Jared R. Mayers, MD, PhD

Research Fellow, Harvard Medical School
Research Fellow, Department of Chemistry and Chemical Biology, Harvard University
Associate Physician, Brigham and Women's Hospital
Boston, Massachusetts

89 Winthrop Rd #3, Brookline, MA 02445
(425) 941-7747
jared_mayers@hms.harvard.edu; jrmayers@gmail.com

RESEARCH & TEACHING INTERESTS

I am a Pulmonary Medicine board-certified physician-scientist with a PhD in Biology from the Massachusetts Institute of Technology and a MD from Harvard Medical School. My current research focuses on probing bacterial metabolism in the context of antimicrobial resistance-associated infections, using a combination of comparative metabolomics, genetics, biochemistry, and chemical biology. Integrating these approaches enables the identification and characterization of new enzymes and pathways that contribute to pathogenesis, generating fresh opportunities for therapeutic intervention. I have now started applying these tools to investigate the development of secondary pneumonias. Longer term, I am also interested in exploring metabolism in dysbiotic microbiomes relevant to pulmonary and critical care medicine, such as in the lung with idiopathic pulmonary fibrosis. In each phase of training, I have actively engaged in teaching opportunities and have experience working with undergraduates, medical students, and medical residents in both individual and classroom settings covering topics ranging from Introductory Biology to bedside medical procedures.

RESEARCH/POST-DOCTORAL EXPERIENCE

2021- **Postdoctoral Fellow in Chemistry and Chemical Biology,** Department of Chemistry and Chemical Biology and Howard Hughes Medical Institute, Harvard University, Cambridge, Massachusetts
Faculty Advisor: Emily P. Balskus, PhD, Professor
Project: Polyamine acetylation in antimicrobial resistance-associated infections reveals a target for antibiotic synergy

2019-2022 **Clinical Fellow in Pulmonary and Critical Care Medicine,** Department of Medicine, Brigham and Women's Hospital, Boston, Massachusetts

2017-2019 **Medical Intern and Resident,** Department of Medicine, Brigham and Women's Hospital, Boston, Massachusetts

EDUCATION

2017 **MD**, Harvard Medical School, Boston, Massachusetts

2015 **PhD in Biology**, Massachusetts Institute of Technology, Cambridge, Massachusetts
Faculty Advisor: Matthew G. Vander Heiden, MD, PhD, Professor
Thesis: Whole body metabolic alterations as an early event in *Kras*-driven cancers

2007 **BA in Biology**, Williams College, Williamstown, Massachusetts
Faculty Advisor: Steven J. Swoap, PhD, Professor
Thesis: Resveratrol fails to prevent the metabolic and fitness decline of *ob/ob* mice and actually hastens the deterioration of their overall health

PUBLICATIONS

First-Author Peer-Reviewed Research

1. Mehta RS*, **Mayers JR***, Zhang Y, Glasser NR, Bhosle A, Nguyen LH, Ma W, Bae S, Branck T, Ananthakrishnan AN, Franzosa EA, Balskus EP, Chan AT, Huttenhower C. (2023) Gut Microbial Metabolism of 5-ASA Diminishes Its Clinical Efficacy in Inflammatory Bowel Disease. *Nat Med,* 29(3):700-709
2. Olivares O*, **Mayers JR***, Gouirand V, Torrence ME, Gicquel T, Borge L, Lac S, Roques J, Lavaut MN, Berthezène P, Rubis M, Secq V, Garcia S, Moutardier V, Lombardo D, Iovanna JL, Tomasini R, Guillaumond F, Vander Heiden MG, Vasseur S. (2017) Collagen-derived proline promotes pancreatic ductal adenocarcinoma cell survival under nutrient limited conditions. *Nat Commun,* 8:16031
3. **Mayers JR***, Torrence ME*, Danai LV, Papagiannakopoulos T, Davidson SM, Lau AN, Bauer MR, Ji BW, Dixit PD, Hosios AM, Muir A, Chin CJ, Freinkman E, Wolpin BM, Vitkup D, Vander Heiden MG. (2016) Tissue-of-origin Dictates Branched-Chain Amino Acid Metabolism in Mutant *Kras*-driven Cancers. *Science,* 353: 1161-1165.
4. **Mayers JR***, Wu C*, Clish CB*, Kraft P, Torrence ME, Fiske BP, Yuan C, Bao Y, Townsend MK, Tworoger SS, Davidson SM, Papagiannakopoulos T, Yang A, Dayton TL, Ogino S, Stampfer MJ, Giovannucci EL, Qian ZR, Rubinson DA, Ma J, Sesso HD, Gaziano JM, Cochran BB, Liu S, Wactawski-Wende J, Manson JE, Pollak MN, Kimmelman AC, Souza A, Pierce K, Wang TJ, Gerszten RE, Fuchs CS, Vander Heiden MG, Wolpin BM. (2014) Elevated circulating branched chain amino acids are an early event in pancreatic adenocarcinoma development. *Nat Med,* 10: 1193-1198
5. **Mayers JR**, Iliff BW, Swoap SJ. (2009) Resveratrol treatment in mice does not elicit the bradycardia and hypothermia associated with calorie restriction. *FASEB J*, 23:1032-40
   (*equal contribution)

