

## **Peter A. Sims, Ph.D.**

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### **Professional Appointments**

Associate Professor, Department of Systems Biology and Department of Biochemistry & Molecular Biophysics, Vagelos College of Physicians & Surgeons, Columbia University, 2020-present

Faculty Director, Columbia Single Cell Analysis Core, Department of Systems Biology, Vagelos College of Physicians & Surgeons, Columbia University, 2017-present

Director, Systems Biology Graduate Studies, Department of Systems Biology, Vagelos College of Physicians & Surgeons, Columbia University, 2016-present

Assistant Professor, Department of Systems Biology and Department of Biochemistry & Molecular Biophysics, Vagelos College of Physicians & Surgeons, Columbia University, 2012-2020

### **Education and Training**

Postdoctoral Fellow, Harvard University 2009-2011  
Cambridge, MA

Ph.D. Chemistry, Harvard University, 2009  
Cambridge, MA

A.M. Chemistry, Harvard University, 2006  
Cambridge, MA

B.S. Chemistry (*summa cum laude*), University of California San Diego, 2004  
La Jolla, CA

### **Awards and Honors**

Research Initiatives for Science and Engineering (RISE) Award, Columbia University, 2021  
Emerging Leader Award, The Mark Foundation for Cancer Research, 2018  
Research Initiatives for Science and Engineering (RISE) Award, Columbia University, 2014  
Cold Spring Harbor Asia Fellowship, 2011  
Biophysical Society Student Travel Award, 2008  
American Chemical Society Contributed Talk Award, 2007

Delegate to the Annual Meeting of Nobel Laureates in Lindau, U.S. Dept. of Energy, 2006  
Certificate of Distinction in Teaching, Harvard University, 2005, 2006  
National Science Foundation Graduate Research Fellowship, 2004-2007  
Joseph E. Mayer Award for Undergraduate Research, UCSD, 2004  
Teaching Assistant Excellence Award, UCSD, 2004  
*Phi Beta Kappa*, UCSD, 2003  
Barry M. Goldwater Scholarship, 2003-2004

## Funding

NIH/NIBIB K01 Career Development Award, PI, 2012-2017  
NIH Common Fund R21, Single Cell Analysis Program, PI, 2012-2014  
Simons Foundation, SFARI Explorer Award, PI, 2012-2013  
Irving Institute for Clinical and Translational Research, CaMPR-BASIC Award, Co-PI, 2013-2014  
Brain Tumor Ecology Collaborative Subaward, James S. McDonnell Foundation, Co-I, 2013-2015  
NHI/NCI U54 Physical Sciences Oncology Center, Co-I, 2015-2020  
NIH/NCI R33 Innovative Molecular Analysis Technologies Award, PI, 2016-2020  
NIH/NCI U54 Center for Cancer Systems Biology, Core Director, 2016-2021  
NIH/NIAID U19 Human Immunology Project Consortium, Core Director, 2016-2021  
NIH/NINDS R01 Research Project Grant, Co-PI, 2017-2022  
Chan Zuckerberg Initiative Human Cell Atlas Pilot Grant, PI, 2017-2018  
NIH/NIAID P01 Program Project Grant, Core Director, 2018-2023  
NIH/NIDDK P20 Developmental Center Grant, Co-PI, 2018-2020  
NIH/NHLBI U01 Immunobiology and alveolar physiology of the aging lung, Co-I, 2018-2022  
Mark Foundation Emerging Leader Award, PI, 2018-2021  
Chan Zuckerberg Initiative Seed Networks for the Human Cell Atlas, Co-PI, 2019-2022  
NIH/NCI R01 Cancer patient on a chip, Co-I, 2020-2025  
Aging Biology Foundation, Single-cell analysis of aging in lymphoid compartments, Co-PI, 2021-2024

## Publications

\* equal contribution; † co-corresponding author

1. Bayin, N.S., Mizrak, D., Stephen, D.N., Lao, Z., **Sims, P.A.**, Joyner, A.L. Injury-induced ASCL1 expression orchestrates a transitory cell state required for repair of the neonatal cerebellum. *Science Advances*, 7, 10.1126/sciadv.abj598 (2021).
2. Poon, M.M.L., Byington, E., Meng, W., Kubota, M., Matsumoto, R., Grifoni, A., Weiskopf, D., Dogra, P., Lam, N., Szabo, P.A., Ural, B.B., Wells, S.B., Rosenfeld, A.M., Brusko, M.A., Brusko, T.M., Connors, T.J., Sette, A., **Sims, P.A.**, Prak, E.T.L., Shen, Y., Farber, D.L. Heterogeneity of human anti-viral immunity shaped by virus, tissue, age, and sex. *Cell Reports*, 37, 110071 (2021).
3. Arrieta, V.A., Chen, A.X., Kane, J.R., Kang, S.J., Kassab, C., Dmello, C., Zhao, J., Burdett, K.B., Upadhyayula, P.S., Lee-Chang, C., Shilati, J., Jaishankar, D., Chen, L., Gould, A., Zhang, D., Yuan, J., Zhao, W., Ling, X., Burks, J.K., Laffleur, B., Amidei, C., Bruce, J.N., Lukas, R.V., Yamaguchi, J.T., Cieremans, D.,

