



Stanford Bio-X Fellows Symposium Poster Session

September 28, 2023

Posters are alphabetized by the last name of the presenter.

Presenters' names are listed in bold.

POSTER #	TITLE	AUTHORS
1	Systemic Immune Modulation Through Cell-Free Circular RNA Uptake	Laura Amaya ^{1,2} , Lilit Grigoryan ³ , Brian Abe ^{2,4} , Jie Liu ^{1,5} , Feifei Zhao ^{1,5} , Audrey Lee ³ , Robert Chen ² , Rui Li ² , Zhijian Li ⁶ , Paul A. Wender ⁶ , Roarke A. Kamber ⁷ , Michael C. Bassik ⁷ , Ravindra Majeti ^{1,5} , Bali Pulendran ³ , Howard Chang ^{2,8} Institute for Stem Cell Biology & Regenerative Medicine ¹ , Center for Personal Dynamic Regulomes ² , Institute for Immunity, Transplantation & Infection ³ , Divisions of Hematology ⁴ and Immunology & Rheumatology ⁵ , Departments of Chemistry ⁶ and Genetics ⁷ , and Howard Hughes Medical Institute ⁸ , Stanford University
2	Dancing Mesenchymal Stem Cells Enhance 3D Chondrogenesis via Early-Stage Cytoskeletal and Nuclear Mechanosensing	Manish Ayushman ¹ , Xinming Tong ² , Pam Cai ³ , Ashby Morrison ⁴ , Andrew Spakowitz ³ , Sarah Heilshorn ⁵ , Fan Yang ^{1,2} Departments of Bioengineering ¹ , Orthopaedic Surgery ² , Chemical Engineering ³ , Biology ⁴ , and Materials Science & Engineering ⁵ , Stanford University
3	Advancing Islet Transplantation for Autoimmune Diabetes Through Bone Marrow Chimerism	Preksha Bhagchandani ¹ , Stephan Ramos ¹ , Charles Chang ¹ , Bianca Rodriguez ¹ , Jessica Poyser ² , Brenda J. Velasco ² , Hye-Sook Kwon ² , Weichen Zhao ¹ , Richard Rodriguez ¹ , Xueying Gu ¹ , Mario A. Miranda ¹ , Diego Burgos ¹ , Shiva Pathak ² , Everett Meyer ² , Judith Shizuru ² , Seung K. Kim ¹ Departments of Developmental Biology ¹ and Medicine (Blood & Marrow Transplantation) ² , Stanford University
4	Identification and Inhibition of a Cyclin D Docking Domain that Drives Cell Division	Cecelia Brown Fleming ¹ , Benjamin R. Topacio ² , Mardo Kõivomägi ³ , Jan M. Skotheim ^{1,4} Department of Biology ¹ , Stanford University; Department of Chemistry & Biochemistry ² , University of California Santa Cruz; Laboratory of Biochemistry & Molecular Biology ³ , National Institutes of Health; Chan Zuckerberg Biohub ⁴
5	Cell-Laden Collagen Hydrogels Covalently Crosslinked by Bio-Orthogonal Click Chemistry for Corneal Tissue Engineering	Lucia G. Brunel ¹ , Sarah M. Hull ¹ , Patrik K. Johansson ² , David Myung ³ , Sarah C. Heilshorn ² Departments of Chemical Engineering ¹ , Materials Science & Engineering ² , and Ophthalmology ³ , Stanford University
6	Topological Damping in Ultrafast Giant Cell	Ray Chang ¹ , Manu Prakash ^{1,2} Department of Bioengineering ¹ and Woods Institute for the Environment ² , Stanford University
7	Deep Learning-Based Limited Angle Tomography for a 1-millimeter Resolution Dual-Panel Clinical PET System	Myungheon Chin ^{1,2} , Garry Chinn ² , Mojtaba Jafaritadi ² , Derek Innes ² , Muhammad Nasir Ullah ² , Craig S. Levin ^{1,2,3,4} Departments of Electrical Engineering ¹ , Radiology ² , Bioengineering ³ , and Physics ⁴ , Stanford University
8	TRACeR: A General Platform for Antigen-Focused MHC Targeting	Haotian Du ¹ , Po-Ssu Huang ² Departments of Chemistry ¹ and Bioengineering ² , Stanford University
