

Kevin J. Tu

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Cancer Research UK Cambridge Institute

University of Cambridge, Cambridge, United Kingdom CB2 2RE

Summary: As a cancer biology and economics student, my research interest is in cost-effective precision oncology. I also have research interests in pedagogy and health equity. Outside of research, I am actively involved in sustainability, teaching, and DEI through social entrepreneurship and policy.

Education

2023 - 2024

University of Cambridge

Master of Philosophy, Medical Science (Cancer Research UK Cambridge Institute)

Advisors: Professor Carlos Caldas; Dr. Oscar Rueda & Professor Florian Markowitz

2019 - 2023

University of Maryland (UMD)

Bachelor of Science, Biological Sciences: Physiology and Neurobiology

Bachelor of Science, Economics

Employment History

Academic Positions

University of Cambridge, Cancer Research UK Cambridge Institute

Cambridge, UK

Churchill Scholar; Primary Supervisor: Prof. Carlos Caldas

October 2023 - Present

- Project 1: Benchmarked immune characterization methods against image mass cytometry data, identified clinically actionable immune biomarkers across 10,000+ breast tumors, and developed on algorithm to translate these findings into FFPE tissues.
- Project 2: Developed Pythia, an R package to identify drug response in *ex vivo* models using mixed effect mathematical modelling.

University of Iowa Carver College of Medicine, Dept. of Emergency Medicine

Iowa City, IA

Research Assistant; Advisor: Prof. Nicholas Mohr

March 2022 - Present

- Project 1: Systematically reviewed and critiqued the literature surrounding the use of telemedicine in sepsis treatment, as well as quantified the impact that consultative tele-ED has on sepsis patient mortality and bundle adherence.
- Project 2: Used Stata to derive a multivariate model to predict the use and benefit of consultative ED telemedicine in rural hospitals for sepsis care.

Duke University, Dept. of Radiation Oncology

Durham, NC

Amgen Scholar, Research Assistant; Advisor: Dr. Zachary Reitman

May 2022 - December 2023

- Project 1: Used R to assess multi-omic (mutational sequencing, expression) and CRISPR genetic screening data of 1,073 cancer cell lines and 500 primary glioblastoma tumors for therapeutic vulnerabilities of telomerase promoter mutations.
- Project 2: Used R to systematically screen 43 million cancer mutations in the COSMIC database to predict change-of-function mutations that may be used to design novel biocatalysts.
- Project 3: Determined the mechanisms by which FLASH radiotherapy mitigates normal tissue radiation toxicity in a transgenic mouse model of pediatric medulloblastoma.

University of Maryland School of Medicine, Dept. of Radiation Oncology

Baltimore, MD

Research Assistant; Advisors: Dr. Hem Shukla and Prof. Amit Sawant

January 2021 - May 2023

- Project 1: Genetically engineered a pancreatic cancer cell line to deplete HIF1 α and investigated the protein's role in promoting tumor survival in the face of radiation-induced DNA strand breaks and apoptotic stress induced from KRAS inhibition.
- Project 2: Reviewed the epigenomic markers that drive chordoma progression and recurrence, identifying potential avenues for therapeutic development.
- Project 3: Used R to identify the pathways and mechanisms that are involved in regulating thermal therapy induced radiosensitivity within metastatic breast cancer.
- Project 4: Discovered docetaxel radiosensitizes castration resistant prostate cancer *in vitro* by decreasing CAV-1 expression in a dose-dependent manner.

University of Maryland, Dept. of Teaching and Learning, Policy and Leadership *College Park, MD*
 Research Assistant; Advisor: Dr. Daniel Levin December 2020 - May 2023

- Project 1: Measured the efficacy of multiple novel active learning applications to limit misconceptions and promote student outcomes within student-initiated courses.
- Project 2: Studied the origin of students' explanations of scientific and mathematical phenomena in regard to the epistemology of their respective fields.

University of Maryland, Dept. of Cell Biology & Molecular Genetics *College Park, MD*
 Research Assistant; Advisor: Prof. Jonathan Dinman August 2019 - January 2021

- Project 1: Investigated the effect of the JAK2 V617F mutation's ablation of a programmed -1 ribosomal frameshift signal, resulting in JAK2 overexpression and subsequent myeloproliferative neoplasms transformation.
- Project 2: Examined termination codon readthrough within four alphaviruses in promoting viral pathogenesis to determine potential targets for small molecule inhibitors.