- Rothschild, G., Basu, U., McCord, M., Brat, D.J., Zhang, H., Cooper, L.A.D, Zhang, B., **Sims, P.**, Cloughesy, T.F., Prins, R., Canoll, P., Stupp, R., Heimberger, A.B, Horbinski, C., Iwamoto, F.M.#, Rabadan, R.#, Sonabend, A.M.# ERK1/2 phosphorylation predicts survival following anti-PD-1 immunotherapy in recurrent glioblastoma. *Nature Cancer*, in press, (2021).
4. Kenchappa, R.S., Liu, Y., Argenziano, M.G., Banu, M.A., Mladek, A.C., West, R., Luu, A., Quinones-Hinojosa, A., Hambarzumyan, D., Justilien, V., Leitges, M., Sarkaria, J.N., **Sims, P.A.**, Canoll, P., Murray, N.R.†, Fields, A.P.†, Rosenfeld, S.S.† Protein kinase C<sub>1</sub> and SRC signaling define reciprocally related subgroups of glioblastoma with distinct therapeutic vulnerabilities, *Cell Reports*, 37, 110054 (2021).
  5. Capdevila, C., Trifas, M., Miller, J., Anderson, T., **Sims, P.A.**, Yan, K.S. Cellular origins and lineage relationships of the intestinal epithelium. *American Journal of Physiology: Gastrointestinal and Liver Physiology*, 321, G413 (2021).
  6. Chen, A.X., Gartrell, R.D., Zhao, J., Upadhyayula, P.S., Zhao, W., Yuan, J., Minns, H.E., Dovas, A., Bruce, J.N., Lasorella, A., Iavarone, A., Canoll, P., **Sims, P.A.**, Rabadan, R. Single-cell characterization of macrophages in glioblastoma reveals MARCO as a mesenchymal pro-tumor marker. *Genome Medicine*, 13, 88 (2021).
  7. Zhao, W.\*, Dovas, A.\*, Spinazzi, E.F.\*, Levitin, H.M., Banu, M.A., Upadhyayula, P., Sudhakar, T., Marie, T., Otten, M.L., Sisti, M., Bruce, J.N., Canoll, P.†, **Sims, P.A.** † Deconvolution of cell type-specific drug responses in human tumor tissue with single-cell RNA-seq. *Genome Medicine*, 13, 82 (2021).
  8. Affo, S., Nair, A., Brundu, F., Ravichandra, A., Bhattacharjee, S., Matsuda, M., Chin, L., Filliol, A., Wen, W., Song, X., Decker, A., Worley, J., Caviglia, J.M., Yu, L., Yin, D., Saito, Y., Savage, T., Wells, R.G., Mack, M., Zender, L., Arpaia, N., Remotti, H.E., Rabadan, R., **Sims, P.**, Leblond, A.-L., Weber, A., Riener, M.-O., Stockwell, B.R., Glaublumme, J., Llovet, J.M., Michalopoulos, G.K., Seki, E., Sia, D., Chen, X., Califano, A., Schwabe, R.F. Promotion of cholangiocarcinoma growth by diverse cancer-associated fibroblast subpopulations, *Cancer Cell*, 39, 866 (2021).
  9. Bhattacharjee, S., Hamberger, F., Ravichandra, A., Miller, M., Nair, A., Affo, S., Filliol, A., Chin, L., Savage, T.M., Yin, D., Wirsik, N.M., Mehal, A., Arpaia, N., Seki, E., Mack, M., Zhu, D., **Sims, P.A.**, Stanger, B.Z., Olive, K.P., Schmidt, T., Wells, R.G., Mederacke, I., Schwabe, R.F. Tumor restriction by type I collagen opposes tumor-promoting effects of cancer-associated fibroblasts. *Journal of Clinical Investigation*, 146987 (2021).
  10. Yun, T.J., Igarashi, S., Zhao, H., Perez, O.A., Pereira, M.R., Zorn, E., Shen, Y., Goodrum, F., Rahman, A., **Sims, P.A.**, Farber, D.L., Reizis, B. Human plasmacytoid dendritic cells mount a distinct antiviral response to virus-infected cells. *Science Immunology*, 6, eabc7302 (2021).
  11. Szabo, P.A.\* , Dogra, P.\* , Gray, J.I.\* , Wells, S.B.\* , Connors, T.J., Weisberg, S.P., Krupska, I., Matsumoto, R., Poon, M.M.L., Idzikowski, E., Morris, S., Pasin, C., Yates, A.J., Ku, A., Chait, M., Davis-Porada, J., Guo, X.V., Zhou, J., Steinle, M., Mackay, S., Saqi, A., Baldwin, M., **Sims, P.A.**, Farber, D.L. Longitudinal profiling of respiratory and systemic immune responses reveals myeloid cell-driven lung inflammation in severe COVID-19. *Immunity*, 54, 1 (2021).