9	Optical-Based Wireless Multi-Electrode Array	Yi-Shiou Duh ^{1,5} , Hongquan Li ^{3,4} , Ching-Ting Tsai ² , Viktoryia Shautsova ^{1,2} , Siddharth Doshi ¹ , Martin Hrton ¹ , Yuecheng Zhou ² , Yang Yang ² , Erica Liu ^{1,2} , Nicholas Melosh ¹ , Manu Prakash ⁴ , Bianxiao Cui ² , Mark Brongersma ¹

		Departments of Materials Science & Engineering ¹ , Chemistry ² , Electrical Engineering ³ , Bioengineering ⁴ , and Physics ⁵ , Stanford University
10	Ultrasensitive Indicators for Unraveling Neuronal Voltage Dynamics Across Scales	Yukun Alex Hao ^{1,2} , Sungmoo Lee ² , Zhaoyang Li ¹ , Tom R. Clandinin ² , Michael Z. Lin ¹ Departments of Bioengineering ¹ and Neurobiology ² , Stanford University
11	Molecular-Weight-Driven Partitioning in Polyelectrolyte Condensates	Jacob Horne ¹ , Kayla P. Barker ² , Junzhe Lou ^{3,4} , Jian Qin ¹ , Yan Xia ² Departments of Chemical Engineering ¹ and Chemistry ² , Stanford University; John A. Paulson School of Engineering & Applied Sciences ³ and Wyss Institute for Biologically Inspired Engineering ⁴ , Harvard University
12	Engineering Charge-Altering Releasable Transporters for Intradermal RNA Vaccine Applications	Yuan Jia ¹ , Summer Ramsay-Burrough ¹ , Yue Xu ^{2,3} , Netra U. Rajesh ⁴ , Madison M. Driskill ² , Joseph M. DeSimone ^{2,3} , Robert M. Waymouth ¹ Departments of Chemistry ¹ , Chemical Engineering ² , Radiology ³ , and Bioengineering ⁴ , Stanford University
13	Inferring Absolute Developmental Potential from Single Cells	Minji Kang ^{1,2,3} , Jose Juan Almagro Armenteros ^{1,2} , Michael Wu ⁴ , Gunsagar S. Gulati ⁵ , Rachel Gleyzer ^{1,2} , James Zou ² , Aaron M. Newman ^{1,2,6} Institute for Stem Cell Biology & Regenerative Medicine ¹ , Departments of Biomedical Data Science ² , Computer Science ³ , and Chemistry ⁴ , and Stanford Cancer Institute ⁶ , Stanford University; Brigham and Women's Hospital ⁵
14	Metabolomic Rearrangement Controls the Intrinsic Microbial Response to Temperature Changes	Benjamin D. Knapp ¹ , Lisa Willis ² , Carlos Gonzalez ³ , Harsh Vashistha ⁴ , Joanna Jammal Touma ⁴ , Mikhail Tikhonov ⁵ , Jeffrey Ram ⁶ , Hanna Salman ⁴ , Josh E. Elias ⁷ , Kerwyn Casey Huang ^{1,2,7,8} Biophysics Program ¹ and Departments of Bioengineering ² , Chemical & Systems Biology ³ , and Microbiology & Immunology ⁸ , Stanford University; Department of Physics & Astronomy ⁴ , University of Pittsburgh; Department of Physics ⁵ , Washington University in St. Louis; Department of Physiology ⁶ , Wayne State University; Chan Zuckerberg Biohub ⁷
15	RNA Plumbing: Beyond Modeling Ordered Waters in RNA Machines	Rachael C. Kretsch ¹ , Shanshan Li ² , Grigore Pintilie ³ , Michael Z. Palo ⁴ , David A. Case ⁵ , Rhiju Das ^{1,6,7} , Kaiming Zhang ² , Wah Chiu ^{1,3,8,9} Biophysics Program ¹ , Departments of Bioengineering (and James H. Clark Center) ³ , Structural Biology ⁴ , Biochemistry ⁶ , and Microbiology & Immunology ⁸ , and Howard Hughes Medical Institute ⁷ , Stanford University; Department of Urology, The First Affiliated Hospital of USTC, MOE Key Laboratory for Cellular Dynamics, Center for Advanced Interdisciplinary Science & Biomedicine of IHM, Division of Life Sciences & Medicine ² , University of Science & Technology of China; Department of Chemistry & Chemical Biology ⁵ , Rutgers University; Division of CryoEM & Bioimaging, SSRL ⁹ , SLAC National Accelerator Laboratory
