

Shucheng (Bangli) Cao

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Linkedin: <https://www.linkedin.com/in/shucheng-bangli-cao-b39ba3184/>**EDUCATION****McGill University****2022-present**

PhD candidate in Quantitative Life Sciences

Montreal

King Abdullah University of Science and Technology**2020-2022**

Master of Science in Bioengineering (Full-funded)

Jeddah

China Pharmaceutical University**2015-2019**

Bachelor of Science in Pharmaceutical Analysis

Nanjing

RESEARCH EXPERIENCE**Ph.D. Study (Advisor: Dr. Guillaume Butler-Laporte, McGill University)****09/2022-present**

- Impact of BMI-driven proteins on Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD)
- To comprehensively assess the association between BMI-driven proteins and MASLD by leveraging extensive proteomic and genetic data
- Identified BMI-driven proteins
- Research field: Genetic Epidemiology, Mendelian Randomization, Bioinformatics, GWAS, Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD)

Ph.D. study and rotation research (Advisor: Dr. Audrey Grant, McGill University)**05/2023-04/2024**

- Cross-Biobank GWAS Harmonization for Enhanced Meta-Analysis: Unveiling the Genetic Landscape of Multisite Chronic Pain
- To bring varied data together across sources to identify the genetic risk factors contributing to individuals' different pain experience
- Generated phenotypes and GWAS results for multisite chronic pain with UK biobank data
- Quality control and GRCh build version alignment for CLSA biobank data
- Analyzed and interpreted GWAS results including heritability
- Research field: Bioinformatics, GWAS, Pain Genomics

Ph.D. rotation research (Advisor: Dr. Ian Waston, McGill University)**01/2023-04/2023**

- Considering transcript isoforms in gene signatures: A use case on melanoma and response to ICI
- To explore whether it is reasonable to include all the isoforms of transcripts or only protein-coding isoform for the evaluation of drug efficacy
- Completed the analysis of transcriptomics by merging the expression values for all isoforms and just protein-coding isoforms
- Discovered the overall difference between the two methods is not substantial, methods' potential to cause false positives, false negatives, and incorrect assessments of medication responsiveness when evaluating drug efficacy.
- Research field: Bioinformatics, Transcriptomics, Tumor Immunity

Ph.D. rotation research (Advisor: Dr. Danilo Bzdok, McGill University & MiLA)**09/2022-12/2022**

- Study on bringing language to dynamic brain states
- To explore the default network's impact on neural responses to evolving movie stories
- Completed the sentimental analysis and association analysis between movie events and dynamic brain states
- Discovered the default network dominates neural responses to evolving movie stories
- Research field: Computational Neuroscience

Master Research (Advisor: Prof. Charlotte Hauser, King Abdullah University of Science and Technology)**09/2021-05/2022**

- Study on the Self-Assembly Mechanism of Rationally Designed Novel Ultrashort Peptide Amphiphile Using Molecular Dynamics Simulations

- To study and confirm the proposed peptides' self-assembling behavior in solution to instruct for study of mechanism of amyloidogenesis in Alzheimer's Disease
- Checked whether aromaticity can influence the aggregation of IVYK
- Checked any difference in self-assembly behaviors if no six-membered ring
- Explored which structure would dynamically prefer in MD simulation of single peptide
- Explored the self-assembly behaviors of IVYK with the inhibitor, IPG
- Proficiently use Linux/Unix, shell, and bash to execute all the command for simulations
- Professionally grasp how to use the softwares of Gromacs, VMD, and pymol to prepare or execute simulations
- Research field: MD simulations, Bio 3D printing, and Tissue Engineering

Course Project (Advisor: Prof. Khaled Nabil Salama, King Abdullah University of Science and Technology)
09/2021-11/2021

- Small-sized Reconfigurable Multi-measurement Electrochemical Station for Point of Care Applications
- To create a device to apply and read the current from a Laser scribed graphene sensor that detects the cardiac Troponin-I
- Created a series of prototypes for its case, a usable electrical circuit and a platform for point-of-care system, and a custom application controlling the circuits
- Research field: ECE, Biomedical wearable devices