12. Damaghi, M., West, J., Robertson-Tessi, M., Xu, L., Ferrall-Fairbanks, M.C., Stewart, P.A., Persi, E.A., Fridley, L.F., Altrock, P.M., Gatenby, R., **Sims, P.A.**, Anderson, A.R., Gillies, R.J. The harsh microenvironment in early breast cancer selects for a Warburg phenotype. *Proc. Natl. Acad. Sci USA*, 118, e2011342118 (2021).
13. Garofano, L., Migliozzi, S., Oh, Y.T., D'Angelo, F., Najac, R.D., Ko, A., Frangaj, B., Caruso, F.P., Yu, K., Yuan, J., Zhao, W., Di Stefano, A.L., Bielle, F., Jiang, T., **Sims, P.A.**, Suva, M.L., Tang, F., Su, X., Ceccarelli, M., Sanson, M., Lasorella, A., Iavarone, A. Pathway-based classification of glioblastoma uncovers a mitochondrial subtype with therapeutic vulnerabilities. *Nature Cancer*, 2, 141 (2021).
14. Liu, Z.\*, Yuan, J.\*, Lasorella, A., Iavarone, A., Bruce, J.N., Canoll, P., **Sims, P.A.** Integrating single-cell RNA-seq and imaging with SCOPE-seq2. *Scientific Reports*, 19482 (2020).
15. Arriaga, J.M., Panja, S., Alshalalfa, M., Zhao, J., Zou, M., Giacobbe, A., Madubata, C.J., Kim, J.Y., Rodriguez, A., Coleman, I., Virk, R.K., Hibshoosh, H., Ertunc, O., Ozbek, B., Fountain, J., Karnes, R.J., Luo, J., Antonarakis, E.S., Nelson, P.S., Feng, F.Y., Rubin, M.A., De Marzo, A.M., Rabadan, R., **Sims, P.A.**, Mitrofanova, A. †, Abate-Shen, C. † A MYC and RAS co-activation signature in localized prostate cancer drives bone metastasis and castration resistance. *Nature Cancer*, 1, 1082 (2020).
16. Caruso, F., Garofano, L., D'Angelo, F., Yu, K., Tang, F., Yuan, J., Zhang, J., Cerulo, L., Pagnotta, S.M., Bedognetti, D., **Sims, P.A.**, Suva, M., Su, X.D., Lasorella, A., Iavarone, A., Ceccarelli, M. A map of tumor-host interactions in glioma at single-cell resolution. *GigaScience*, g109 (2020).
17. Pan, H., Xue, C., Auerbach, B.J., Fan, J., Bashore, A.C., Cui, J., Yang, D.Y., Trignano, S.B., Liu, W., Shi, J., Ihuegbu, C.O., Bush, E.C., Worley, J., Vlahos, L., Laise, P., Solomon, R.A., Connolly, E.S., Califano, A., **Sims, P.A.**, Zhang, H., Li, M., Reilly, M.P. Single-cell genomics reveals a novel cell state during smooth muscle cell phenotypic switching and potential therapeutic targets for atherosclerosis in mouse and human. *Circulation*, 142, 2060 (2020).
18. Hobson, B.D., Kong, L., Hartwick, E.W., Gonzalez, R.L. Jr., **Sims, P.A.** Elongation inhibitors do not prevent release of puromycylated polypeptide chains from ribosomes. *eLife*, 9, e60048 (2020).
19. Capdevila, C., Calderon, R.I., Bush, E.C., Sheldon-Collins, K., **Sims, P.A.**, Yan, K.S. Single cell transcriptional profiling of the intestinal epithelium. *Methods in Molecular Biology*, 2171, 129 (2020).
20. Mizrak, D., Bayin, N.S., Yuan, J., Liu, Z., Siciu, R., Niphakis, M.J., Ngo, N., Lum, K.M., Cravatt, B.F., Joyner, A.L., **Sims, P.A.** Single-cell profiling and SCOPE-seq reveal the lineage dynamics of adult V-SVZ neurogenesis and NOTUM as a key regulator. *Cell Reports*, 31, 107805 (2020).
21. Martuscello, R.T., Kerridge, C.A., Chatterjee, D., Hartstone, W.G., Kuo, S.H., **Sims, P.A.**, Louis, E.D., Faust, P.L. Gene expression analysis of the cerebellar cortex in essential tremor. *Neuroscience Letters*, 721, 134540 (2020).
22. Szabo, P.A.\*, Levitin, H.M.\*, Miron, M., Snyder, M.E., Senda, T., Yuan, J., Cheng, Y.L., Bush, E.C., Dogra, P., Thapa, P., Farber, D.L.†, **Sims, P.A.**† Single-cell transcriptomics of human T cells reveals tissue and activation signatures in health and disease. *Nature Communications*, 10, 4706 (2019).

23. Sheth, R.U., Li, M., Jiang, W., **Sims, P.A.**, Leong, K.W., Wang, H.H. Spatial metagenomic characterization of microbial biogeography in the gut. *Nature Biotechnology*, 37, 877 (2019).
24. Louis, E.D.†, Kerridge, C.A., Chatterjee, D., Martuscello, R.T., Diaz, D.T., Koepfen, A.H., Kuo, S.H., Vonsattel, J.P.G., **Sims, P.A.**, Faust, P.L.† Contextualizing the pathology in the essential tremor cerebellar cortex: A pathology-omics approach. *Acta Neuropathologica*, 135, 859 (2019).
25. Ma, W., Lee, J., Backenroth, D., Zhou, Y.J., Bush, E., **Sims, P.**, Liu, K., Shen Y., Single cell RNA-Seq reveals pre-cDCs fate determined by transcription factor combinatorial dose. *BMC Molecular and Cell Biology*, 20, 20 (2019).
26. Farber, D.L.†, **Sims, P.A.**† Dissecting lung development and fibrosis at single-cell resolution. *Genome Medicine*, 11, 33 (2019).
27. Hobson, B.D.†, **Sims, P.A.**† Critical analysis of particle detection artifacts in synaptosome flow cytometry. *eNeuro*, 10.1523/ENEURO.0009-19.2019 (2019).
28. Zhang, J., Caruso, F.P., Sa, J.K., Justesen, S., Nam, D.H., **Sims, P.**, Ceccarelli, M., Lasorella, A., Iavarone, A. The combination of neoantigen quality and T lymphocyte infiltrates identifies glioblastomas with the longest survival. *Communications Biology*, 2, 135 (2019).
29. Das Sharma, S.\* , Metz, J.B.\* , Li, H., Hobson, B.D., Hornstein, N., Sulzer, D., Tang, G., **Sims, P.A.** Widespread alterations in translation elongation in the brain of juvenile *Fmr1* knock-out mice. *Cell Reports*, 26, 3313 (2019).
30. Snyder M.E., Finlayson, M.O., Connors, T.J., Dogra, P., Senda, T., Bush, E., Carpenter, D., Marboe, C., Benvenuto, L., Shah, L., Robbins, H., Hook, J.L., Sykes, M., D'Ovidio, F., Bacchetta, M., Sonett, J.R., Lederer, D.J., Arcasoy, S., **Sims, P.A.**, Farber, D.L. Generation and persistence of human tissue-resident memory T cells in lung transplantation. *Science Immunology*, 4, eaav5581 (2019).
31. Levitin, H.M., Yuan, J., Cheng, Y.L., Ruiz, F.J.R., Bush, E.C., Bruce, J.N., Canoll, P., Iavarone, A., Lasorella, A., Blei, D.M.†, **Sims, P.A.**† *De novo* Gene Signature Identification from Single-Cell RNA-seq with Hierarchical Poisson Factorization. *Molecular Systems Biology*, 15, e8557 (2019).
32. Zhao, J., Chen, A.X., Gartrell, R.B., Silverman, A.M., Aparicio, L., Chu, T., Borbar, D., Shan, D., Samanamud, J., Mahajan, A., Filip, I., Orenbuch, R., Goetz, M., Yamaguchi, J.T., Cloney, M., Horbinski, C., Lukas, R.V., Raizer, J., Rae, A.I., Yuan, J., Canoll, P., Bruce, J.N., Saenger, Y.M., **Sims, P.**, Iwamoto, F.M.†, Sonabend, A.M.†, Rabadan, R.† Immune and genomic correlates of response to anti-PD-1 immunotherapy in glioblastoma. *Nature Medicine*, 25, 462 (2019).
33. Mizrak, D., Levitin, H.M., Delgado, A.C, Crotet, V., Yuan, J., Chaker, Z., Silva-Vargas, V., **Sims, P.A.**†, Doetsch, F.† Single cell analysis of regional differences in adult V-SVZ neural stem cell lineages. *Cell Reports*, 26, 394 (2019).
34. Yuan, J., Sheng, J., **Sims, P.A.** SCOPE-seq: A Scalable Technology for Linking Live Cell Imaging and Single-Cell RNA-seq. *Genome Biology*, 19, 227 (2018).