First-Author Reviews, Commentaries, Book Chapters

1. **Mayers JR** and Vander Heiden MG. (2022) Chapter 489: Metabolomics. In Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson J (Ed.). *Harrison's Principles of Internal Medicine, 21st Edition* (pp. 3831-3836). McGraw Hill.
2. **Mayers JR.** (2017) Metabolic markers as cancer clues. *Science,* 358: 1265
3. **Mayers JR** and Vander Heiden MG. (2017) Nature and Nurture: What determines metabolic phenotypes? *Cancer Res,* 77: 3131-3134
4. **Mayers JR** and Vander Heiden MG. (2015) Famine versus feast: Understanding the metabolism of tumors *in vivo. Trends Biochem Sci,* 40: 130-40
5. **Mayers JR** and Vander Heiden MG. (2013) BCAT1 defines gliomas by IDH status. *Nat Med,*19:816-7

Additional Published Research

1. Kosyakovsky LB, Somerset E, Rogers AJ, Sklar M, **Mayers JR**, Toma A, Szekely Y, Soussi S, Wang B, Fan CS, Baron RM, Lawler PR. (2022) Machine learning approaches to the human metabolome in sepsis identify metabolic links with survival. *Intensive Care Med Exp,* 10(1):24
2. Gouirand V, Gicquel T, Lien EC, Jaune-Pons E, Da Costa Q, Finetti P, Metay E, Duluc C, **Mayers JR,** Audebert S, Camoin L, Borge L, Rubis M, Leca J, Nigri J, Bertucci F, Dusetti N, Iovanna JL, Tomasini R, Bidaut G, Guillaumond F, Vander Heiden MG, Vasseur S. (2022) Ketogenic HMG-CoA lyase and its product b-hydroxybutyrate promote pancreatic cancer progression. *EMBO,* 41(9):e110466
3. Lau AN, Li Z, Danai LV, Westermark AM, Darnell AM, Ferreira R, Gocheva V, Sivanand S, Lien EC, Sapp KM, **Mayers JR,** Biffi G, Chin CR, Davidson SM, Tuveson SM, Tuveson DA, Jacks T, Matheson NJ, Yilmaz O, Vander Heiden MG. (2020) Dissecting cell type-specific metabolism in pancreatic ductal adenocarcinoma. *eLife,* 9:e56782
4. Eberly LA, Richterman A, Beckett AG, Wispelwey B, Marsh RH, …, **Mayers JR**, …, Zon R. Identification of Racial Inequities in Access to Specialized Inpatient Heart Failure Care at an Academic Medical Center. (2019) *Circ Heart Fail,* 12(11):e006214
5. McBrayer SK, **Mayers JR**, DiNatale GJ, Shi DD, Khanal J, Chakraborty AA, Sarosiek KA, Briggs KJ, Robbins AK, Sewastianik T, Shareef SJ, Olenchock BA, Parker SJ, Tateishi K, Spinelli JB, Islam M, Haigis MC, Looper RE, Ligon KL, Bernstein BE, Carrasco RD, Cahill DP, Asara JM, Metallo CM, Yennawar NH, Vander Heiden

MG, Kaelin WG. (2018) Direct Inhibition of BCAT by 2HG Impairs Glutamate Biosynthesis and Redox Homeostasis in Glioma. *Cell*, 175: 101-116