Johns Hopkins University, Research Assistant *Baltimore, MD*
 Research Intern; Advisor: Dr. Tong Li June 2016 - July 2019

- Project 1: Developed a transgenic Alzheimer's disease mouse model that accurately replicates sex differences and tau pathology.
- Project 2: Dissected the role of the mTOR pathway in Alzheimer's disease sex differences.

Nonacademic positions

Sustainabli *January 2023 - Present*
 Founder and CEO

- A startup with the mission of decarbonizing research labs. Actively working with universities, biomedical/chemical companies, hospitals, and nonprofits to make their green lab efforts scalable.
- Inventing easy-to-deploy IoT devices that promote energy efficiency and safety in the laboratory environment.
- Impact to-date: reduced carbon emissions by 5.9 tCO₂e; saved \$14,172 in energy costs; decreased energy waste by 8.4 MWh.

Combating Overdoses in Rural Areas *June 2020 - May 2023*
 Founder and President

- A 501(c)(3) nonprofit providing free drug treatment and harm reduction to rural communities.
- Managed 8 chapters spanning 3 states, with ~150 members. Reached 4,000+ people with our educational modules, trained 1500+ in overdose response and naloxone administration, raised \$30,000, and testified to the Maryland Legislature to increase access to substance use treatment.
- Created the Maryland Harm Reduction Database, which contains 2000+ local, vetted harm reduction resources (~100 users/month)

The Hare Satirical Magazine
Founder and Editor in Chief

August 2019 - May 2023

- Obtain and manage an annual budget of \$20,000 through grants and donations, which goes towards publishing the print and maintaining the online versions of our magazine.
- Manage a staff of ~30 to write and publish articles, run social media, and acquire funding.

National Rural Health Association
Health Policy Intern

May 2021 - August 2021

- Drafted association position papers on the topics of rural substance use, behavioral health issues, and telehealth to be shared with congressional representatives.

Lean On Me College Park
Co-Founder and Training Coordinator

January 2020 - August 2021

- An anonymous, peer-to-peer emotional support text line for UMD students.
- Worked with the university counseling center to develop our training materials and personally trained over 70 supporters, who have taken 450+ conversations with fellow students.

Significant Honors and Awards

Churchill Scholarship	Fully funded MPhil at the University of Cambridge, awarded to 16 STEM student researchers in the US	2023
Andrew Reisse Endowed Teaching Award	Nominated and awarded based on an exemplary teaching record, enthusiasm for pedagogy, and positive impact.	2023
Amgen Scholarship	Funded by the Amgen Foundation to conduct biotechnology/drug discovery research at Duke University	2022
Barry M. Goldwater Scholarship	Recognizes top undergraduate STEM researchers in the US	2022
Departmental Diversity, Equity, Inclusion Award	For furthering DEI at the UMD and passing bills to protect and elevate LGBTQ+ students	2022
Out to Innovate Scholarship	Awarded for academic excellence and commitment to increasing visibility of LGBTQ+ scientists	2022
Governor's Service Award, Emerging Leader	Recognizes outstanding volunteerism, citizenship, and initiative within Maryland	2020
Banneker/Key Scholarship	Covers tuition and room/board at the UMD. Distinction of intellect and character as evidenced by academic leadership	2019

Administrative Service **Institutional Service**

University of Maryland Office of Sustainability
Green Labs Manager

January 2022 - May 2023

- Coordinating sustainability engagement programs within UMD STEM departments which, when scaled, will reduce UMD's annual carbon footprint by 1000 tons and lower costs by \$150,000.

UMD Student Government Association
CMNS Legislator

August 2021 - May 2022

- Passed bills to provide access to free overdose response trainings and naloxone to all 40,000 students in the university.
- Revitalized the 50 Queer Scientists Project at UMD to increase LGBTQ+ visibility in STEM.
- Obtained \$2,000 in funding to restart the university's Green Lab program.

UMD University Senate
CMNS Undergraduate Senator

August 2020 - May 2021

- Passed bill to change university's general education diversity requirement to include discussions of systemic and structural racism throughout history and across the world.
- Introduced bills to support summer housing for LGBT students with unsafe home situations.

National Service

International Institute for Sustainable Laboratories

December 2023- Present

Chair of the Ventilation Efficiency Working Subgroup

- Organizing an International Shut the Sash Competition to reduce energy waste in laboratories worldwide by up to 70%.

National Suicide Prevention and TREVOR Lifelines

August 2019 - May 2023

Crisis Counselor

- Taken over 1000+ calls.
- Diffused an in-person active suicide on the University of Maryland campus.

Journal of Young Investigators

January 2020 - May 2022

Quantitative Sciences Section Editor

- Reviewed ~12 papers/year related to quantitative chemistry and physics.
- Lead a team of 4 associate reviewers.