35. Yuan, J., Levitin, H.M., Frattini, V., Bush, E.C., Boyett, D.M., Samanamud, J., Ceccarelli, M., Dovas, A., Zanazzi, G., Canoll, P., Bruce, J.N., Lasorella, A., Iavarone, A., **Sims, P.A.** Single-cell transcriptome analysis of lineage diversity in high-grade glioma. *Genome Medicine*, 10, 57 (2018).
36. Pan, Y., Duron, C., Bush, E.C., Ma, Y., **Sims, P.A.**, Gutmann D.H., Radunskaya, A., Hardin, J. Graph complexity analysis identifies an ETV5 tumor-specific network in human and murine low-grade glioma. *PLoS One*, 13, e0190001 (2018).
37. Liu, B., Lee, B.W., Nakanishi, K., Villasante, A., Williamson, R., Metz, J., Kim, J., Kanai, M., Bi, L., Brown, K., Di Paolo, G., Homma, S., **Sims, P.A.**, Topkara, V.K., Vunjak-Novakovic, G. Cardiac recovery via extended cell-free delivery of extracellular vesicles secreted by cardiomyocytes derived from iPS cells. *Nature Biomedical Engineering*, 2, 293 (2018).
38. Levitin, H.M., Yuan, J., **Sims, P.A.** Single-cell transcriptomic analysis of tumor heterogeneity. *Trends in Cancer*, 4, 4, 264 (2018).
39. Ding, H., Douglass, Jr., E.F. Sonabend, A.M., Mela, A., Bose, S., Gonzalez, C., Canoll, P., **Sims, P.A.**, Alvarez, M.J., Califano, A., Quantitative assessment of protein activity in orphan tissues and single cells using the metaVIPER algorithm. *Nature Communications*, 9, 1471 (2018).
40. Juliano, J., Gil, O., Hawkins-Daarud, A., Noticewala, S., Rockne, R.C., Gallaher, J., Massey, S.C., **Sims, P.A.**, Anderson, A.R.A., Swanson, K.R., Canoll, P. Comparative dynamics of microglial and glioma cell motility at the infiltrative margin of brain tumors. *J.R. Soc. Interface*, 15, 139 (2018).
41. Kiryluk, K., Bomback, A.S., Cheng, Y.L., Xu, K., Camara, P.G., Rabadan, R., **Sims, P.A.**, Barasch, J. Precision medicine for acute kidney injury (AKI): Redefining AKI by agnostic kidney tissue interrogation and genetics. *Seminars in Nephrology*, 1, 40 (2018).
42. Yuan, J., **Sims, P.A.** SPOTS fill a major gap in RNA quantification. *Nature Methods*, 14, 1137-1138 (2017).
43. Bush, E.C., Ray, F., Alvarez, M., Realubit, R., Li, H., Karan, C., Califano, A.†, **Sims, P.A.**† PLATE-Seq for Genome-Wide Regulatory Network Analysis of High-Throughput Screens. *Nature Communications*, 8, 105 (2017).
44. Pan, Y., Bush, E.C., Toonen, J., Ma, Y., Solga, A., **Sims, P.A.**†, Gutmann, D.† Whole tumor RNAsequencing and deconvolution reveal a clinically-prognostic PTEN/PI3K-regulated glioma transcriptional signature. *Oncotarget*, doi: 10.18632/oncotarget.17193 (2017).
45. Kuo, S.H., Lin, C.Y., Wang, J., **Sims, P.A.**, Pan, M.K., Liou, J.Y., Lee, D., Tate, W.J., Kelly, G.C., Louis, E.D., Faust, P.L. Climbing fiber-Purkinje cell synaptic pathology in tremor and cerebellar degenerative diseases, *Acta Neuropathol.*, doi:10.1007/s00401-016-1626-1 (2016).
46. Yuan, J., **Sims, P.A.** An automated microwell platform for large-scale single cell RNA-Seq, *Scientific Reports*, 6, 33883, (2016).
47. Pulko, V., Davies, J.S., Martinez, C., Lanteri, M.C., Busch, M.P., Diamond, M.S., Knox, K., Bush, E.C., **Sims, P.A.**, Sinari, S., Billheimer, D., Haddad, E.K., Murray, K.O., Wertheimer, A.M., Nikolich-Zugich, J.

