

Nicholas E. Banovich

Curriculum Vitae
Translational Genomics Research Institute
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Positions

- 2021 - **Associate Professor**, Translational Genomics Research Institute (TGen), Phoenix, Arizona.
- 2024 - **Director**, Division of Bioinnovation and Genome Sciences, TGen
- 2024 - **Member**, Scientific Advisory Leadership Council, TGen

Institutional and Scientific Leadership Positions

- 2021 - **Director**, TGen's **Center for Spatial Multi-Omics (COSMO)**
- 2024 - **Network Coordinator**, Human Cell Atlas Lung Biological Network
- 2024 - **Member**, City of Hope Comprehensive Cancer Center
- 2024 - **Associate Director**, **Biodevelopmental Origins of Lung Disease (BOLD)** Center, Vanderbilt University

Additional Appointments and Positions

- 2022 - **Associate Professor**, Department of Integrative Translational Sciences, City of Hope, Duarte California
- 2017 - **Adjunct Faculty**, Arizona State University, Tempe, Arizona.

Education, Training, and Past Positions

- 2023 - 2024 Chief Scientist, Deepcell, Menlo Park California
- 2017 - 2020 Assistant Professor, Translational Genomics Research Institute, Phoenix, Arizona.
- 2016 - 2017 Postdoctoral Researcher, Translational Genomics Research Institute, Phoenix Arizona
- 2011 - 2016 Ph.D. in Human Genetics
Title: *Characterizing Inter-individual Regulatory Variation Using Induced Pluripotent Stem Cells*
University of Chicago - Chicago, IL
- 2009 - 2011 B.S. in Anthropology (Cum Laude) - Arizona State University - Tempe, AZ
- 2006-2008 Scottsdale Community College - Scottsdale, AZ

Preprints

- 2025 Gholamin S, Natri HM, Zhao Y, Xu S, Aftabizadeh M, Comin-Anduix B, Saravanakumar S, Masia C, Wong RA, Peter L, Chung MI, Mee ED, Aguilar B, Starr R, Torrejon DY, Alizadeh D, Wu X, Kalbasi A, Ribas A, Forman S, Badie B, **Banovich NE***, Brown CE*. Overcoming myeloid-driven resistance to CAR T therapy by targeting SPP1. bioRxiv. 2025. <https://www.biorxiv.org/content/10.1101/2025.04.01.646202v1.abstract>
- 2025 Lyu R, Vannan A, Kropski JA, **Banovich NE**, McCarthy DJ. SpatialRNA: a python package for easy application of Graph Neural Network models on single-molecule spatial transcriptomics dataset. bioRxiv. 2025. <https://www.biorxiv.org/content/10.1101/2025.03.20.644258v1.abstract>
- 2025 Amancherla K, Taravella Oill AM, Bledsoe X, Williams AL, Chow N, Zhao S, Sheng Q, Bearl DW, Hoffman RD, Menachem JN, Siddiqi HK, Brinkley DM, Mee ED, Hadad N, Agrawal V, Schmeckpepper J, Rali AS, Tsai S, Farber-Eger EH, Wells QS, Freedman JE, Tucker NR, Schlendorf KH, Gamazon ER, Shah RV*, **Banovich NE***. Dynamic responses to rejection in the transplanted human heart revealed through spatial transcriptomics. bioRxiv. 2025. <https://www.biorxiv.org/content/10.1101/2025.02.28.640852v1.abstract>
- 2024 Natri HM, Bui L, Peter L, Argente B, Federico A, Gutierrez A, Chung MI, Keats J, **Banovich NE**. Germline and somatic genetic effects on gene expression and outcome in patients with Multiple Myeloma. bioRxiv. 2024. p. 2024.10.09.617438. Available from: <https://www.biorxiv.org/content/10.1101/2024.10.09.617438v1.abstract>
- 2024 Wang D, Hadad N, Moss S, Lopez-Jimenez E, Johnson SR, Maher TM, Molyneaux PL, Zhao Y, Perry JRB, Wolters PJ, Kropski JA, Jenkins RG, **Banovich NE**, Stewart I. Association between mosaic loss of chromosome Y and pulmonary fibrosis susceptibility and severity. bioRxiv. 2024 May 30; Available from: <http://dx.doi.org/10.1101/2024.05.25.595885> PMID: PMC11160640
- 2023 Wang L, Oill AT, Blanchard M, Wu M, Hibbard J, Sepulveda S, Peter L, Kilpatrick J, Munoz M, Stiller T, Shulkin N, Wagner J, Dolatabadi A, Nisis M, Shepphird J, Sanchez G, Lingaraju C, Manchanda M, Natri H, Kouakanou L, Sun G, Oliver-Cervantes C, Georges J, Aftabizadeh M, Forman S, Priceman S, Ressler J, Arvanitis L, Cotter J, D'Apuzzo M, Tamrazi B, Badie B, Davidson T, **Banovich NE***, Brown C*. Expansion of endogenous T cells in CSF of pediatric CNS tumor patients undergoing locoregional delivery of IL13R α 2-targeting CAR T cells: an interim analysis. 2023 Oct 23. Research Square. <https://www.researchsquare.com/article/rs-3454977/v1>
- 2023 Bui LT, Cao X, Wang J, Meng F, Feng M, Arvanitis L, Mannan R, Woo Y, Idrees K, **Banovich NE**, Raoof M*. Integrated characterization of cell types, states and molecular programs in disseminated appendiceal neoplasms. bioRxiv. 2023. doi:<https://doi.org/10.1101/2023.09.28.559817>
- 2021 Winters NI, Taylor CJ, Jetter CS, Camarata JE, Gutierrez AJ, Bui LT, Gokey JJ, Bacchetta M, **Banovich NE**, Sucre JMS, Kropski JA. Single-cell transcriptomic assessment of cellular phenotype stability in human precision-cut lung slices. bioRxiv. 2021. bioRxiv, 2020. doi:10.1101/2021.08.19.457016
- 2020 Subramanian, A., Vernon, K.A., Slyper, M., Waldman, J., Luecken, M.D., Gosik, K., Dubinsky, D., Cuoco, M.S., Keller, K., Purnell, J., Nguyen, L., Dionne, D., Rozenblatt-Rosen, O., Weins, A.,

