Genotyped over 3000 mice and 500 finches

Laboratory management and supervision

- Trained in compliance with OHS requirements and animal ethics requirements
- Training and experience to work in up to PC3 (live viruses) environment, radioactive substances, controlled/scheduled substances
- Experience in writing animal ethics applications and liaising with animal care staff
- Overall lab management - record maintenance and data management, chemical inventories, dispensing controlled substances, purchase of equipment and software, equipment maintenance (hiring contractors, calibration service, international shipping of biohazardous samples)
- Built custom equipment (pedestals for miniscopes, EEG cables, circuits, behaviour assessment chambers)
- Animal colony management, mice (over 200 cages) and zebra finches (over 300), including breeding, health management, experimental procedures and eventual euthanasia.

Communication, teamwork and interpersonal skills

- Extremely adaptable, was a part of 6 labs/research teams on 3 different continents.
- Contributed to a total of 18 collaborative research projects at The University of Melbourne, California Institute of Technology, Pennsylvania State University and Monash University
- Authored peer-reviewed research articles (both as first author and co-author), presented research findings to diverse audiences at various local and international conferences

Other

- First Aid, cardiopulmonary resuscitation (trained first aid officer)
- Authorized to work with scheduled/controlled drugs and radioactive substances
- Working with children clearance (exp. 2025)
- Victorian driver's license (exp. 2030)
- Languages: fluent (95th percentile) – English, Russian, Armenian, (80th percentile) – Georgian, Spanish