Master research (Advisor: Prof. Di Wang, King Abdullah University of Science and Technology)
01/2021-06/2021

- Study on Differentially Private and Fair Generative Adversarial Network
- To achieve privacy and fairness in GAN algorithm and applied for health field
- Applied Python PyTorch to establish the generative adversarial network (GAN)
- Made experiments to show that GAN causes fairness and privacy issue in healthcare data
- Explored whether Fair GAN causes privacy issue, and whether DP-GAN causes fairness issue
- Designed an algorithm which gets a trade-off in privacy and fairness, and test using healthcare data.
- Research field: deep learning.

Online Research (Advisor: Dr. Jun Ma, University of Toronto)
02/2020-07/2020

- Semi-supervised learning for automatic segmentation of multi abdominal CT images
- To improve the efficacy of the model in multi-center segmentation of multi-abdominal organs in CT images
- To provide more clinical features for doctors and colleagues by building the open source database for COVID-19 lung CT images
- One publication on IEEE Transactions on Pattern Analysis and Machine Intelligence
- Built one open-source database for COVID-19 lung CT images
- Research field: Medical Imaging, Machine Learning

Research Assistant (Advisor: Prof. Zheng Li, China Pharmaceutical University & Weill Cornell Medicine)
09/2019-07/2020

- PDA functionalized 3D decellularized matrices for better screening antitumor drug.
- Humanized mouse models to mimic environment in human body for better anticancer drug evaluation.
- Evaluated enzymatic, in vitro, and in vivo activities of the drug
- Experiments: Primary cell culture, subculture, and MTT assay; Orbital blood sampling; tail-vein administration, oral administration, intragastric administration
- One academic paper is prepared to be submitted
- Research field: Tumor Immunity and Photodynamics Theranostics

Undergraduate Thesis (Advisor: Prof. Jun Zhou, China Pharmaceutical University)
02/2019-06/2019

- Thesis title: Construction of mScarlet bimolecular fluorescence system
- Constructed a series of plasmids containing interactive proteins and fragments of fluorescent protein
- Experiments: PCR, plasmid extraction, qPCR, purification of DNA, DNA gel electrophoresis; Primary cell culture, subculture, cell transfection, and fluorescent microscope
- Research field: Immunofluorescent System

Winter Vacation Research Experience (Advisor: Prof. Junbiao Dai, SIAT UCAS)**01/2018-02/2018**

- Synthesized chromosome of *Saccharomyces cerevisiae*.
- Learned specific techniques in molecular cloning
- Molecular biology Experiments: PCR, plasmid extraction, qPCR, purification of DNA, DNA gel electrophoresis
- Microbiological Experiments: Yeast photocopy, observation of yeast growth with microscope
- Research field: Synthetic Genomics

Student's Platform for Innovation and Entrepreneurship Training Program (Advisor: Prof. Can Zhang, CPU)**3/2017–5/2018**

- Learned a series of techniques in fabricating a liposome-based nanopatform for targeted delivery of siRNA to cancer cells
- Learned specific techniques in Neutrophil-mediated drug delivery
- Experiments: synthesis and characterization of liposomes and neutrophils; confocal microscope

Research field: Pharmaceutics, Nanotechnology, Cancer research, Cell-mediated drug delivery

WORK EXPERIENCE**Event coordinator - Academic events (Lady Davis Institute Trainee Committee)**

07/21/2025

- Lead to organize Lady Davis Institute Research Day
- Lead to organize LinkedIn workshop to instruct early-career researchers
- Lead to organize round tables in biomedical and biological sciences benefiting the research community in Montreal.

