

Kathryn A. Whitehead, Ph.D.

Professor

Departments of Chemical Engineering and Biomedical Engineering

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EDUCATION

Ph.D. in Chemical Engineering (2007)

University of California, Santa Barbara, Santa Barbara, CA

Advisor: Professor Samir Mitragotri

Honors Bachelor of Chemical Engineering (2002)

Degree with Distinction, Magna Cum Laude; Minor in Mathematics

University of Delaware, Newark, DE

PROFESSIONAL POSITIONS

Carnegie Mellon University, Departments of Chemical Engineering and Biomedical Engineering (courtesy)

- Professor, 2022 – present
- Associate Professor, 2019 – 2022
- Assistant Professor, 2012 – 2019

Massachusetts Institute of Technology, Koch Institute for Integrative Cancer Research

- Postdoctoral Fellow, 2010 – 2012
- Postdoctoral Associate, 2008 – 2010
- Advisors: Professors Robert Langer & Daniel Anderson

HONORS AND AWARDS (selected)

FRAXA Research Foundation, Research Ingenuity Award (2022)

Elected Fellow, Controlled Release Society (2021)

Elected Fellow, American Institute for Medical and Biological Engineering (2021)

Controlled Release Society Young Investigator Award (2020)

Curtis W. McGraw Research Award, American Society for Engineering Education (2019)

Dean's Early Career Fellowship, Carnegie Mellon University (2019 - 2021)

George Tallman Ladd Research Award, Carnegie Mellon University (2018)

NIH Director's New Innovator Award (2018)

DARPA Director's Fellowship (2018)

Selected Delegate, Academy of Achievement International Summit (2017)

Carnegie Science Center Emerging Female Faculty Award (2017)

DARPA Young Faculty Award (2016)

Cellular and Biomolecular Engineering Young Innovator Award (2016)

Brilliant Ten Award from *Popular Science* (2015)

Selected participant, National Academy of Engineering U.S. Frontiers of Engineering (2015)

Kun Li Award for Excellence in Education, Carnegie Mellon University (2015)

NIH Early Career Reviewer Program, selected participant (2014 – 2016)

MIT Technology Review Innovator Under 35 (2014)

NIH Ruth Kirschstein NRSA (F32) Fellowship (2010 – 2012)

UC Graduate Research and Education in Adaptive Biotechnology Fellowship (2004 – 2006)

Diabetes Technology Society Peterson Research Award (2004)

Controlled Release Society Capsugel/Pfizer Innovative Aspects of Oral Drug Delivery Award (2004)

Chemical Engineering Service Award, University of California, Santa Barbara (2004)

NSF Graduate Fellowship Honorable Mention (2003)

Materials Research Laboratory Fellowship (2002 – 2003)
Outstanding Senior Research Award, University of Delaware (2002)
Chemical Engineering Class of 1952 Scholarship, University of Delaware (2000 – 2002)
Phi Kappa Phi Honor Society (2001)
Just Born Candies Scholarship (2000 – 2003)
Tau Beta Pi Engineering Honor Society (2000)

OTHER EXPERIENCE AND PROFESSIONAL MEMBERSHIPS

- Scientific Advisory Boards: Rampart Bioscience (2022 – present); Enter X Bio (2022 – present); Flagship Ventures NewCo (2021 – present); FoRmulaEx Center for functional RNA delivery, Sweden (2021 – present)
- Boards of Directors: Director-at-Large, Controlled Release Society (2019 – 2021); Director, Controlled Release Society Focus Groups (2019 – 2020)
- Conference Leadership: Vice Chair (2022) & Chair (2024), Gordon Research Conference on Drug Carriers in Medicine & Biology; Chair, Keystone Symposium on Drug Delivery (2019); Inaugural Chair, Controlled Release Society Oral Delivery Focus Group (2017 – 2019); Chair, AIChE Division 22B Bionanotechnology (2016 – 2018)
- Journal Activities: Associate Scientific Advisor, *Science Translational Medicine* (2016 – 2017); Guest editor, *Bioengineering and Translational Medicine* special issue on Nucleic Acid Delivery: Enabling the Drugs of Tomorrow (2016)
- Society Memberships: American Association for Pharmaceutical Sciences (2021 – present); American Association for the Advancement of Science (2021 – present); American Institute of Chemical Engineers (2004 – present); American Institute for Medical and Biological Engineering (2021 – present); Controlled Release Society (2004 – present)
- Academic Memberships: Center for Nucleic Acids Science and Technology, CMU (2013 – present); McGowan Institute for Regenerative Medicine, Univ. of Pittsburgh (2013 – present)