6. Danai LV, Babic A, Rosenthal MH, Dennstedt E, Muir A, Lien EC, **Mayers JR**, Tai K, Lau AN, Sali PJ, Prado CM, Petersen GM, Takahashi N, Sugimoto M, Yeh JJ, Lopez N, Bardeesy N, Fernandez-del Castillo C, Liss AS, Koong AC, Bui J, Yuan C, Welch MW, Brais LK, Kulke MH, Dennis C, Clish CB, Wolpin BM, Vander Heiden MG. (2018) Altered exocrine function can drive adipose wasting in early pancreatic cancer. *Nature,* 558: 600-604
7. Davidson SM, Jonas O, Keibler MA, Hou HW, Luengo A, **Mayers JR**, Wyckoff J, Del Rosario AM, Whitman M, Chin CR, Condon KJ, Lammers A, Kellersberger KA, Stall BK, Stephanopoulos G, Bar-Sagi D, Han J, Rabinowitz JD, Cima MJ, Langer R, Vander Heiden MG. (2017) Direct evidence for cancer cell-autonomous extracellular protein catabolism in pancreatic tumors. *Nat Med,* 2: 235-241
8. Yuan C, Clish CB, Wu C, **Mayers JR**, Kraft P, Townsend MK, Zhang M, Tworoger SS, Bao Y, Qian ZR, Rubinson DA, Ng K, Giovannucci EL, Ogino S, Stampfer MJ, Gaziano JM, Ma J, Sesso HD, Anderson GL, Cochrane BB, Manson JE, Torrence ME, Kimmelman AC, Amundadottir LT, Vander Heiden MG, Fuchs CS, Wolpin BM. (2016) Circulating Metabolites and Survival Among Patients With Pancreatic Cancer. *J Natl Cancer Inst,* 108:6
9. Fendt SM, Bell EL, Keibler MA, Olenchock BA, **Mayers JR**, Wasylenko TM, Vokes NI, Guarente L, Vander Heiden MG, Stephanopoulos G. (2013) Reductive glutamine metabolism is a function of the α-ketoglutarate to citrate ratio in cells. *Nat Commun,* 4:2236
10. Fendt SM, Bell EL, Keibler MA, Davidson SM, Wirth GJ, Fiske B, **Mayers JR**, Patnaik A, Bellinger G, Csibi A, Blenis J, Cantley LC, Guarente L, Pollak M, Olumi AF, Vander Heiden MG, Stephanopoulos G. (2013) Metformin decreases glucose oxidation and increases dependency of prostate cancer cells on reductive glutamine metabolism. *Cancer Res,* 73:1-10
11. Cao H, Sekiya M, Erikci M, Burak MF, **Mayers JR**, White A, Inouye K, Rickey LM, Ercal BC, Furuhashi M, Rimm E, Tuncman G, Hotamisligil GS. (2013) Adipocyte lipid chaperone aP2 is a secreted adipokine regulating hepatic glucose production. *Cell Metab,* 17:768-78
12. Erbay EE, Babaev VR, **Mayers JR**, Makowski L, Charles KN, Snitow ME, Fazio S, Wiest MM, Watkins SM, Linton MF, Hotamisligil GS. (2009) Reducing endoplasmic reticulum stress through a macrophage lipid chaperone alleviates atherosclerosis. *Nat Med,* 15:1383-139
13. Cao H, Gerhold K, **Mayers JR**, Wiest MM, Watkins SM, Hotamisligil GS. (2008) Identification of a lipokine, a lipid hormone linking adipose tissue to systemic metabolism. *Cell,* 134:933-44

PRESENTATIONS

Invited Lectures

1. Comparative metabolomics reveals polyamine acetylation as a target for antibiotic synergy in antimicrobial-resistant infections. Guest lecture, U19 CITADel meeting. Broad Institute, Cambridge, Massachusetts, 2023.
2. My career path and research. Science-in-Residency Program, Brigham and Women's Hospital, Boston, Massachusetts. 2023
3. A metabolic pipeline to identify novel diagnostic and therapeutic targets in antibiotic resistant infections. Work-in-progress, Brigham and Women's Hospital, Boston, Massachusetts. 2022.
4. Investigating bacterial metabolic activity in sepsis. Work-in-progress, Brigham and Women's Hospital, Boston, Massachusetts. 2022.
5. Metabolic Markers as Cancer Clues. *Science* and SciLife Prize Symposium, Stockholm, Sweden. 2017
6. Elevated branched chain amino acids are an early event in pancreatic adenocarcinoma. Broad Institute Cancer Program Meeting, Broad Institute, Cambridge, Massachusetts. 2014
7. Pancreatic cancer and altered whole body metabolism. MD-PhD and Leder Human Biology Grand Rounds, Harvard Medical School, Boston, Massachusetts. 2014

Conference Talks

1. Tissue-of-origin dictates the metabolic fate of branched chain amino acids in mutant *Kras*-driven cancers. American Association for Cancer Research Conference on Cancer and Metabolism, Bellevue, Washington. 2015