16	N-Lactoyl Phenylalanine as a Molecular Transducer of Physical Activity	Veronica L. Li ^{1,2,3,6} , Yang He ⁴ , Kévin Contrepois ⁵ , Hailan Liu ⁴ , Michael P. Snyder ⁵ , Yong Xu ⁴ , Jonathan Z. Long ^{1,3} Departments of Pathology ¹ , Chemistry ² , and Genetics ⁵ , Sarafan ChEM-H ³ , and Stanford Bio-X ⁶ , Stanford University; Children's Nutrition Research Center, Department of Pediatrics ⁴ , Baylor College of Medicine
17	Optical Detection of Cellular Action Potentials Using Electrochromic Materials	Erica Liu ¹ , Yuecheng Zhou ¹ , Yang Yang ¹ , Felix S. Alfonso ¹ , Burhan Ahmed ² , Kenneth Nakasone ² , Csaba Forró ¹ , Holger Müller ^{2,3} , Bianxiao Cui ¹ Department of Chemistry ¹ , Stanford University; Department of Physics ² , University of California

		Berkeley; Molecular Biophysics & Integrated Bioimaging ³ , Lawrence Berkeley National Lab
18	Dynamics of Bacterial Recombination in the Human Gut Microbiome	Zhiru Liu ¹ , Benjamin H. Good ^{1,2,3} Departments of Applied Physics ¹ and Biology ² , Stanford University; Chan Zuckerberg Biohub ³
19	Cell-Specific Mapping of Lipid Accumulation in Alzheimer's Disease	Christopher Long ¹ , Patrik Johansson ¹ , Michael Haney ² , Christy Munson ² , Tony Wyss-Coray ² , Annika Enejder ¹ , Sarah Heilshorn ¹ Departments of Materials Science & Engineering ¹ and Neurology & Neurological Sciences ² , Stanford University
20	Pilot Study: Knee-Ankle Exoskeleton Assistance Reduces Muscle Contributions to Knee Joint Loading	Delaney Miller ¹ , Scott Delp ^{1,2,3} , Steve Collins ¹ Departments of Mechanical Engineering ¹ , Bioengineering ² , and Orthopaedic Surgery ³ , Stanford University
21	Design and Implementation of Small Molecule Tools to Study Chloride Channels in the Central Nervous System	Steven Miller ¹ , Alex Powers ² , John Huguenard ³ , Ron Dror ² , Merritt Maduke ⁴ , Justin Du Bois ¹ Departments of Chemistry ¹ , Computer Science ² , Neurology & Neurological Sciences ³ , and Molecular & Cellular Physiology ⁴ , Stanford University
22	<i>De novo</i> Distillation of Thermodynamic Affinity from Deep Learning Regulatory Sequence Models of <i>in vivo</i> Protein-DNA Binding	Amr Mohamed Alexandari ¹ , Connor A. Horton ² , Avanti Shrikumar ³ , Nilay Shah ⁴ , Eileen Li ² , Melanie Weiler ⁴ , Miles A. Pufall ⁵ , Julia Zeitlinger ^{4,6} , Polly M. Fordyce ^{2,7,8,9} , Anshul Kundaje ^{1,2} Departments of Computer Science ¹ , Genetics ² , Earth System Science ³ , and Bioengineering ⁷ and Sarafan ChEM-H ⁸ , Stanford University; Stowers Institute for Medical Research ⁴ ; Department of Biochemistry, Carver College of Medicine ⁵ , University of Iowa; The University of Kansas Medical Center ⁶ ; Chan Zuckerberg Biohub ⁹
23	The Triggering Receptor Expressed on Myeloid Cells-1 (TREM1) in the Acute-to-Chronic Pain Transition After Injury	Gabriella P. B. Muwanga ^{1,2} , Akila Ram ¹ , Caldwell Bridges ¹ , Leela Mahajan ¹ , Samantha Reyes ³ , Mausam Kalita ³ , Renesmee Chenting Kuo ³ , Carmen Azevedo ³ , Sydney Clara Nagy ³ , Michelle L. James ³ , Vivianne L. Tawfik ¹ Departments of Anesthesiology, Perioperative & Pain Medicine ¹ and Neurology & Neurological Sciences ³ and Neurosciences Graduate Program ² , Stanford University
