Gerald Wai Yeung Cheng

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Education

Sep 2019 – Aug 2023   Doctor of Philosophy, Medical Laboratory Science
Hong Kong Polytechnic University, Hong Kong
PhD Dissertation: Radio-pathological investigation of myelin loss and oligodendrocyte degeneration using multimodal functional MRI in Alzheimer's disease

Sep 2016 – Nov 2017   Masters of Research (Merit), Biomedical Science
University of Glasgow, United Kingdom
Master's Thesis 1: "Colony Formation Influence of Polycaprolactone Topography on hTERT Fibroblast Growth."
Master's Thesis 2: "Projection and Quantification of Mouse Dorsal Horn Excitatory Interneurons and Primary Afferents in Lamina I-III."

Aug 2011 – May 2015   Bachelor of Science, Biological Science
University of Georgia, U

Research

Sep 2023 – Present   Post-Doctoral Fellow, Dr. Yoo Jung Sun
Department of Health Technology and Informatics, Polytechnic University of Hong Kong
- Studied the effect of TRIM47 on autophagy of blood-brain barrier (BBB)
- Performed MRI on atherosclerosis-induced apolipoprotein knock-out mice model
- Processed brain tissue clearing and immunohistochemistry with X-Clarity for BBB tracking
- Cultured bEnd.3 cells to simulate the effect of autophagy of lysosome formation in BBB

Sep 2019 – Aug 2023   Research Post-Graduate, Dr. Tse Kai-Hei
Department of Health Technology and Informatics, Polytechnic University of Hong Kong
- Studied the effect of demyelination and apolipoprotein on Alzheimer's progression
- Performed radiological analysis on MRI scanned mice for white matter alterations
- Maintained mice colonies for radiological and immunohistochemical procedures
- Performed behavior and metabolic assessment with y-maze and metabolic cage, respectively
- Performed primary culture of oligodendrocytes of dissected mice brain
- Managed final year project students and their progress
- Assisted in teaching in both laboratory and administrative settings

Aug 2018 – Aug 2019   Research Assistant, Prof. Karl Herrup
Division of Life Science, Hong Kong University of Science and Technology
- Performed routine mice sacrifices, histology, and protein assays
- Managed apolipoprotein and Alzheimer's disease transgenic mice model colonies (ApoE knockouts, ApoE3, ApoE4, and R1.40)
- Executed various processing techniques such as cryogenic and vibrating microtome
- Assisted in age-dependent MRI study of cuprizone-induced demyelination
- Guided undergraduates in their final year projects

Apr 2017 – Aug 2017   Graduate Research, Dr. Andrew J. Todd
Department of Neuroscience, University of Glasgow
- Quantified excitatory and inhibitory interneurons using known classifications of neuropeptides to observe the representation of either group of interneurons
- Examined and followed interneurons tagged with CTb through five sections of spinal cord to determine the origin of the signals
- Processed full spinal cords into 60μm sections with corresponding antibodies

- Introduced incoming students and volunteers on lab work and supervised their integration into the working environment
- Observed an under-representation of both excitatory and inhibitory interneurons within dorsal horn indicating possible interneurons originating from lateral spinal neurons instead of laminae

Jan 2017 – Apr 2017 Graduate Research, Dr. Mathis O. Riehle
Institute of Molecular Cell and Systems Biology, University of Glasgow

- Investigated the effects of topographical alterations to human telomerase reverse transcriptase (hTERT) stem cell motility, nuclear and cellular orientation, and differentiation
- Built model used to stretch and pull polycaprolactone (PCL) sheets used to create ridges and peaks for seeding hTERT stem cells
- Aided in the creation and construction of stretching apparatus using 3D printer
- Optimized bead densities within PCL sheets to quantify and qualify strain fields among areas aiding in understanding the effects of microenvironments on cell responses

May 2013 – Dec 2013 Volunteer Research, Dr. Anthony Chan
Yerkes Regional Primate Research Center, Emory University

- Organized quantitative data among 4 post-docs through Excel spread sheets
- Differentiated and quantified neural cells derived from Huntington's disease rhesus monkey iPSCs
- Stereological analysis of transgenic monkey brain sections
- Maintained and cultured rhesus neural stem cells for graduate students and post-doctoral fellows
- Organizing and preparation of necropsy on transgenic Huntington's disease rhesus monkey

Publications

In preparation **Cheng GWY**, Ma IWT, Huang J, Mak HKF, Herrup K, Chan KWY, Tse KH. Amyloid precursor protein overexpression exacerbates demyelination response independent of presenilin-1 mutation in Alzheimer's disease model. Manuscript prepared for J. Neurosci. or Acta Neuropath Comm.