- Human memory T cells with a naive phenotype accumulate with aging and respond to persistent viruses, *Nature Immunology*, 17, 966, (2016).
48. Sims, J.S., Grinshpun, B., Feng, Y., Ung, T.H., Niera, J.A., Samanamud, J.L., Canoll, P., Shen, Y.†, **Sims, P.A.†**, Bruce, J.N.† Diversity and Divergence of the glioma-infiltrating T cell receptor repertoire, *Proc. Natl. Acad. Sci. USA*, doi:10.1073/pnas.1601012113 (2016).
  49. Hornstein, N.\*, Torres, D.\*, Das Sharma, S., Tang, G., Canoll, P.†, **Sims, P.A.†** Ligation-free ribosome profiling of cell type-specific translation in the brain, *Genome Biology*, 17, 149 (2016).
  50. Lescarbeau, R., Lei, L., Bakken, K.K., **Sims, P.A.**, Sarkaria, J.N., Canoll, P., White, F.M. Quantitative phosphoproteomics reveals Wee1 kinase as a therapeutic target in a model of proneural glioblastoma, *Molecular Cancer Therapeutics*, 15, 1332 (2016).
  51. Bose, S., **Sims, P.A.** Genome-Wide Analysis of Single Cells and the Role of Microfluidics. *Wiley Blackwell Biotechnology Series: Micro and Nanosystems for Biotechnology*, (2016).
  52. Qiu, W., Tang, S.M., Lee, S., Turk, A.T., Sireci, A.N., Qiu, A., Rose, C., Xie, C., Kitajewski, J., Wen, H., Crawford, H.C., **Sims, P.A.**, Hruban, R.H., Remotti, H.E., Su, G. Loss of Activin Receptor Type 1B Accelerates Development of Intraductal Papillary Mucinous Neoplasms in Mice with Activated KRAS. *Gastroenterology*, 150, 218-228 (2016).
  53. Venere, M., Horbinski, C., Crish, J.F., Jin, X., Vasanthi, A., Major, J., Burrows, A.C., Chang, C., Prokop, J., Wu, Q., **Sims, P.A.**, Canoll, P., Summers, M.K., Rosenfeld, S.S., Rich, J.N. The mitotic kinesin KIF11 is a driver of invasion, proliferation, and self-renewal in glioblastoma. *Science Translational Medicine*, 7, 304ra143 (2015).
  54. Bose, S., Wan, Z., Carr, A., Rizvi, A.H., Vieira, G., Pe'er, D., **Sims, P.A.** Scalable Microfluidics for Single Cell RNA Printing and Sequencing. *Genome Biology*, 16, 120 (2015).
  55. Shelanski, M., Shin, W., Aubry, S., **Sims, P.**, Alvarez, M.J., Califano, A. A Systems Approach to Drug Discovery in Alzheimer's Disease. *Neurotherapeutics*, 12, 126-131 (2015).
  56. Worthley, D.L., Churchill, M., Compton, J.T., Taylor, Y., Rao, M., Si, Y., Levin, D., Schwartz, M.G., Uygur, A., Hayakawa, Y., Gross, S., Renz B.W., Setlik, W., Martinez, A.N., Chen, X., Nizami, S., Lee, H.G., Kang, H.P., Caldwell, J.M., Asfaha, S., Westphalen, C.B., Graham, T., Jin, G., Nagar, K., Wang, H., Kheirbek, M.A., Kolhe, A., Carpenter, J., Glaire, M., Nair, A., Renders, S., Manieri, N., Muthupalani, S., Fox, J.G., Reichert, M., Giraud, A.S., Schwabe, R.F., Pradere, J.P., Walton, K., Prakash, A., Gumucio, D., Rustgi, A.K., Stappenbeck, T.S., Friedman, R.A., Gershon, M.D., **Sims, P.**, Grikscheit, T., Lee, F.Y., Karsenty, G., Mukherjee, S., Wang, T.C. Gremlin 1 Identifies a Skeletal Stem Cell with Bone, Cartilage, and Reticular Stromal Potential. *Cell*, 160, 269-284 (2015).
  57. Gill, B.\*, Pisapia, D.\*, Malone, H., Goldstein, H., Lei, L., Sonabend, A., Yun, J., Samanamud, J., Sims, J., Banu, M., Dovas, A., Teich, A.F., Sheth, S., McKhann, G., Sisti, M., Bruce, J.N.†, **Sims, P.A.†**, Canoll, P.† MRI-Localized Biopsies Reveal Subtype-Specific Differences in Molecular and Cellular Composition at the Margins of Glioblastoma. *Proc. Natl. Acad. Sci. USA*, 111, 12550-12555 (2014).