Workshop lead - Introduction to R (McGill Initiative in Computational Medicine)

04/13/2025

- Took full leadership in designing and delivering the workshop content for beginners in R programming.
- Prepared structured slides, real-world code examples, and hands-on exercises tailored to the audience's background.
- Anticipated common learning challenges and developed step-by-step explanations to support student understanding.
- Answered questions both during and after the workshop to ensure individual student needs were met.
- Role description: I led the planning, design, and delivery of the workshop - Introduction to R for graduate students. I developed a structured and engaging curriculum with hands-on coding tasks, anticipated common student challenges, and provided clear, step-by-step instruction to build foundational skills in programming and data handling. I actively supported learners during and after the session to ensure mastery.

Facilitator - Statistics in R (McGill Initiative in Computational Medicine)

02/20/2025

- Provided live coding support and explained statistical concepts in R in an accessible, student-friendly way.
- Helped students debug their code and understand the logic behind statistical functions and data structures.
- Collaborated with the lead instructor to maintain a smooth workshop flow and encourage peer learning.
- Role description: I served as a technical and pedagogical support lead during the workshop - statistics in R. I provided real-time troubleshooting, clarified statistical logic and function use, and explained complex concepts in accessible language. I helped maintain a collaborative learning atmosphere and supported peer-to-peer learning.

Facilitator - Introduction to R (McGill Initiative in Computational Medicine)

02/13/2025

- Supported student learning by offering one-on-one guidance during lab exercises.
- Helped clarify programming logic and syntax issues for beginners.
- Contributed to a welcoming, inclusive learning environment that encouraged participation and confidence.
- Role description: I guided beginner-level learners through their first exposure to R in the workshop – Introduction to R, offering one-on-one support during coding exercises. I focused on breaking down syntax and logical structures into approachable segments, while ensuring students felt confident and included in the learning process.

PUBLICATIONS

1. Chen-Yang Su, Masashi Hasebe, Dandan Tan, **Shucheng Cao**, Kevin Liang, Takayoshi Sasako, Vincent Mooser, Wenmin Zhang, Sirui Zhou, Satoshi Yoshiji, Tianyuan Lu, Guillaume Butler-Laporte*. Disentangling osteoarthritis-specific genetic effects from obesity to identify novel therapeutic targets. (Accepted, Nature Communications, in press)
2. **Shucheng Cao**, Chen-Yang Su, Dandan Tan, Takayoshi Sasako, Satoshi Yoshiji, Guillaume Butler-Laporte*. Integrative proteogenomic Mendelian randomization identifies and refines obesity-driven circulating mediators of MASLD. (Submitted to Nature Communications)

3. Wanheng Zhang^a, Yan Chen^a, Mengyuan Li^a, **Shucheng Cao**, Nana Wang, Yingjian Zhang*, and Yongtao Wang*. PDA functionalized three-dimensional decellularized matrices for simulating tumor microenvironment and investigating spatial differences of cells and drug responsiveness. **Advanced Science (2023). (IF: 17.521)**
4. Cao, Shucheng. *Molecular Dynamics Simulations to Study the Mechanism of Self-Assembly of Amphiphilic Ultrashort Peptides*. **Diss. 2022.**
5. Pengzhao Shang^a, Liting Yu^a, **Shucheng Cao**, Changying Guo*, Wanheng Zhang*. An Improved Cell Line-Derived Xenograft Humanized Mouse Model for Evaluation PD-1/PD-L1 Blocker BMS202-induced Immune Responses in Colorectal Cancer. *Acta Biochimica et Biophysica Sinica (2022). (IF: 3.511)* <https://europepmc.org/article/med/36269133>
6. Jun Ma, Yao Zhang, Song Gu, Cheng Zhu, Cheng Ge, Yichi Zhang, Xingle An, Congcong Wang, Qiyan Wang, Xin Liu, **Shucheng Cao**, Qi Zhang, Shangqing Liu, Yunpeng Wang, Yuhui Li, Jian He, Xiaoping Yang*. (2021/07/27). Abdomenct-1k: Is abdominal organ segmentation a solved problem. *IEEE Transactions on Pattern Analysis and Machine Intelligence (IF: 24.314)*. <https://ieeexplore.ieee.org/document/9497733>
7. Ma Jun; Ge Cheng; Wang Yixin; An Xingle; Gao Jiantao; Yu Ziqi; Zhang Mingqing; Liu Xin; Deng Xueyuan; **Cao Shucheng**; Wei Hao; Mei Sen; Yang Xiaoyu; Nie Ziwei; Li Chen; Tian Lu; Zhu Yuntao; Zhu Qiongjie; Dong Guoqiang; He Jian*. (2020/04/20). COVID-19 CT Lung and Infection Segmentation Dataset (Version 1.0) [Data set]. Zenodo. <http://doi.org/10.5281/zenodo.3757476>
8. Yuyang Zhang, Weihang Xu, **Shucheng Cao**, Xuehai Zhou, Qihuang Zhang. A Tropical Geometry-inspired Zero-Parameter Feature Extractor for Neuronal Morphology Classification. (Submitted to AAAI)