24	Development of Deep-Learning Guided Mutational Scans to Allow Fast Mapping of Sequence to Function	AkshatKumar Nigam ^{1,2} , Raeline Valbuena ^{1,2} , Michael Bassik ^{1,2} , Anshul Kundaje ^{1,2} Departments of Computer Science ¹ and Genetics ² , Stanford University
25	Eccentric Nordic Hamstring Exercise Induces Nonuniform Muscle Hypertrophy in Different Regions	Anoosha Pai S ¹ , Max H. Andrews ^{1,2} , Reed D. Gurchiek ¹ , Patricio A. Pincheira ^{2,3} , Scott L. Delp ¹ , Glen A. Lichtwark ² , Valentina Mazzoli ⁴ , Akshay S. Chaudhari ⁴ Departments of Bioengineering ¹ and Radiology ⁴ , Stanford University; School of Human Movement & Nutrition Sciences ² and School of Health & Rehabilitation Sciences ³ , The University of Queensland
26	ChromBPNet: Bias Factorized, Base-Resolution Deep Learning Models of Chromatin Accessibility Reveal Cis-regulatory Sequence Syntax, Transcription Factor Footprints and Regulatory Variants	Anusri Pampari ^{1*} , Anna Shcherbina ^{2*} , Anshul Kundaje ^{1,2,3} (*equal contribution) Departments of Computer Science ¹ and Genetics ³ and Division of Biological Data Science ² , Stanford University
27	Systems Immunology of Transcriptional Responses to Multiple Viruses Identifies Conserved Antiviral Pathway Dynamics In Macaques and Humans	Kalani Ratnasiri ^{1,2} , Hong Zheng ^{4,5} , Jiaying Toh ^{1,3,4,5} , Zhiyuan Yao ⁶ , Veronica Duran ⁶ , Michele Donato ^{3,4} , Mario Roederer ⁷ , Megha Kamath ⁷ , John-Paul M. Todd ⁷ , Matthew Gagne ⁷ , Kathryn E. Foulds ⁷ , Joseph R. Francica ⁷ , Kizzmekia S. Corbett ⁷ , Daniel C. Douek ⁷ , Robert A. Seder ⁷ , Shirit Einav ^{6,8,9} , Catherine A. Blish ^{1,8,9,10*} , Purvesh Khatri ^{3,4,5*} (*corresponding author) Stanford Immunology Program ¹ , Departments of Epidemiology & Population Health ² , Surgery (Division of Abdominal Transplantation) ³ ,

		Medicine ⁸ (Center for Biomedical Informatics Research) ⁴ , and Microbiology & Immunology ⁶ , Institute for Immunity, Transplantation & Infection ⁵ , and Medical Scientist Training Program ¹⁰ , Stanford University; Vaccine Research Center, National Institute of Allergy & Infectious Diseases ⁷ , National Institutes of Health; Chan Zuckerberg Biohub ⁹
28	Using <i>C. elegans</i> to Identify GPCRs Involved in Detecting Valproic Acid, an Anticonvulsant and Mood-Stabilizing Drug	Lucero E. Rogel-Hernandez ¹ , Emily Fryer ¹ , Sue Rhee ² , Miriam B. Goodman ¹ Department of Molecular & Cellular Physiology ¹ , Stanford University; Department of Plant Biology ² , Carnegie Institution for Science
29	Theoretical Calculation and Experimental Demonstration of Differential Heating for Conductive Nanoparticles in Lossy Biological Media Under Radio Frequency Irradiation	Nicholas J. Rommelfanger ^{1,4,5} , Kenneth Brinson Jr. ^{2,4} , Zihao Ou ^{2,4} , John E. Bailey ^{2,3,4} , Analiese M. Bancroft ^{2,4} , Carl H.C. Keck ^{2,4} , Guosong Hong ^{2,4} Departments of Applied Physics ¹ , Materials Science & Engineering ² , Electrical Engineering ³ , Wu Tsai Neurosciences Institute ⁴ , and Stanford Bio-X ⁵ , Stanford University
30	Optical Coagulation for 3D Bioprinting	Joshua Sampson ¹ , Elisa Marani ¹ , Zhe Ji ² , Arnold Langat ¹ , Abi Archer ¹ , Steve Boxer ² , Mark Skylar-Scott ¹ Departments of Bioengineering ¹ and Chemistry ² , Stanford University