Teaching Service

Lecturing

BSCI238D: A Primer on Research Techniques in Molecular Biology

August 2020 - January 2023

- Created and taught a university-approved class on troubleshooting and the chemical basis of molecular biology research techniques through the Student Initiated Courses program.
- Taught ~125 students; the most highly rated instructor in the UMD Department of Biology on RateMyProfessors.com (5/5 across 40 reviews)
- Course framework and materials to be made publicly available and published in the Journal of College Science Teaching

Teaching Assistantship

BSCI410: Molecular Genetics

January 2023 - May 2023

- Graded weekly essays and exams and lead office hours for the course (200 students)

BSCI222: Principles of Genetics

January 2023 - May 2023

- Taught a discussion section (23 students) in an introductory genetics course, led exam review sessions and office hours for the course (230 students)

Mentorship

- 1 undergraduate at Cancer Research UK Cambridge Institute, meeting biweekly over a year.

Grant Support

Completed Grants

1/1/2022-12/31/2023

Sustainability Mini-Grant (PI, 40%)

"Revitalizing the University Green Labs Program"

University of Maryland Intramural Grant

Annual Direct Costs: \$2,000

Total Direct Costs: \$2,000

Patents, Inventions and Copyrights

1. FUME HOOD ENERGY USAGE OPTIMIZATION SYSTEM. Filed Oct 25, 2023. Application 18492875

Publications

* Indicates corresponding author; † indicates authors contributed equally

Peer-Reviewed Journal Articles

1. **Tu KJ**, Stewart CE, Williams NT, et al. Single-fraction Radiation Treatment Dose Response in a Genetically Engineered Mouse Model of Medulloblastoma. *Radiation Research*. 2023 Nov 22;200(6):587-592.
2. **Tu KJ**, Diplas B, Regal D, Waitkus M, Pirozzi C, Reitman Z. Mining Cancer Genomes for Gain-of-Metabolic-Function Mutations. *Communications Biology*. 2023 Nov 10;6(1):1143.
3. **Tu KJ**, Stewart C, Regal J, Kim S, Waitkus M, Reitman Z. Pooled genetic screens to identify vulnerabilities in TERT-promoter-mutant glioblastoma. *Oncogene*. 2023 Sep 23;42(44):3274-3286.
4. **Tu KJ**, Roy SK, Sawant A, Shukla H, Biswal N. Docetaxel sensitizes castration resistant prostate cancer cells to radiotherapy. *International Journal of Radiation Biology*. 2023 Sep 25;1-12.
5. **Tu KJ**, Wymore C, Tchangalova N, Fuller BM, Mohr NM. The impact of telehealth in sepsis care: A systematic review. *Journal of Telemedicine and Telecare*. 2023 Apr 24;1357633X2311700.
6. **Tu KJ***, Sun A, Levin D. Design and Outcomes of a Student-Initiated Course on Research Methodologies in Molecular Biology. *Journal for College Science Teaching*. 2023 Jan 24. In Press.
7. **Tu KJ*†**, Sun A†, Levin D. A Sweet Method of Modeling Restriction Endonuclease-Based Molecular Cloning. *The American Biology Teacher*. 2023 Jan 1;85(1):52–4.
8. Kim DW, **Tu KJ**, Wei A, Lau AJ, Gonzalez-Gil A, Cao T, et al. Amyloid-beta and tau pathologies act synergistically to induce novel disease stage-specific microglia subtypes. *Molecular Neurodegeneration*. 2022 Dec 17;17(1):83.
9. **Tu KJ*†**, Sun A†, Levin DM. Using memes to promote student engagement and classroom community during remote learning. *Biochem Molecular Bio Educ*. 2022 Dec 7;bmb.21700.
10. Roy S, Dukic T, Bhandary B, **Tu KJ**, Molitoris J, Ko YH, et al. 3-Bromopyruvate inhibits pancreatic tumor growth by stalling glycolysis, and dismantling mitochondria in a syngeneic mouse model. *American Journal of Cancer Research*. 2022 Nov 15;12(11):4977–87.
11. **Tu KJ**, Lee S, Roy S, Sawant A, Shukla H. Dysregulated Epigenetics of Chordoma: Prognostic Markers and Therapeutic Targets. *Current Cancer Drug Targets*. 2022 Sep;22(8):678–90.
12. **Tu KJ**, Levin D. Learning to Troubleshoot Experiments: Flipped Classrooms Activities for PCR and Western Blot. *The American Biology Teacher*. 2022 May 1;84(5):315–6.
13. Singh P, Eley J, Mahmood N, Bhandary B, Dukic T, **Tu KJ**, et al. Therapeutic Efficacy of Variable Biological Effectiveness of Proton Therapy in U-CH2 and MUG-Chor1 Human Chordoma Cell Death. *Cancers*. 2021 Dec 4;13(23):6115.