2. Amino acids and cancer metabolism. Koch Institute Annual Fall Retreat, North Falmouth, Massachusetts. 2014

Posters and abstracts

1. Development and validation of a metabolomic pipeline to identify novel diagnostic and therapeutic targets in antibiotic resistant bacterial infections. American Thoracic Society, Washington DC. 2023
2. Tissue-of-origin dictates the metabolic fate of branched chain amino acids in mutant *Kras*-driven cancers. American Association for Cancer Research Conference on Cancer and Metabolism, Bellevue, Washington. 2015
3. Elevated circulating branch chain amino acids are an early event in pancreatic adenocarcinoma development. Keystone Symposia Conference on Tumor Metabolism, Whistler, British Columbia. 2014.

TEACHING & ADVISING EXPERIENCE

Teaching Assistant

1. 7.016 Introductory Biology. Fall 2014, Massachusetts Institute of Technology. 40 students
2. 7.27 Principles of Human Disease. Spring 2013, Massachusetts Institute of Technology. 35 students

Guest lecturer

1. Introduction to clinical research. Balskus laboratory teaching meeting, Harvard University, Cambridge, Massachusetts. 2022
2. Emerging insight into the lung microbiome. Pulmonary Grand Rounds, Brigham and Women's Hospital, Boston, Massachusetts. 2021
3. Metabolomics: Practical considerations and applications. Pulmonary Grand Rounds, Brigham and Women's Hospital, Boston, Massachusetts. 2020.

Undergraduate Research Mentorship

1. Franziska Lichtenauer. Harvard University. 2022-
2. Margaret Torrence. Massachusetts Institute of Technology. 2012-2015
3. Gabriel Gihana. Massachusetts Institute of Technology. MIT Summer Research Program. 2012

Career Panelist

1. Life of a Post-Doc/Research Fellow. Amgen Scholars Program. July 27, 2022

FELLOWSHIPS, AWARDS & CERTIFICATIONS

Fellowships

1. T32 Research Fellow. Integrate Training in Respiratory Research. NIH-NHLBI. 2021-2024.
2. Ruth L. Kirschstein National Research Service Awards for Individual Predoctoral MD/PhD Fellows (F30). Investigating branched chain amino acids in pancreatic cancer. NIH-NCI. 2014-2017.

Academic Recognition

1. Category Winner in Translational Medicine, *Science* and SciLife Lab Prize, Stockholm, Sweden. 2017
2. James Tolbert Shipley Prize, Harvard Medical School, Boston, Massachusetts. 2017
3. Martha Gray Prize in Physiology and Systems Biology, Harvard HST Program, Boston, Massachusetts, 2014
4. Honorable Mention, Graduate Student Teaching Award, Massachusetts Institute of Technology, Cambridge, Massachusetts, 2013
5. Magna cum laude, Williams College, Williamstown, Massachusetts. 2007
6. James Bronson Conant and Nathan Russell Harrington Class of 1983 Prize in Biology, Williams College, Williamstown, Massachusetts. 2007
7. Sigma Xi, Williams College, Williamstown, Massachusetts. 2007
8. Phi Beta Kappa, Williams College, Williamstown, Massachusetts. 2006

Travel awards
1. Marlena Felter Bradford Research Travel Fellowship, Koch Institute, Cambridge, MA. 2014.

Medical Certifications
1. ABIM Board Certified in Pulmonary Medicine. 2022-
2. ABIM Board Certified in Internal Medicine. 2020-
3. Massachusetts State Medical License. 2019-
4. Massachusetts State Medical License (limited). 2017-2019

PROFESSIONAL SERVICE

Committee Experience
1. Faculty Reviewer, Harvard College Research Program. 2022-
2. Resident Co-Leader, Brigham and Women's Hospital-Harvard Medical School MD-PhD Grand Rounds. 2018-2019
3. Resident member of Education Working Group, Brigham Health Sepsis Task Force. 2018-2019
4. Student subcommittee member, Harvard-MIT HST-MD Admissions Committee. 2012-2014

Ad-Hoc Reviewer
1. Journal of Experimental Medicine. 2019
2. Cancer and Metabolism. 2022-

Educational Outreach
1. Activity design and co-teacher. Science Solstice. Driscoll Elementary School. Brookline, Massachusetts. Dec 16, 2022.
2. Co-head coach. Driscoll Dragons Robotics. FIRST Lego League Challenge. 2022.

Professional memberships
1. American Thoracic Society. 2022-