31	Cerebrovascular Glycocalyx Degeneration Promotes Blood-Brain Barrier Dysfunction in Aging and Disease	Sophia M. Shi ^{1,2} , Ryan J. Suh ² , D. Judy Shon ¹ , Francisco J. Garcia ³ , Nannan Lu ² , Myriam Heiman ³ , Carolyn R. Bertozzi ^{1*} , Tony Wyss-Coray ^{2*} (*corresponding author) Departments of Chemistry ¹ and Neurology & Neurological Sciences ² , Stanford University; Picower Institute for Learning & Memory, Department of Brain & Cognitive Sciences ³ , Massachusetts Institute of Technology
32	Rapid 3D Bioprinting of Multimaterial Trileaflet Heart Valve	Fredrik Samdal Solberg ¹ , Allison Zhang ² , Mark Skylar-Scott ² Departments of Mechanical Engineering ¹ and Bioengineering ² , Stanford University
33	Simulating Muscle-Level Energetic Cost Savings When Humans Run with a Passive Assistive Device	Jon P. Stingel ¹ , Jennifer L. Hicks ² , Scott D. Uhlich ² , Scott L. Delp ^{1,2,3} Departments of Mechanical Engineering ¹ , Bioengineering ² , and Orthopaedic Surgery ³ , Stanford University
34	MreB Mechanically Couples the Cytoplasmic Membrane to the Cell Wall in <i>Escherichia coli</i>	Jiawei Sun ¹ , Kerwyn Casey Huang ¹ Department of Bioengineering ¹ , Stanford University
35	High-Throughput Measurements of Direct Activation Domain-Coactivator Interactions	Nicole DelRosso ^{1*} , Peter Suzuki ^{2*} , Daniel Griffith ^{4,5,6} , Alex Holehouse ^{4,5,6} , Lacramioara Bintu ^{1,2*} , Polly Fordyce ^{1,2,3*} (*equal contribution) Biophysics Program ¹ and Departments of Bioengineering ² and Genetics ³ , Stanford University; Computational & Systems Biology Program ⁴ , Department of Biochemistry & Molecular Biophysics ⁵ , and Center for Science & Engineering of Living Systems ⁶ , Washington University in St. Louis
36	Molecular-Scale Decryption of Transcriptional Repressor Domains from Deep Mutational Scanning Data	Raeline Valbuena ^{1*} , AkshatKumar Nigam ^{2*} , Josh Tycko ¹ , Kaitlyn Spees ¹ , Aradhana ¹ , Sophia Arana ¹ , Lacramioara Bintu ³ , Anshul Kundaje ^{1,2} , Michael Bassik ¹ (*co-first authors) Departments of Genetics ¹ , Computer Science ² , and Bioengineering ³ , Stanford University
37	Biophysical Model of Retinal Responses to Multi-Electrode Stimulation	Ramandeep Vilku ¹ , Praful Vasireddy ¹ , A.J. Phillips ¹ , Alex Gogliettino ² , Pawel Hottowy ³ , Wladyslaw Dabrowski ³ , Alexander Sher ⁴ , Alan Litke ⁴ , Subhasish Mitra ¹ , E.J. Chichilnisky ² Departments of Electrical Engineering ¹ and Neurosurgery ² , Stanford University; AGH University of Science & Technology ³ ; University of California Santa Cruz ⁴

38	Engineering Bone ECM-Derived Microribbon Scaffolds for Immunomodulation and Bone Regeneration	Cassandra Villicana ¹ , Ni Su ² , Andrew Yang ¹ , Fan Yang ^{1,2} Departments of Bioengineering ¹ and Orthopaedic Surgery ² , Stanford University
39	Interpreting the Cortical Neural Code for Naturalistic Virtual Reality	Javier C. Weddington ¹ , Joshua Melander ¹ , Stephen A. Baccus ^{1,2} Neurosciences Interdepartmental Program ¹ and Department of Neurobiology ² , Stanford University
40	A Low-Cost Multimaterial 3D Bioprinter	Jonathan Weiss ¹ , Alana Mermin-Bunnell ¹ , Mark Skylar-Scott ¹ Department of Bioengineering ¹ , Stanford University