Regev, A., Greka, A., Human Cell Atlas Lung Biological Network, (**Banovich NE** is a member of the HCA Lung Biological Network). RAAS blockade, kidney disease, and expression of ACE2, the entry receptor for SARS-CoV-2, in kidney epithelial and endothelial cells. bioRxiv, July 1, 2020. <https://doi.org/10.1101/2020.06.23.167098>

Publications

- 2025 Mallapragada S, Lyu R, Williams-Katek AL, Fischer BK, Vannan A, Hadad N, Mee ED, Shirazi SP, Jetter CS, Negretti NM, Hilgendorff A, Eldredge LC, Deutsch GH, McCarthy DJ, Kropski JA, Sucre JMS, Banovich NE. A spatial transcriptomic atlas of acute neonatal lung injury across development and disease severity. *American Journal of Physiology-Lung Cellular and Molecular Physiology*. American Physiological Society Rockville, MD; 2025 Aug 1; Available from: <https://journals.physiology.org/doi/10.1152/ajplung.00191.2025>
- 2025 Shirazi SP, Negretti NM, Jetter CS, Sharkey AL, Garg S, Kapp ME, Wilkins D, Fortier G, Mallapragada S, **Banovich NE**, Wright CVE, Frank DB, Kropski JA, Sucre JMS. Bronchopulmonary Dysplasia with Pulmonary Hypertension Associates with Loss of Semaphorin Signaling and Functional Decrease in FOXF1 Expression. *Nat Commun*. 2025 May 30;16(1):5004. PMID: PMC12122835
- 2025 Vannan A, Lyu R, Williams AL, Negretti NM, Mee ED, Hirsh J, Hirsh S, Nichols DS, Calvi CL, Taylor CJ, Polosukhin VV, Serezani AP, McCall AS, Gokey JJ, Shim H, Ware LB, Bacchetta MJ, Shaver CM, Blackwell TS, Walia R, Sucre JM, Kropski JA*, McCarthy DJ*, **Banovich NE***. Image-based spatial transcriptomics identifies molecular niche dysregulation associated with distal lung remodeling in pulmonary fibrosis. **[Cover]** *Nature Genetics*. 2025 Feb 3; <https://doi.org/10.1038/s41588-025-02080-x>
- 2025 Scott McCall A, Tanjore H, Burman A, Sherrill T, Chapman M, Calvi CL, Camarata J, Hunt RP, Nichols D, **Banovich NE**, Lawson WE, Gokey JJ, Kropski JA, Blackwell TS. Hypoxia-inducible factor 2 regulates alveolar regeneration after repetitive injury in three-dimensional cellular and in vivo models. *Science Translational Medicine*. 2025 Jan 8. doi:10.1126/scitranslmed.adk8623
- 2024 Perry AS, Hadad N, Chatterjee E, Ramos MJ, Farber-Eger E, Roshani R, Stolze LK, Zhao S, Martens L, Kendall TJ, Thone T, Amancherla K, Bailin S, Gabriel CL, Koethe J, Jeffrey Carr J, Terry JG, Freedman J, Tanriverdi K, Alsop E, Van Keuren-Jensen K, Sauld JFK, Mahajan G, Khan S, Colangelo L, Naylor M, Fisher-Hoch S, McCormick J, North KE, Below J, Wells Q, Abel D, Kalhan R, Scott C, Guillems M, Fallowfield JA, **Banovich NE**, Das S, Shah R. A prognostic molecular signature of hepatic steatosis is spatially heterogeneous and dynamic in human liver. *Cell Reports Medicine*. 2024 Dec 17. <https://doi.org/10.1016/j.xcrm.2024.101871>
- 2024 Lehmann M, Krishnan R, Sucre J, Kulkarni HS, Pineda RH, Anderson C, **Banovich NE**, Behrsing HP, Dean CH, Haak A, Gosens R, Kaminski N, Zagorska A, Koziol-White C, Metcalf JP, Kim YH, Loebel C, Neptune E, Noel A, Raghu G, Sewald K, Sharma A, Suki B, Sperling A, Tatler A, Turner S, Rosas IO, van Ry P, Wille T, Randell SH, Pryhuber G, Rojas M, Bourke J,