58. Gonzalez, C., Sims, J.S.\*, Hornstein, N.\*, Mela, A., Garcia, F., Lei, L., Gass, D.A., Amendolara, B., Bruce, J.N., Canoll, P.†, **Sims, P.A.**† Ribosome Profiling Reveals a Cell Type-Specific Translational Landscape in Brain Tumors. *J. Neuroscience*, 34, 10924-10936 (2014).
59. Sonabend, A.M., Bansal, M., Guarnieri, P., Lei, L., Amendolara, B., Soderquist, C., Leung, L., Yun, J., Kennedy, B., Sisti, J., Bruce, S., Bruce, R., Shakya, R., Ludwig, T., Rosenfeld, S., **Sims, P.A.**, Bruce, J.N., Califano, A., Canoll, P. The Transcriptional Regulatory Network of Proneural Glioma Determines the Genetic Alterations Selected during Tumor Progression. *Cancer Research*, 74, 1440 (2014).
60. Sonabend, A.M., Yun, J., Lei, L., Leung, R., Soderquist, C., Crisman, C., Gill, B.J., Carminucci, A., Sisti, J., Castelli, M., **Sims, P.A.**, Bruce, J.N., Canoll, P. Murine cell line model of proneural glioma for evaluation of anti-tumor therapies. *J. Neuro-Oncology*, 112, 375 (2013).
61. Lu, P.J., Hoehl, M.M., Macarthur, J.B., **Sims, P.A.**, Ma, H., Slocum, A.H. Robust and economical multi-sample, multi-wavelength UV/vis absorption and fluorescence detector for biological and chemical contamination. *AIP Advances*, 2, 032110 (2012).
62. Hoehl, M.M., Lu, P.J., **Sims, P.A.**, Slocum, A.H. Rapid and Robust Detection Methods for Poison and Microbial Contamination. *J. Agric. Food Chem.*, 60, 6349-6358 (2012).
63. Men, Y., Fu, Y., Chen, Z., **Sims, P.A.**, Greenleaf, W.J., Huang, Y. Digital Polymerase Chain Reaction in an Array of Femtoliter Polydimethylsiloxane Microreactors. *Analytical Chemistry*, 84, 4262-4266 (2012).
64. Shiroguchi, K., Jia, T.Z., **Sims, P.A.**, Xie X.S. Digital RNA Sequencing Minimizes Sequence-Dependent Bias and Amplification Noise with Single Molecule Barcodes. *Proc. Natl. Acad. Sci. USA*, 109, 1347-1352 (2012).
65. **Sims, P.A.**\*, Greenleaf, W.J.\*., Duan, H., Xie, X.S. Fluorogenic DNA Sequencing in PDMS Microreactors. *Nature Methods*, 8, 575-580 (2011).
66. **Sims, P.A.**, Xie, X.S. Probing dynein and kinesin stepping with mechanical manipulation in a living cell. *ChemPhysChem*, 10, 1511-1516 (2009).
67. Sims, J.S., Militello, K.T., **Sims, P.A.**, Patel, V.P., Kasper, J.M., Wirth D.F. Patterns of genespecific and total transcriptional activity during the Plasmodium falciparum intraerythrocytic developmental cycle. *Eukaryot. Cell*, 8, 327-338 (2009).
68. Nan, X., **Sims, P.A.**, Xie, X.S. Organelle tracking in a living cell with microsecond time resolution and nanometer spatial precision. *ChemPhysChem*, 9, 707-712 (2008).
69. Lu, P.J., **Sims, P.A.**, Oki, H., MacArthur, J., Weitz, D.A. Target-locking acquisition with real-time confocal (TARC) microscopy. *Optics Express*, 15, 8702-8712 (2007).
70. Nan, X., **Sims, P.A.**, Chen, P., Xie, X.S. Observation of individual microtubule motor steps in living cells with endocytosed quantum dots. *J. Phys. Chem. B*, 109, 24220-24224 (2005).



71. **Sims, P.A.**, Wong, C.F., Vuga, D., McCammon, J.A., Sefton, B.M. Relative contributions of desolvation, inter-, and intramolecular interactions to binding affinity in protein kinase systems. *J. Comp. Chem.*, 26, 668-681 (2005).
72. **Sims, P.A.**, Wong, C.F., McCammon, J.A. Charge optimization of the interface between protein kinases and their ligands. *J. Comp. Chem.*, 25, 1416-1429 (2004).
73. **Sims, P.A.**, Wong, C.F., McCammon, J.A. A computational model of binding thermodynamics: The design of cyclin-dependent kinase 2 inhibitors. *J. Med. Chem.*, 46, 3314-3325 (2003).

## Patents

Xie, X.S., Shiroguchi, K., **Sims, P.A.**, Jia, T.Z. Single Cell Nucleic Acid Detection and Analysis. U.S. Patent 11,078,533 (2021).

Xie, X.S., Shiroguchi, K., **Sims, P.A.**, Jia, T.Z. Single Cell Nucleic Acid Detection and Analysis. U.S. Patent 11,035,001 (2021).

Xie, X.S., Shiroguchi, K., **Sims, P.A.**, Jia, T.Z. Single Cell Nucleic Acid Detection and Analysis. U.S. Patent 10,584,382 (2020).

**Sims, P.A.** High-Throughput Single Molecule Protein Identification. U.S. Patent 10,466,248 (2019).

Xie, X.S., Shiroguchi, K., **Sims, P.A.**, Jia, T.Z. Single Cell Nucleic Acid Detection and Analysis. U.S. Patent 10,287,630 (2019).

Xie X.S., Shiroguchi K., **Sims P.A.**, Jia T.Z. Single Cell Nucleic Acid Detection and Analysis. U.S. Patent 9,260,753 (2016).

## Invited Presentations

SCOPE-seq: Scalable Technology for Linking Live Cell Imaging and scRNA-seq, Biophysical Society Japan, 2021.

Single-Cell Analysis of Differentiation and Drug Response in Glioblastoma, Keynote Lecture, Radiation Oncology / Center for Radiation Research Retreat, Columbia University, New York, NY, 2021.

Subcellular Molecular Profiling of Midbrain Dopamine Neurons, Cajal Neuroscience, 2021.

Single-Cell Analysis of Differentiation and Drug Response in Glioblastoma, Magee-Womens Research Institute, University of Pittsburgh, 2021

An Integrated Map of the Immune System in Humans Across Tissues and Ages, Chan Zuckerberg Initiative Seed Networks Annual Meeting (virtual), 2020

scRNA-seq and SCOPE-seq Uncover a Secreted Enzyme Regulator of Adult Neurogenesis in the Mouse Brain, American Society for Cell Biology (ASCB) / European Molecular Biology Organization (EMBO) Joint Meeting, Washington D.C., 2019

Single-Cell Analysis of Differentiation and Drug Response in Glioblastoma, International Symposium of the Princess Takamatsu Cancer Research Fund, Tokyo, Japan, 2019.

Single-Cell Analysis of Differentiation and Drug Response in Glioblastoma, Physical Sciences Oncology Center Seminar, University of Pennsylvania, Philadelphia, PA 2019.