Submitted or In-Revision Peer-reviewed Journal Articles

1. **Tu KJ***, Vakkalanka P, Okoro U, Harland K, Wymore C, Fuller B, Campbell K, Swanson M, Parker E, Mack L, Bell A, DeJong K, Faine B, Zepeski A, Mueller K, Chrischilles E, Carpenter C, Jones M, Ward M, Mohr N. Provider-to-provider telemedicine for sepsis is used less frequently in communities with high social vulnerability. Submitted to *The Journal of Rural Health*.

Abstracts and/or Proceedings

1. **Tu KJ**, Wymore C, Tchangalova N, Fuller B, and Mohr NM. ‘Telehealth in Sepsis Care: A Scoping Review and Meta-Analysis’. *American Journal of Respiratory and Critical Care Medicine*, American Thoracic Society International Conference Abstracts, 1 May 2023, A3407–A3407.
2. **Tu KJ**, Diplas B, Regal D, Waitkus M, Pirozzi C, Reitman ZR. ‘A Bioinformatic Pipeline for Identifying Change-of-Metabolic-Function Cancer Mutations’. *Cancer Research* 83, no. 7_Supplement (4 April 2023): 3143–3143.
3. **Tu KJ**, Roy SK, Sawant A, and Shukla HD. ‘HIF1 α Is Involved in Radiation-Induced DNA Damage Repair and Anti-Apoptotic Pathways in Pancreatic Ductal Adenocarcinoma’. *Cancer Research* 83, no. 7_Supplement (4 April 2023): 4810–4810.
4. **Tu KJ**, Zhang H, Rodrigues D, Molitoris JK, Sawant A, and Shukla HD. ‘Gene Expression Profile Analysis of Hyperthermia-Induced Radiosensitivity in Breast Cancer’. *Cancer Research* 83, no. 7_Supplement (4 April 2023): 1104–1104.
5. Roy SK, Dukic T, Bhandary B, Acharya A, **Tu KJ**, Ko YH, and Shukla HD. ‘3-Bromopyruvate in Combination with Radiation Inhibits Pancreatic Cancer Growth by Dismantling Mitochondria and ATP Generation in a Preclinical Mouse Model’. *Cancer Research* 82, no. 12_Supplement (15 June 2022): 5243–5243.
6. **Tu KJ**, Roy SK, Bhandary B, Sawant A, and Shukla HD. ‘Loss of HIF1A Decreases Resistance to Radiation and Invasiveness in Pancreatic Ductal Adenocarcinoma’. *Cancer Research* 81, no. 22_Supplement (15 November 2021): PO-126-PO-126.
7. **Tu KJ**, Wei A, Lau A, Chen L, and Li T. Sex differences in tau pathological development in mouse models of Alzheimer’s Disease. *Society for Neuroscience*. (22 October 2019): 446.02

Major Invited Speeches

Local

1. **Tu KJ**, Distinguished Alumni Speech, University of Maryland, College Park, MD, 2023.

Proffered Communications

Local

2. **Tu KJ**, Wymore C, Tchangalova N, Fuller B, Mohr N. The use of consultative telemedicine on sepsis patient outcomes. Oral presentation, University of Iowa Department of Emergency Medicine Research Day, Iowa City, IA, April 2023.
3. **Tu KJ**, Reitman Z. Mechanisms of FLASH-RT in Pediatric Medulloblastoma. Oral Presentation, Amgen Scholar Conference, Durham, NC, July 2022.
4. **Tu KJ**, Roy S, Sawant A, Shukla H. HIF1A acts as a molecular switch to promote radioresistance and aggression in pancreatic ductal adenocarcinoma. Oral Presentation, University of Maryland Department of Radiation Oncology Research Day, Baltimore, MD, March 2022.
5. **Tu KJ**, Dinman J. The JAK2 V617F Mutation Disrupts a Frameshift Sequence That May Disrupt Gene Expression. Poster Presentation, University of Maryland Undergraduate Research Day, College Park, MD, April 2021.
6. **Tu KJ**, Li T. The mTOR Pathway is Associated with the Gender Difference in an Alzheimer's Disease Mouse Model. Oral presentation, Johns Hopkins Intern Research Day, Columbia, MD, April 2019.