Königshoff M. Precision Cut Lung Slices: Emerging Tools for Preclinical and Translational Lung Research. An Official American Thoracic Society Workshop Report. *Am J Respir Cell Mol Biol*. 2024 Nov 5; Available from: <http://dx.doi.org/10.1165/rcmb.2024-0479ST> PMID: 39499861

- 2024 Hasegawa Y, Franks JM, Tanaka Y, Uehara Y, Read DF, Williams C, Srivatsan S, Pitstick LB, Nikolaidis NM, Shaver CM, Kropski J, Ware LB, Taylor CJ, **Banovich NE**, Wu H, Gardner JC, Osterburg AR, Yu JJ, Koprass EJ, Teitelbaum SL, Wikenheiser-Brokamp KA, Trapnell C, McCormack FX. Pulmonary osteoclast-like cells in silica induced pulmonary fibrosis. *Sci Adv*. 2024 Jul 12;10(28):ead14913. PMID: PMC11235167
- 2024 Natri HM, Del Azodi CB, Peter L, Taylor CJ, Chugh S, Kendle R, Chung MI, Flaherty DK, Matlock BK, Calvi CL, Blackwell TS, Ware LB, Bacchetta M, Walia R, Shaver CM, Kropski JA, McCarthy DJ, **Banovich NE**. Cell type-specific and disease-associated eQTL in the human lung. *Nature Genetics*. 2024 Mar 28. <https://doi.org/10.1038/s41588-024-01702-0>
- 2024 Brown C, Hibbard J, Alizadeh D, Blanchard M, Natri H, Wang D, Ostberg J, Aguilar B, Wagner J, Paul J, Starr R, Filippov A, Chaudhry A, Ressler J, Kilpatrick J, Myers-McNamara P, Chen M, Wang L, Rockne R, Georges J, Portnow J, Barish M, D'Apuzzo M, **Banovich NE**, Forman S, Badie B. Phase I Trial Evaluating Locoregionally-delivered IL13R α 2-targeting CAR T Cells in High-Grade Glioma. *Nature Medicine*. 2024 Mar 7. <https://doi.org/10.1038/s41591-024-02928-5>
- 2024 Gutova M, Hibbard JC, Ma E, Natri H, Adhikarla V, Ching NO, Qiu R, Nguye C, Melendez E, Aguilar B, Starr R, Ono M, Yin H, Rockne RC, **Banovich NE**, Yuan YC, Brown C, Kahn M. Targeting WNT Signaling for Improved Glioma Immunotherapy. *Front Immunol*. Frontiers; 2024 Jan 29;15:1342625.
- 2024 Choi B, Liu GY, Sheng Q, Amancherla K, Perry A, Huang X, San José Estépar R, Ash SY, Guan W, Jacobs DR Jr, Martinez FJ, Rosas IO, Bowler RP, Kropski JA, **Banovich NE**, Khan SS, San José Estépar R, Shah R, Thyagarajan B, Kalhan R, Washko GR. Proteomic Biomarkers of Quantitative Interstitial Abnormalities in COPD Gene and CARDIA Lung Study. *Am J Respir Crit Care Med*. 2024 Jan 29; <http://dx.doi.org/10.1164/rccm.202307-1129OC> PMID: 38285918
- 2023 Rojas-Quintero J, Ochsner SA, New F, Divakar P, Yang CX, Wu TD, Robinson J, Shimoga Chandrashekar D, **Banovich NE**, Rosas IO, Sauler M, Kheradmand F, Gaggari A, Margaroli C, San Jose Estepar R, McKenna NJ, Polverino F. Spatial Transcriptomics Resolve an Emphysema-specific Lymphoid Follicle B Cell Signature in COPD. *Am J Respir Crit Care Med*. 2023 Nov 7; Available from: <http://dx.doi.org/10.1164/rccm.202303-0507LE> PMID: 37934672
- 2023 Sikkema L, Strobl D, Zappia L, Madissoon E, Markov NS, Zaragosi L, Ansari M, Arguel M, Apperloo L, Bécavin C, Berg M, Chichelnitskiy E, Chung M, Collin A, Gay ACA, Hooshyar Kashani B, Jain M, Kapellos T, Kole TM, Mayr C, von Papen M, Peter L, Ramírez-Suástegui C, Schniering J, Taylor C, Walzthoeni T, Xu C, Bui LT, de Donno C, Dony L, Guo M, Gutierrez AJ, Heumos L, Huang N, Ibarra I, Jackson N, Kadur Lakshminarasimha Murthy P, Lotfollahi M, Tabib T, Talavera-Lopez C, Travaglini K, Wilbrey-Clark A, Worlock KB, Yoshida M, Lung Biological Network Consortium, Desai T, Eickelberg O, Falk C, Kaminski N, Krasnow M, Lafyatis R, Nikolic M, Powell J, Rajagopal J, Rozenblatt-Rosen O, Seibold MA, Sheppard D, Shepherd D, Teichmann SA, Tsankov A, Whitsett J, Xu Y, **Banovich NE**, Barbry P, Duong TE, Meyer KB, Kropski JA, Pe'er D, Schiller HB, Tata PR, Schultze JL, Misharin AV, Nawijn MC, Luecken MD,