JOURNAL REVIEWERS

Gene Reports

Heliyon

Frontiers in Microbiology

Frontiers in Pharmacology

Discover Oncology

Biomedical Genetics

BMC Cancer

Journal of Cellular and Molecular Medicine

PRESENTATIONS

Two-step Mendelian randomization identifies circulating metabolites mediating the effect of BMI on metabolic dysfunction-associated steatotic liver disease

- Event: American Society of Human Genetics (ASHG) Annual Meeting, Montreal, Canada (abstract accepted)
- Date: October 20-24, 2026

Integrative proteogenomic Mendelian randomization identifies and refines obesity-driven circulating mediators of MASLD

- Event: Poster Presentation in European Society of Human Genetics (ESHG) Annual Meeting, Gothenburg, Sweden
- Date: June 13-16, 2026

Causal Inference of Obesity-Related Pathways in Metabolic Dysfunction-associated Steatotic Liver Diseases (MASLD)

- Event: Oral presentation at QLS Research Day, Quantitative Life Sciences, McGill University
- Date: February 3, 2026

Causal Inference of Obesity-Related Pathways in Metabolic Dysfunction-associated Steatotic Liver Diseases (MASLD)

- Event: Invited talk, Cardiovascular & Metabolic Diseases Innovation Center, Guangdong Medical University, Dongguan, China
- Date: December 24, 2025

The Evolution of Causal Inference in Epidemiology and Mendelian Randomization: Unraveling the Role of Obesity-Associated Plasma Proteins in MASLD Pathogenesis

- Event: Invited presentation for Epidemiology Round Table at McGill University
- Date: November 6th, 2025

Multi-Omic Causal Inference of Obesity-Related and Obesity-Independent Pathways in Metabolic Liver Diseases

- Event: PhD comprehensive exam
- Date: September 30th, 2025

Impact of BMI-Driven Proteins on Change of Alanine Transferase Levels in Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD)

- Event: Poster Presentation in American Society of Human Genetics Annual Meeting
- Date: November 8th, 2024

Retail GenAI Hackathon held by Amazon Web Services (Team: AI Avatar)

- Event: Retail GenAI Hackathon
- Date: October 16th, 2023

Research Overview on Evaluating the Impact of Transcript Isoforms on Gene Signatures

- Event: 3-minute competition in Quantitative Life Sciences at McGill University
- Date: April 25th, 2023

Evaluating the Impact of Transcript Isoforms on Gene Signatures Associated with Immune Checkpoint Inhibitors (ICI) Response in Melanoma

- Event: oral presentation for the third rotation in Quantitative Life Sciences at McGill University
- Date: April 13th, 2023

Research Overview on Dynamic Brain States with NLP Language

- Event: 3-minute competition in Quantitative Life Sciences at McGill University
- Date: December 8th, 2022

Bringing language to dynamic brain states: the default network dominates neural responses to evolving movie stories

- Event: oral presentation for the third rotation in Quantitative Life Sciences at McGill University
- Date: November 24th, 2022