41	Mapping COVID-19 Initiation in the Human Lung: Noncanonical Macrophages, Receptors, and Host Response	Timothy T.H. Wu ^{1,4} , Kyle Travaglini ^{1,4} Arjun Rustagi ² , Duo Xu ¹ , Leonid Andronov ³ , W. E. Moerner ³ , Peter S. Kim ¹ , Catherine A. Blish ² , Mark A. Krasnow ^{1,4} Departments of Biochemistry ¹ , Medicine ² , and Chemistry ³ , Stanford University; Howard Hughes Medical Institute ⁴
42	Kinase-Modulated Bioluminescent Indicators Enable Noninvasive Imaging of Drug Activity in the Brain	Yan Wu ^{1,5*} , Joel R. Walker ⁴ , Michael Westberg ² , Lin Ning ² , Michelle Monje ³ , Thomas A. Kirkland ⁴ , Michael Z. Lin ^{1,2} , Yichi Su ^{2,5*} (*equal contribution) Departments of Bioengineering ¹ , Neurobiology ² , Neurology & Neurological Sciences ³ , Stanford University; Promega Biosciences LLC ⁴
43	Wired-OR Analog-to-digital Compression Tradeoffs for Artificial Retina	Pumiao Yan ¹ , Nishal P. Shah ^{1,2} , Arash Akhouni ⁴ , Pulkit Tandon ¹ , Dante G. Muratore ⁴ , E.J. Chichilnisky ^{2,3,5} , Boris Murmann ¹ Departments of Electrical Engineering ¹ , Neurosurgery ² , and Ophthalmology ³ and Hansen Experimental Physics Laboratory ⁵ , Stanford University; Department of Microelectronics ⁴ , Delft University of Technology
44	Genetically Encoded Lysosomal Targeting Chimeras	Jonathan Yang ¹ , Sean Hunter ² , Louai Labanieh ² , David Roberts ¹ , Brendan Floyd ¹ , Crystal Mackall ² , Alice Ting ³ , Carolyn Bertozzi ¹ Departments of Chemistry ¹ and Genetics ³ and School of Medicine ² , Stanford University
45	Disease Diagnostics Using Machine Learning of Immune Receptors	Maxim E. Zaslavsky ¹ , Erin Craig ² , Jackson K. Michuda ² , Nikhil Ram-Mohan ³ , Ji-Yeun Lee ⁴ , Khoa D. Nguyen ⁴ , Ramona A. Hoh ⁴ , Tho D. Pham ^{4,5} , Ella S. Parsons ⁶ , Susan R. Macwana ⁷ , Wade DeJager ⁷ , Krishna M. Roskin ^{8,9} , Charlotte Cunningham-Rundles ¹⁰ , M. Anthony Moody ^{11,12,13} , Barton F. Haynes ^{12,13,14} , Jason D. Goldman ^{15,16} , James R. Heath ^{17,18} , Imelda Balboni ¹⁹ , Paul J. Utz ²⁰ , Kari C. Nadeau ^{6,20} , Benjamin A. Pinsky ^{4,20} , Catherine A. Blish ²⁰ , Joan T. Merrill ⁷ , Joel M. Guthridge ⁷ , Judith A. James ⁷ , Samuel Yang ³ , Robert Tibshirani ^{2,21} , Anshul Kundaje ^{1,22*} , Scott D. Boyd ^{4,6*} (*equal contribution) Departments of Computer Science ¹ , Biomedical Data Science ² , Emergency Medicine ³ , Pathology ⁴ , Pediatrics ¹⁹ , Medicine ²⁰ , Statistics ²¹ , and Genetics ²² and Sean N. Parker Center for Allergy & Asthma Research ⁶ , Stanford University; Stanford Blood Center ⁵ ; Department of Arthritis & Clinical Immunology ⁷ , Oklahoma Medical Research Foundation; Department of Pediatrics ⁸ , University of Cincinnati; Divisions of Biomedical Informatics & Immunobiology, Cincinnati Children's Hospital Medical Center ⁹ ; Icahn School of Medicine at Mount Sinai ¹⁰ ; Duke Human Vaccine Institute ¹² and Departments of Pediatrics ¹¹ , Immunology ¹³ , and Medicine ¹⁴ , Duke University; Swedish Center for Research & Innovation ¹⁵ , Swedish Medical Center; Division of Allergy & Infectious Diseases ¹⁶ and Department of Bioengineering ¹⁸ , University of Washington; Institute for Systems Biology ¹⁷