Theis F. An integrated cell atlas of the human lung in health and disease. *Nature Medicine*. 2023 June 8; <https://doi.org/10.1038/s41591-023-02327-2>

- 2023 Oldham JM, Allen RJ, Lorenzo-Salazar JM, Molyneaux PL, Ma SF, Joseph C, Kim JS, Guillen-Guio B, Hernández-Beeftink T, Kropski JA, Huang Y, Lee CT, Adegunsoye A, Pugashetti JV, Linderholm AL, Vo V, Strek ME, Jou J, Muñoz-Barrera A, Rubio-Rodriguez LA, Hubbard R, Hirani N, Whyte MKB, Hart S, Nicholson AG, Lancaster L, Parfrey H, Rassl D, Wallace W, Valenzi E, Zhang Y, Mychaleckyj J, Stockwell A, Kaminski N, Wolters PJ, Molina-Molina M, **Banovich NE**, Fahy WA, Martinez FJ, Hall IP, Tobin MD, Maher TM, Blackwell TS, Yaspan BL, Jenkins RG, Flores C, Wain LV, Noth I. PCSK6 and Survival in Idiopathic Pulmonary Fibrosis. *Am J Respir Crit Care Med*. 2023 Feb 13; <http://dx.doi.org/10.1164/rccm.202205-0845OC>
- 2023 Liu Q, Zhou Y, Cogan JD, Mitchell DB, Sheng Q, Zhao S, Bai Y, Ciombor KK, Sabusap CM, Markin CR, Douglas K, Ding G, Malabanan MM, **Banovich NE**, Nickerson DA, Blue EE, Bamshad MJ, Brown KK, Schwartz DA, Phillips JA 3rd, Martinez-Barricarte R, Salisbury ML, Shyr Y, Loyd JE, Kropski JA, Blackwell TS. The Genetic Landscape of Familial Pulmonary Fibrosis. *Am J Respir Crit Care Med*. 2023 Jan 9; <http://dx.doi.org/10.1164/rccm.202204-0781OC>
- 2022 Bucktrout SL, **Banovich NE**, Butterfield LH, Cimen Bozkus C, Giles JR, Good Z, Goodman D, Jonsson VD, Lareau C, Marson A, Maurer DM, Munson PV, Stubbington M, Taylor S, Cutchin A. Advancing T cell-based cancer therapy with single-cell technologies. *Nat Medicine*, 2022 Sep 20. <https://doi.org/10.1038/s41591-022-01986-x>
- 2022 Suzuki T, Kropski JA, Chen J, Carrier EJ, Chen X, Sherrill TP, Winters NI, Camarata JE, Polosukhin VV, Han W, Rathinasabapathy A, Gutor S, Gulleman P, Sabusap C, **Banovich NE**, Tanjore H, Freeman ML, Tada Y, Young LR, Gokey JJ, Blackwell TS, West JD (2022) Thromboxane-prostanoid receptor signaling drives persistent fibroblast activation in pulmonary fibrosis. *Am J Respir Crit Care Med*, 2022 Jun 21. <https://doi.org/10.1164/rccm.202106-1503OC>
- 2022 Blackburn JB, Schaff JA, Gutor S, Du R-H, Nichols D, Sherrill T, Gutierrez AJ, Xin MK, Wickersham N, Zhang Y, Holtzman MJ, Ware LB, **Banovich NE**, Kropski JA, Blackwell TS, Richmond BW. Secretory cells are the primary source of pIgR in small airways. *Am J Respir Cell Mol Biol*, 2022 Jun 13. doi.org/10.1165/rcmb.2021-0548OC
- 2022 Long E, García-Closas M, Chanock SJ, Camargo MC, **Banovich NE**, Choi J (2022) The case for increasing diversity in tissue-based functional genomics datasets to understand human disease susceptibility. *Nat Commun*, 2022 May 25. <https://doi.org/10.1038/s41467-022-30650-8>
- 2022 Natri HM, Hudjashov G, Jacobs G, Kusuma P, Saag L, Darusallam CC, Metspalu M, Sudoyo H, Cox MP*, Gallego Romero I*, **Banovich NE***. Genetic architecture of gene regulation in Indonesian populations identifies QTLs associated with local ancestry and archaic introgression. *AJHG*, 2022 Jan 6. doi: <https://doi.org/10.1016/j.ajhg.2021.11.017>
- 2021 Negretti NM, Plosa EJ, Benjamin JT, Schuler BA, Habermann AC, Jetter CS, Taylor CJ, Gullemna P, Nichols D, Matlock BK, Guttentag SH, Blackwell TS, **Banovich NE**, Kropski JA, Sucre JMS. A Single Cell Atlas of Lung Development. *Development*. 2021 Dec. 15. doi: <https://doi.org/10.1242/dev.199512>