Single-Cell Analysis of Differentiation and Drug Response in Glioblastoma, Institute for Systems Genetics Seminar, New York University, New York, NY 2019.

Single-Cell RNA-seq Uncovers a Secreted Enzyme Regulator of Adult Neurogenesis in the Mouse Brain, Single Cell Analysis Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY 2019.

Single-Cell Analysis of Differentiation and Drug Response in Glioblastoma, Pathology Grand Rounds, Renaissance School of Medicine, Stony Brook University, Stony Brook, NY 2019.

A Single-Cell Reference Map for Human Blood and Tissue T Cell Activation, 10x User Group Meeting, New York, NY 2019.

Single Cell Transcriptomics, The Genome Access Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 2019.

New Tools for Single-Cell Analysis in Cancer: Differentiation and Drug Response in Glioblastoma, Cardiovascular Seminar Series, Columbia University, New York, NY, 2019.

Differentiation and Drug Response in Glioblastoma, Experimental Biology: Histochemical Society Workshop, Orlando, FL, 2019.

Deconvolving Cell Type-Specific Drug Response in Brain Tumors with Single-Cell Genomics, New York Genome Center, New York, NY, 2019.

High-Dimensional Single Cell Analysis of Lineage Diversity and Drug Response in Glioblastoma, Grand Rounds, Department of Neurological Surgery, Columbia University, New York, NY, 2019.

Discussion Leader: Precision Medicine and Cancer Evolution in Clinical Trial Design, Gordon Research Conference: Physical Science of Cancer, Galveston, TX, 2019.

SCOPE-seq: A Scalable Technology for Linking Live Cell Imaging and Single-Cell RNA-seq, IMAT Investigators Meeting, National Cancer Institute, Rockville, MD, 2018.

High-Dimensional Single Cell Analysis of Glioblastoma, Neuro-oncology Program, Herbert Irving Comprehensive Cancer Care Center, Columbia University, New York, NY, 2018

New Tools for Single-Cell Analysis in Cancer, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY 2018.

High-Dimensional Single-Cell Analysis of Glioblastoma, Department of Physiology and Biophysics, College of Medicine, University of Illinois, Chicago, IL 2018.

Probing Translational Dysregulation in Neurological Disorders with High-Sensitivity Ribosome Profiling, Royal Society, Chicheley Hall, England 2018.

Single-Cell Dissection of High-Grade Glioma. Cancer Genomics and Mathematical Data Analysis Symposium, Columbia University Medical Center, New York, NY 2018.

Large-Scale Integration of Live Cell Imaging and Single-Cell RNA-Seq. IMAT Investigators Meeting, National Cancer Institute, Rockville, MD, 2017.

Single-Cell Dissection of High-Grade Glioma. Department of Neurology, Yale School of Medicine, New Haven, CT, 2017.

Single-Cell Dissection and Topological Analysis of High-Grade Glioma. Koch Institute for Integrative Cancer Research at MIT, Cambridge, MA, 2017.

Applications and Analysis of Large-Scale, Single-Cell RNA-Seq. Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 2017.

New Tools for Single Cell Analysis in Cancer. NCI Special Session on Technologies for Advanced Omic Analysis, American Association for Cancer Research (AACR) Annual Meeting, Washington D.C., 2017

High-Dimensional Single Cell Analysis of Glioblastoma: New Tools and Insights. O'Brien Urology Symposium, Columbia University, New York, NY, 2017.

High-Dimensional Single Cell Analysis of Glioblastoma: New Tools and Insights. Computational Biology Center, IBM Thomas J. Watson Research Center, Yorktown Heights, NY, 2017.

High-Dimensional Single Cell Analysis of Glioblastoma: New Tools and Insights. Institute for Computational Biomedicine, Weill Cornell Medical College, New York, NY, 2017.

High-Dimensional Single Cell Analysis of Glioblastoma. Cancer Regulatory Networks Seminar, Columbia University Medical Center, New York, NY, 2017.

Microfluidics for Large-Scale Single Cell RNA-Seq in Glioblastoma. Molecular Medicine Tri-Conference, San Francisco, CA, 2017.

Scalable Microfluidics for Linking Single Cell Microscopy and Sequencing. Single Cell Analysis Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 2016.

Single Cell and Cell Type-Specific Expression Analysis in Neurological Disorders. Epilepsy Research Seminar, Department of Neurology, Columbia University Medical Center, New York, NY 2016.

Scalable Microfluidics for Linking Single Cell Microscopy and Sequencing. The Center for Computational Biology, The University of Kansas, Lawrence, KS, 2016.

Scalable Microfluidics for Linking Single Cell Microscopy and Sequencing. Five Points Lecture, New York Genome Center, New York, NY, 2016.

A Scalable Platform for Single Cell Transcriptomics. Gordon Research Conference: Molecular Mechanisms in Evolution, Easton, MA, 2015.

A Scalable Platform for Single Cell RNA-Seq. Clontech Laboratories, Mountain View, CA, 2015.

A Scalable Platform for Single Cell RNA-Seq. Single Cells Meeting, Cold Spring Harbor Asia, Suzhuo, China, 2014.

Microwell Arrays for Single Cell Transcriptomics. Single Cell Analysis Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 2014.

Image-Guided RNA-Seq Reveals Subtype-Specific Patterns at the Infiltrative Margins of Glioblastoma. Tumor Microenvironment-New York City (TME-NYC) Symposium, NYU School of Medicine and Columbia University Medical Center, New York, NY, 2014.

Tackling Cellular Heterogeneity in Glioma. Grand Rounds, Department of Neurological Surgery, Columbia University Medical Center, New York, NY, 2013.

Tackling Cellular Heterogeneity in Systems Biology. MIT Biophysics Program, Massachusetts Institute of Technology, Cambridge, MA, 2013.