Study of Self-Assembly Mechanism of Novel Ultrashort Peptides Using Molecular Dynamics Simulations

- Event: MS graduation defense at King Abdullah University of Science and Technology
- Date: May 25th, 2022

The construction of mScarlet-I-based bimolecular fluorescent system

- Event: BS graduation defense at China Pharmaceutical University
- Date: May 20th, 2019

TRAININGS

KAUST Entrepreneurship for All Special Edition Summer 2021, Host: KAUST & UCB & Stanford & Cornell

06/2021

- Learning a lot about leadership, design thinking, and product design and application.

International Course-Cerebrovascular Diseases and Neuroimmune System (Lecturer: Prof. Heng Zhao, Stanford University)

11/2019

- Learned a lot of knowledge related to neuroscience and immunology.
- Critical thinking about philosophy of science like holism.

FELLOWSHIPS & SCHOLARSHIPS

- **MiCM Graduate Award** 04/2026
 - 300 CAD
- **McGill PhD Scholarship (from 4th Year)** 09/2025-08/2026
 - 44,731 CAD
- **Doctoral Scholarship (Fonds de recherche du Québec – Nature et technologies)** 05/2025-present
 - 25,000 CAD per year
- **MiCM Graduate Award** 04/2025
 - 700 CAD
- **McGill GREAT Award** 11/2024
 - 500 CAD
- **McGill PhD Scholarship (from 3rd Year)** 09/2024-08/2025
 - 44,169 CAD
- **Shuk-Tak Liang Fellowship** 09/2024-08/2025
 - 12,000 CAD
- **McGill QLS Grad Award** 05/2024-06/2024
 - 3,463 CAD
- **McGill PhD Scholarship (from 2nd Year)** 09/2023-08/2024
 - 41,500 CAD
- **McGill PhD Scholarship (1st Year)** 09/2022-08/2023
 - 38,000 CAD
- **King Abdullah University of Science and Technology MS Annual Fellowship** 09/2020-05/2022
 - 70,000 USD
- **King Abdullah University of Science and Technology Annual Travel Award** 09/2020-05/2022
 - 2,100 USD
- **Jiangxi Province Excellence Student Award** 09/2012-06/2015
 - 200 USD every year

AWARDS

- McGill Quantitative Life Sciences 500 CA\$ travel award. 11/2024
- Best Product Market Fit Prize with 750 CA\$ in Retail GenAI Hackathon. 10/2023
- Excellent volunteer in Global Conference on Pharmacy & Pharmaceutical Sciences Education. 11/2016

COMPETITIONS

Retail GenAI Hackathon held by Amazon Web Services (AI Avatar) 10/2023

- Developed an AI agent capable of engaging with a diverse clientele, adapting communication to various cultural and educational backgrounds through appropriate tonality and facial expressions for an enhanced online shopping experience.
- Innovated to minimize operational costs while ensuring equitable service to minorities and individuals with disabilities.
- Engineered a diffusion model capable of responding to customer inquiries via text or audio with warm tones and empathetic facial expressions.
- Authored a comprehensive business proposal outlining the AI agent's commercial viability and potential impact on customer satisfaction and inclusivity.
- Designed a visually compelling PowerPoint presentation, effectively illustrating the project's mechanics, outcomes, and strategic relevance.
- Successfully presented the project to a panel of senior AWS managers and Business School professors at McGill University, demonstrating proficiency in product development and stakeholder communication.

VOLUNTEER EXPERIENCE

- **World Summit AI Americas 2023** 04/2023

- Escorted guest speakers to session venues and provided on-site assistance
- Supported Q&A sessions by managing audience microphones and moderating questions
- **Global Conference on Pharmacy & Pharmaceutical Sciences Education** 11/2016
 - Escorted guest speakers to session venues and provided on-site assistance
 - Supported Q&A sessions by managing audience microphones and moderating questions

TECHNICAL SKILLS

- R, Python, Linux/Unix, Shell