- 2021 Bui LT, Winters NI, Chung M-I, Joseph C, Gutierrez AJ, Habermann AC, Adams TS, Schupp JC, Poli S, Peter LM, Taylor CJ, Blackburn JB, Richmond BW, Nicholson AG, Rassl D, Wallace WA, Rosas IO, Jenkins RG, Kaminski N, Kropski JA, **Banovich NE**, the Human Cell Atlas Lung Biological Network. Chronic lung diseases are associated with gene expression programs favoring SARS-CoV-2 entry and severity. Nat Communications. 2021 July 14. doi: <https://doi.org/10.1038/s41467-021-24467-0>
- 2021 Schupp JC, Adams TS, Cosme C, Raredon MSB, Omote N, De Fria, SP, Rose K-A, Manning E, Sauler M, Deluliis G, Ahangari F, Neumark N, Yuan Y, Habermann AC, Gutierrez AJ, Bui LT, Meyer KB, Nawijn MC, Teichmann SA, **Banovich NE**, Kropski JA, Niklason LE, Pe'er D, Yan X, Homer R, Rosas IO, Kaminski N. Integrated Single Cell Atlas of Endothelial Cells of the Human Lung. Circulation, 2021 May 25. doi: <https://doi.org/10.1161/CIRCULATIONAHA.120.052318>
- 2021 Muus, C., Luecken, M.D., Eraslan, G., Waghray, A., Heimberg, G., Sikkema, L., Kobayashi, Y., Vaishnav, E.D., Subramanian, A., Smilie, C., Jagadeesh, K., Duong, E.T., Fiskin, E., Triglia, E.T., Ansari, M., Cai, P., Lin, B., Buchanan, J., Chen, S., Shu, J., Haber, A.L., Chung, H., Montoro, D.T., Adams, T., Aliee, H., Samuel, J., Andrusivova, A.Z., Angelidis, I., Ashenberg, O., Bassler, K., Bécavin, C., Benhar, I., Bergensträhle, J., Bergensträhle, L., Bolt, L., Braun, E., Bui, L.T., Chaffin, M., Chichelnitskiy, E., Chiou, J., Conlon, T.M., Cuoco, M.S., Deprez, M., Fischer, D.S., Gillich, A., Gould, J., Guo, M., Gutierrez, A.J., Habermann, A.C., Harvey, T., He, P., Hou, X., Hu, L., Jaiswal, A., Jiang, P., Kapellos, T., Kuo, C.S., Larsson, L., Leney-Greene, M.A., Lim, K., Litviňuková, M., Lu, J., Ludwig, L.S., Luo, W., Maatz, H., Madissoon, E., Mamanova, L., Manakongtreecheep, K., Marquette, C.-H., Mbano, I., McAdams, A.M., Metzger, R.J., Nabhan, A.N., Nyquist, S.K., Penland, L., Poirion, O.B., Poli, S., Qi, C., Queen, R., Reichart, D., Rosas, I., Schupp, J., Sinha, R., Sit, R.V., Slowikowski, K., Slyper, M., Smith, N., Sountoulidis, A., Strunz, M., Sun, D., Talavera-López, C., Tan, P., Tantivit, J., Travaglini, K.J., Tucker, N.R., Vernon, K., Wadsworth, M.H., Waldman, J., Wang, X., Yan, W., Zhao, W., Ziegler, C.G.K., The NHLBI LungMAP Consortium, The Human Cell Atlas Lung Biological Network, (**Banovich NE** is a member of the HCA Lung Biological Network). Single-cell meta-analysis of SARS-CoV-2 entry genes across tissues and demographics. Nature Medicine. March 2, 2021. <https://doi.org/10.1038/s41591-020-01227-z>
- 2021 Ward MC*, **Banovich NE***, Sarkar A, Stephens M, Gilad Y. Dynamic effects of genetic variation on gene expression revealed following hypoxic stress in cardiomyocytes. eLife. Feb 8, 2021. doi: <https://doi.org/10.7554/eLife.57345>
- 2020 Bernardes, JP, Mishra, N, Tran, F, Bahmer, T, Best, L, Blase, JI, Bordoni, D, Franzenburg, J, Geisen, U, Josephs-Spaulding, J, Koehler, P, Kuenstner, A, Rosati, E, Aschenbrenner, AC, Bacher, P, Baran, N, Boysen, T, Brandt, B, Bruse, N, Doerr, J, Draeger, A, Elke, G, Ellinghaus, D, Fischer, J, Forster, M, Franke, A, Franzenburg, S, Frey, N, Friedrichs, A, Fuss, J, Glueck, A, Hamm, J, Hinrichsen, F, Hoepfner, MP, Imm, S, Juenker, R, Kaiser, S, Kan, YH, Knoll, R, Lange, C, Laue, G, Lier, C, Lindner, M, Marinos, G, Markewitz, R, Nattermann, J, Noth, R, Pickkers, P, Rabe, KF, Renz, A, Roecken, C, Rupp, J, Schaffarzyk, A, Scheffold, A, Schulte-Schrepping, J, Schunck, D, Skowasch, D, Ulas, T, Wandinger, K-P, Wittig, M, Zimmermann, J, Busch, H, Hoyer, BF, Kaleta, C, Heyckendorf, J, Kox, M, Rybniker, J, Schreiber, S, Schultze, J, Rosenstiel, P, HCA Lung Biological Network (**Banovich NE** is a member of the HCA Lung Biological Network), Deutsche COVID-19 Omics Initiative (DeCOI). Longitudinal