Jan 2023 Law LH, Huang J, Xiao P, Liu Y, Chen Z, Lai JHC, Han X, **Cheng GWY**, Tse KH, Chan KWY. Multiple CEST contrast imaging of nose-to-brain drug delivery using iohexol liposomes at 3T MRI. J Control Release. 2023 Jan 10;354:208-220. doi: 10.1016/j.jconrel.2023.01.011. Epub ahead of print. PMID: 36623695.

Dec 2022 *Mok KKS, *Yeung SHS, ***Cheng GWY**, Ma IWT, Lee RH, Herrup K, Tse KH. Apolipoprotein E ε4 disrupts oligodendrocyte differentiation by interfering with astrocyte-derived lipid transport. J Neurochem. 2022 Dec 22. doi: 10.1111/jnc.15748. Epub ahead of print. PMID: 36549843.

Aug 2022 **Cheng GWY**, Mok KKS, Yeung SHS, Kofler J, Herrup K, Tse KH. Apolipoprotein E ε4 Mediates Myelin Breakdown by Targeting Oligodendrocytes in Sporadic Alzheimer Disease. J Neuropathol Exp Neurol. 2022 Aug 16;81(9):717-730. doi: 10.1093/jnen/nlac054. PMID: 35779013; PMCID: PMC9393713.

Oct 2021 Huang J, Lai JHC, Tse KH, **Cheng GWY**, Liu Y, Chen Z, Han X, Chen L, Xu J, Chan KWY. Deep neural network based CEST and AREX processing: Application in imaging a model of Alzheimer's disease at 3 T. Magn Reson Med. 2022 Mar;87(3):1529-1545. doi: 10.1002/mrm.29044. Epub 2021 Oct 17. PMID: 34657318.

May 2020 Huang J, van Zijl PCM, Han X, Dong CM, **Cheng GWY**, Tse KH, Knutsson L, Chen L, Lai JHC, Wu EX, Xu J, Chan KWY. Altered d-glucose in brain parenchyma and cerebrospinal fluid of early Alzheimer's disease detected by dynamic glucose-enhanced MRI. Sci Adv. 2020 May 13;6(20):eaba3884. doi: 10.1126/sciadv.aba3884. PMID: 32426510; PMCID: PMC7220384.

Conference Abstracts

Mar 2023	Yeung MHY, **Cheng GWY**, TSE KH. APOE-mediated lipid accumulation in endothelium – A pilot investigation of a common pathology in chronic kidney disease and age-related dementia. ISN World Congress of Nephrology. 2023.
Nov 2022	**Cheng GWY**, Huang J, Yeung MHY, Chen Z, Mok KKS, Yeung SHS, Herrup K, Mak HKF, Chan KWY, Tse KH. APOE4 directly disrupts lipid profile and myelination in the aging mouse brain. Society for Neuroscience. 2022.
	Ma IWT, Yeung SHS, **Cheng GWY**, Mok KKS, Herrup K, Tse KH. Bridging integrator 1 (BIN1)-mediated cell cycle regulation– bridging ATM and Myc functions in oligodendrocyte. Society for Neuroscience. 2022.
Nov 2021	**Cheng GWY**, Huang J, Mok KKS, Yeung SHS, Chen Z, Herrup K, Mak HKF, Chan KWY, Tse KH. APOE4 compromises white matter integrity by harnessing oligodendrocyte differentiation– a radio-pathological investigation –. Society for Neuroscience. 2021.
	Tse KH, **Cheng GWY**, Huang J, Mok KKS, Yeung SHS, Chen Z, Mak HKF, Chan KWY, Herrup K. Does demyelination accelerate the neuropathology progression of Alzheimer's disease? – a radio-pathological investigation. Society for Neuroscience. 2021.
	Yeung SHS, Cheng A, **Cheng GWY**, Mok KKS, Herrup K, Tse KH. Divergent effects of ATM mutations on oligodendrocytes- the cellular basis of myelin pathology in Ataxia Telangiectasia. Society for Neuroscience. 2021.
May 2021	Huang H, Lai JHC, TSE KH, **Cheng GWY**, Liu Y, Chen Z, Han X, Chen L, Xu J, Chan KWY. CEST and AREX data analysis based on deep neural network: application to image Alzheimer's disease at 3T ISMRM 2021 D-56 3707.
July 2019	**Cheng GWY**, Herrup K, Tse KH. Apolipoprotein ε4 contributes to oligodendrocyte vulnerability and decreased myelination in Alzheimer's disease. Alzheimer's Association International Conference. 2019.