Microreactor Arrays for Digital PCR, Sequencing, and Single Cell Analysis. Biochemistry and Biotechnology Program, University of Missouri at St. Louis, St. Louis, MO, 2012.

Microreactor Arrays for Digital PCR, Sequencing, and Single Cell Analysis. Digital PCR Application and Advances Conference, Cambridge Healthtech Institute, San Diego, CA, 2012.

Fluorogenic Pyrosequencing. Columbia Initiative in Systems Biology, College of Physicians and Surgeons, Columbia University, New York, NY, 2011.

Fluorogenic Pyrosequencing in PDMS Microreactors. Biodynamic Optical Imaging Center, School of Life Sciences, Peking University, Beijing, China, 2011.

Optical trapping of kinesin- and dynein-driven cargoes in living cells with submillisecond tracking. Single Molecule Discussion Group, Harvard Medical School, Boston, MA, 2008.

## **Professional Service**

### **Editorial**

Rabadan, R., **Sims, P.A.** Genetics and Epigenomics, *Current Opinion in Systems Biology*, 7, (2018).

## **Grant Review**

NIH National Institute of Mental Health UG3 Special Emphasis Panel: BRAIN Initiative, 2021

NIH National Institute of Mental Health R01 Special Emphasis Panel: BRAIN Initiative, 2021

NIH National Institute of Diabetes and Digestive and Kidney Diseases, Consortium of Beta Cell Death and Survival U01 Special Emphasis Panel, 2020

NIH National Institute of Mental Health, BRAIN Initiative: Novel Tools for Cells and Circuits R01/UG3/UH3 Special Emphasis Panel, 2020

The Mark Foundation for Cancer Research, Aspire Award Review, 2019

NIH National Institute of Neurological Disorders and Stroke P01 Special Emphasis Panel, 2019

The Emerson Collective Cancer Research Fund, 2019.

NIH Office of the Director DP5 Special Emphasis Panel for Early Independence Award, 2018.

NIH IMST Small Business: Cell and Molecular Biology Panel, 2018.

NIH National Institute of Mental Health R01 Special Emphasis Panel: BRAIN Initiative, 2018

NIH National Cancer Institute U01 Special Emphasis Panel: Cancer Systems Biology Consortium, 2017

NIH National Institute of Mental Health U01 Special Emphasis Panel: BRAIN Initiative, 2017

NIH National Cancer Institute U01 Special Emphasis Panel: Physical Sciences Oncology Projects, 2017

NIH National Institute of Mental Health U01 Special Emphasis Panel: BRAIN Initiative, 2016

NIH National Institute of Allergy and Infectious Disease P01 Special Emphasis Panel, 2016

NIH National Institute of Mental Health R01 Special Emphasis Panel: Clinical Studies of Mental Illness Not Involving Treatment Development, Efficacy, or Effectiveness Trials, 2016

Swiss National Science Foundation Research Equipment Program Panel, 2015

NIH National Institute of Mental Health R01 Special Emphasis Panel: Clinical Studies of Mental Illness Not Involving Treatment Development, Efficacy, or Effectiveness Trials, 2015

NIH National Institute of Mental Health U01 Special Emphasis Panel: BRAIN Initiative, 2014

NIH National Institute of Mental Health R01 Special Emphasis Panel: EUREKA for Neuroscience and Disorders of the Nervous System, 2014

NIH National Institute of Mental Health R01 Special Emphasis Panel: EUREKA for Neuroscience and Disorders of the Nervous System, 2013

NIH National Institute of Mental Health R21 Special Emphasis Panel: Development of New Tools to Explore the Synaptome, 2012

### **Journal Review**

*Biophysical Journal, Cancer Research, Cell, Cell Genomics, Cell Reports, CellStemCell, Cell Systems, ChemPhysChem, eLife, Genome Biology, Genome Medicine, Genome Research, iScience, Journal of the Royal Society Interface, Journal of Translational Medicine, Lab on a Chip, Molecular Cancer Research, Molecular Systems Biology, Nature, Nature Biomedical Engineering, Nature Biotechnology, Nature Cancer, Nature Communications, Nature Immunology, Nature Medicine, Nature Methods, Nature Neuroscience, Nature Reviews Genetics, Nucleic Acids Research, PeerJ, PNAS, Science, Science Advances, Trends in Cancer*

## **Teaching and Mentoring**

### **Courses**

Lecturer in Cellular and Molecular Biology of Cancer, 2018-2021

Lecturer in Biochemistry, Molecular & Cell Biology I, 2013-2021

Lecturer in Deep Sequencing, 2015-2019; 2021

Lecturer in MD/PhD Ethics in Research, 2014-2021

Lecturer in Columbia Med into Grad Program, 2017

Lecturer in Statistics for Basic Sciences, 2018-2020

Instructor in Single Cell Analysis Course, Cold Spring Harbor Laboratory, 2014-2019

### **Graduate Student Researchers**

Alex George (MD/PhD Program)

Daniel Caron (Microbiology, Immunology, and Infection PhD Program)

Qiuyu Gong (Biotechnology MA Program)

John Tuddenham (MD/PhD Program)

Zhouzerui Liu (Systems Biology PhD Program)

Benjamin Hobson (MD/PhD Program, defended 9/2021)

Hanna Mendes Levitin (Systems Biology PhD Program, defended 4/2020)

Jordan Metz (MD/PhD Program)

Nathan Omans (Neuroscience MS Program)

Nicholas Hornstein (MD/PhD Program, defended 12/2016)

Erin Bush (Biotechnology MA Program)

### **Postdoctoral Research Scientists**

Timothy Olsen, PhD

Katherine Xu, PhD

Wenting Zhao, PhD

Yim Ling Cheng, PhD

Dogukan Mizrak, PhD

Jinzhou Yuan, PhD

Sohani Das Sharma, PhD  
Gregory Vieira, PhD  
Christian Gonzalez, PhD  
Sayantan Bose, PhD