Multi-omics Analyses Identify Responses of Megakaryocytes, Erythroid Cells, and Plasmablasts as Hallmarks of Severe COVID-19. *Immunity*. Dec 15, 2020.

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- 2020 Tucker NR, Chaffin M, Bedi KC Jr, Papangelis I, Akkad AD, Arduini A, Hayat S, Eraslan G, Muus C, Bhattacharyya RP, Stegmann CM, Human Cell Atlas Lung Biological Network, Margulies KB, Ellinor PT, Human Cell Atlas Lung Biological Network Consortium Members (**Banovich NE** is a member of the HCA Lung Biological Network). Myocyte-Specific Upregulation of in Cardiovascular Disease: Implications for SARS-CoV-2-Mediated Myocarditis. *Circulation*. 2020 Aug 18;142(7):708–710. PMID: PMC7424896
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- 2020 Natri H, Bobowik KS, Kusuma P, Darusallam CC, Jacobs GS, Hudjashov G, Lansing JS, Sudoyo H, **Banovich NE***, Cox MP*, Gallego Romero I*. Genome-wide DNA methylation and gene expression patterns reflect genetic ancestry and environmental differences across the Indonesian archipelago. *PLoS Genet*. May 26, 2020 16(5): e1008749. <https://doi.org/10.1371/journal.pgen.1008749>. PMID: 32453742
- 2020 Sungnak, W., Huang, N., Bécavin, C., Berg, M., Queen, R., Litvinukova, M., Talavera-López, C., Maatz, H., Reichart, D., Sampaziotis, F., Worlock, K.B., Yoshida, M., Barnes, J.L., HCA Lung Biological Network (**Banovich NE** is a member of the HCA Lung Biological Network). SARS-CoV-2 entry factors are highly expressed in nasal epithelial cells together with innate immune genes. *Nat. Med*. April 23, 2020. doi: <https://doi.org/10.1038/s41591-020-0868-6>. PMID: 32327758
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- 2017 Ritzman TB, **Banovich NE**, Kaitlin BP, Guida J, Rubel MA, Pinney J, Khang B, Ravosa MJ, Stone AC. Facing the facts: The *Runx2* gene is associated with variation in facial morphology in primates. *Journal of Human Evolution*. 2017 Aug.9. doi.org/10.1016/j.jhevol.2017.06.014.

- 2016 Kagan CL*, **Banovich NE***, Pavlovic BJ, Patterson K, Gallego Romero I, Pritchard JK, and Gilad Y. Genetic Variation, Not Cell Type of Origin, Underlies Regulatory Differences in iPSCs. *PLoS Genetics*. 2016 Jan 26;12(1):e1005793. doi: 10.1371/journal.pgen.1005793. PMID: 26812582

- 2015 Gallego Romero I, Pavlovic BJ, Hernando-Herraez I, Zhou X, Ward MC, **Banovich NE**, Kagan CL, Burnett JE, Huang CH, Mitrano A, Chavarria CI, Friedrich Ben-Nun I, Li Y, Sabatini K, Leonardo TR, Parast M, Marques-Bonet T, Laurent LC, Loring JF, Gilad Y. A panel of induced pluripotent stem cells from chimpanzees: a resource for comparative functional genomics. *Elife*. 2015 Jun 23;4. doi: 10.7554/eLife.07103. PMID: 26102527

- 2014 **Banovich NE**, Lan X, McVicker G, van de Geijn B, Degner JF, Blischak JD, Roux J, Pritchard JK, and Gilad Y. Methylation QTLs Are Associated with Coordinated Changes in Transcription Factor Binding, Histone Modifications, and Gene Expression Levels. *PLoS Genetics* 2014 Sep 18;10(9):e1004663. PMID: 25233095

- 2013 McVicker G, van de Geijn B, Degner JF, Cain CE, **Banovich NE**, Raj A, Lewellen N, Myrthil M, Gilad Y, and Pritchard JK. Identification of genetic variants that affect histone modifications in human cells. *Science*. 2013 Nov 8;342(6159):747-9. PMID: 24136359

Invited Presentations

- Nov. 2025 Pulmonary Fibrosis Foundation Summit, Chicago IL
- Sep. 2025 Seattle Children's Research Institute, Seattle WA
- May 2025 American Thoracic Society, San Francisco CA

May 2025	Cleveland Clinic, Cleveland OH
April 2025	Pulmonary and Critical Care Medicine, Massachusetts General Hospital, Boston MA
April 2025	Theodore L. Badger Lecture, Channing Division of Network Medicine, Brigham and Women's Hospital and Harvard University, Boston MA
Mar. 2025	Spatial Biology and Single-Cell Multiomics - Precision Med TRI-CON, San Diego CA
Feb. 2025	Advances in Genome Biology and Technology (AGBT), Marco Island FL
Oct. 2024	RegenMed Symposium, Phoenix AZ
Jul. 2024	Lung Epithelium in Health and Disease, Southbridge MA
May. 2024	American Thoracic Society, San Diego CA
May. 2024	International Spatial Biology Congress, San Diego CA
Mar. 2024	ASU BMES, Tempe AZ
April 2024	University of Illinois Chicago, Chicago IL
Feb. 2024	St. Jude, Memphis TN
Nov. 2023	University of Utah, Salt Lake City UT
Sep. 2023	University of Minnesota, Minneapolis MN
Jun. 2023	WASOG, Stockholm, Sweden
Feb. 2023	Genome Sciences, University of Washington, Seattle WA
Dec. 2022	Phoenix Children's Hospital, Phoenix AZ
Nov. 2022	Arizona State University, Tempe AZ
Oct. 2021	NIH NHLBI workshop, Virtual
Jun. 2021	Human Cell Atlas general meeting, Virtual
Mar. 2021	Northwestern University, Chicago IL
Feb. 2021	Human Cell Atlas seminar series, Virtual
Feb. 2021	10X Genomics Cell & Gene Therapy Workshop, Virtual
Oct. 2020	10X Genomics user group meeting, Virtual
Oct. 2020	ATS RCMB Webinar, Virtual
Aug. 2020	ATS annual meeting, Virtual
Feb. 2020	Penn State University, State College PA
Oct. 2019	10X Genomics user group meeting, Denver CO
Sep. 2019	University of Idaho, Moscow ID
May. 2019	Arizona Symposium in Regenerative Medicine, Phoenix, AZ
Mar. 2019	Melbourne Integrative Genomics, University of Melbourne, Melbourne, Australia
Feb. 2019	Cellular and Molecular Medicine, University of Arizona, Tucson, AZ
Feb. 2018	Center for Evolutionary Medicine, Arizona State University, Tempe, AZ
Jan. 2018	Chan Zuckerberg Biohub, San Francisco, CA
Sep. 2017	Baylor Scott & White Research Institute, Dallas, TX
Oct. 2017	American Society of Human Genetics meeting (Agilent sponsored seminar), Orlando, FL

Funding and support

R01	Kalhan	08/15/2025 - 07/31/2029
R01HL122477		
Title: Transitions from Impaired Respiratory Health to Lung Disease		
Role: Co-I		
P01HL172729	Banovich	09/17/2024 - 07/31/2029

NIH NHLBI

Title: Project 4: Defining the Molecular Natural History of Early and Progressive Pulmonary Fibrosis
Role PI

P01HL172729 Banovich 09/17/2024 - 07/31/2029

NIH NHLBI

Title: Genomics Core

Role PI

U01HL175444 Kropski, Sucre, and Banovich (PIs) 09/01/2024 - 08/31/2029

NIH NHLBI

Title: Unraveling the molecular origins of chronic parenchymal lung diseases

Role: PI

R01HL145372 Banovich and Kropski (PIs) 01/01/2019-04/30/2028

NIH NHLBI

Title: Spatiotemporal genomic regulation of disease initiation and progression in pulmonary fibrosis

Role: PI

R01HL168556 Sucre 05/20/2023-04/30/2028

NIH NHLBI

Title: Integrated Molecular and Cellular Drivers of Alveologenesis

Role: Co-I

R01CA254271 Badie and Brown 08/01/2020-04/30/2026

NIH NCI

Title: Clinical Evaluation of Chlorotoxin-redirected Chimeric Antigen Receptor (CAR) T cells for Treatment of Glioblastoma.

Role: Co-I

Grant Wang 01/15/2023-01/14/2026

The Marcus Foundation Inc.

Title: CAR-T cell priming of an endogenous immune response to overcome antigen escape

Role: Co-I

R01HG011886 Banovich and McCarthy (PIs) 09/15/2022-06/30/2026

NIH NHGRI

Title: Integrated analysis of multi-omic QTLs at single cell resolution

Role: PI

Completed

Grant Wang and Banovich (PIs) 07/15/2022-07/15/2025

V Foundation for Cancer Research

Title: Patient-driven improvement of CAR T cell therapy for pediatric brain tumors

Role: PI

Grant Banovich 12/01/2024-11/30/2024

Chan Zuckerberg Initiative

Title: Immune cell atlas of environmental and ancestral diversity in Indonesia

Role: PI

Grant Kropski and Banovich (PIs) 07/01/2021-12/31/23

Three Lakes Foundation

Title: Defining the molecular pathogenesis of early pulmonary fibrosis

Role: PI

W81XWH1910416 Banovich and Kropski (PIs) 08/01/2019-07/31/2023

DOD

Integrated molecular pathogenesis of pulmonary fibrosis

Role: PI

Grant Kropski (PI) 07/01/2018 - 06/31/2021

Doris Duke Charitable Foundation Clinical Scientist Development Award

Title: Mechanisms of disease initiation and propagation in pulmonary fibrosis

Role: Co-I

Fellowship Banovich (PI) 03/01/2018-2/28/2019

Multiple Myeloma Research Foundation

Identification and characterization of genetic vulnerabilities in two subtypes of multiple myeloma.

Role: PI

Grant Keats (PI) 09/01/2017 - 08/31/2018

Chan Zuckerberg Initiative, an advised fund of Silicon Valley Community Foundation

Title: Developing robust methods to process solid tissues for single cell RNA sequencing.

The project aims to develop standard operating procedures for the processing and storage of solid tissues for scRNA-seq.

Role: Co-I

F31 AG 044948 Banovich (PI)

03/01/2014-09/30/2016

NIH/NIA

Title: Genetic Factors Governing Inter-individual Variation to Oxidative Stress Response.

T32 GM 719739 Banovich (PI)

10/01/2011-02/28/2014

NIH

Title: Genetics and Gene Regulation Training Grant.

Academic Honors

2016 Charles J. Epstein Trainee Awards for Excellence in Human Genetics Research Semifinalist

2015 Departmental nominee for the Weintraub Graduate Student Award

2014 - 2016 Ruth L. Kirschstein National Research Service Awards for Individual Predoctoral Fellows (F31) - National Institute of Aging

2011 - 2014	NIH Genetics and Regulation Training Grant (University of Chicago)
2011	Cynthia Lakin Award, School of Evolution and Social Change, Arizona State University
2011	Undergraduate Mentoring & Diversity Program Travel Award, Society for Molecular Biology and Evolution
2010	Undergraduate Research Assistantship, School of Evolution and Social Change, Arizona State University
2010	Grant in Aid of Research, Sigma Xi, Arizona State University
2009 - 2011	Dean's List, Arizona State University

Teaching Experience

2019	Co Instructor: BMMAG/BMMSG 891: Precision Medicine - Midwestern University, Phoenix, AZ
2017	Software Carpentry Instructor - TGen
2014	Teaching Assistant: HGEN 4700 - Human Genetics, University of Chicago.
2013	Teaching Assistant: HGEN 47300 - Genomics and Systems Biology, University of Chicago.
2013	Teaching Assistant: BIOS 21206 - Human Evolution and Disease, University of Chicago.

Current Trainees

Laavanya Sankaranarayana	Postdoctoral fellow
Annika Vannan	Postdoctoral fellow
Saahithi Mallapragada	PhD student
Son Vo	PhD student
Yafnelt Hernandez	Masters student
Rishika Mudunuri	Postbaccalaureat scholar
Lauren Shiply	Undergraduate researcher

Past Trainees

Kara Ramirez	Masters student
Griffin Azrak	PhD student (rotation)
Linh Bui, PhD	NRSA postdoctoral fellow
Hanyu Chen	Rotation PhD student (City of Hope)
Arnold Federico	Undergraduate researcher
Stephanie Yahn, PhD	Postdoctoral fellow
Heini Natri, PhD	Prevent Cancer Foundation postdoctoral fellow
Sophia Zhang	High school researcher
Danika Kartchner	Undergraduate researcher
Bianca Argente	Undergraduate researcher
Austin Gutierrez	Undergraduate researcher

Thesis Committees

Rayyan Aburajab	2025-
David Ruiz Pardo	2025-
Jiayi Tan	2020-2024
Kimberley Olney	2017-2021

Professional Affiliations

American Society of Human Genetics

American Thoracic Society

Service

Program Committee, American Thoracic Society

Consulting editor JCI insights

NIH CRD study section member

Board of reviewing editors eLife (2019-2024)

Ad Hoc study section member NIH SEP

Ad Hoc study section member DOD Peer Reviewed Medical Research Program

Reviewer for Nature

Reviewer for Science

Reviewer for Cell

Reviewer for Nature Genetics

Reviewer for Nature Biotechnology

Reviewer for Developmental Cell

Reviewer for American Journal of Respiratory and Critical Care Medicine

Reviewer for European Respiratory Journal

Reviewer for Bioinformatics

Reviewer for PLoS Genetics

Reviewer for Molecular Biology and Evolution

Reviewer for Scientific Reports

Reviewer for Cell Reports

Reviewer for Nature Communications

Reviewer for PLoS One

Organizer of MCTB Single Cell Symposium, Phoenix, AZ

Symposium Co-Moderator at the 2018 American Society for Human Genetics Meeting, San Diego, CA

Symposium Co-Moderator at the 2016 American Society for Human Genetics Meeting, Vancouver, Canada

Symposium Co-Chair at the 2015 Society for Molecular Biology and Evolution meeting, Vienna, Austria