PUBLICATIONS (>9,000 total citations, average ~150 citations per paper)

Peer-Reviewed

1. Lamson, N., Fein, K., Gleeson, J., Xian, S., Newby, A., Chaudhary, N., Melamed, J., Cochran, C., Ball, R., Suri, K., Ahuja, V., Zhang, A., Berger, A., Kolodieznyi, D., Schmidt, B., Silva, G., and Whitehead, K. The strawberry-derived permeation enhancer pelargonidin enables oral protein delivery. *Proceedings of the National Academy of Sciences*, in press, 2022.
2. Doerfler, R., Melamed, J., and Whitehead, K. The effect of infant gastric digestion on human maternal milk cells. *Molecular Nutrition and Food Research*, in press, 2022.
3. Gleeson, J., Chaudhary, N., Fein, K., Doerfler, R., Hredzak-Showalter, T., and Whitehead K. Profiling of mature-stage human breast milk cells identifies six unique lactocyte sub-populations. *Science Advances*, [8: eabm6865](https://doi.org/10.1126/sciadv.2022.8.eabm6865), 2022.
4. Fein, K., Gleeson, J., Cochran, C., Lamson, N., Doerfler, R., Melamed, J., and Whitehead, K. Long-term daily oral administration of intestinal permeation enhancers is safe and effective in mice. *Bioengineering and Translational Medicine*, [doi:10.1002/btm2.10342](https://doi.org/10.1002/btm2.10342), 2022.
5. LoPresti, S., Arral, M., Chaudhary, N., and Whitehead, K. The replacement of helper lipids with charged alternatives in lipid nanoparticles facilitates targeted mRNA delivery to the spleen and lungs. *Journal of Controlled Release*, [345: 819-831](https://doi.org/10.1016/j.jconrel.2022.03.011), 2022.
6. Fein, K., Gleeson, J., Newby, A., and Whitehead, K. Intestinal permeation enhancers enable oral delivery of macromolecules up to 70 kDa in size. *European Journal of Pharmaceutics and Biopharmaceutics*, [doi: 10.1016/j.ejpb.2021.11.010](https://doi.org/10.1016/j.ejpb.2021.11.010), 2022.

7. Melamed, J., Hajj, K., Chaudhary, N., Strelkova, D., Arral, M., Pardi, N., Alameh, M., Miller, J., Farbiak, L., Siegwart, D., Weissman, D., and Whitehead, K. Lipid nanoparticle chemistry determines how nucleoside base modifications alter mRNA delivery. *Journal of Controlled Release*, doi: [10.1016/j.jconrel.2021.11.002](https://doi.org/10.1016/j.jconrel.2021.11.002), 2021.
8. Chaudhary, N., Weissman, D., and Whitehead, K. mRNA vaccines for infectious diseases: Principles, delivery, and clinical translation. *Nature Reviews Drug Discovery*, [20:817-838](https://doi.org/10.1038/s41573-021-0081-2), 2021.
9. Gleeson, J., Fein, K., and Whitehead, K. Oral delivery of peptide therapeutics in infants: Challenges and opportunities. *Advanced Drug Delivery Reviews*, [173:112-124](https://doi.org/10.1016/j.addr.2021.113124), 2021.
1. Gleeson, J., Fein, K., Chaudhary, N., Doerfler, R., Newby, A., and Whitehead, K. The enhanced intestinal permeability of infant mice enables oral protein and macromolecular absorption without delivery technology. *International Journal of Pharmaceutics*, [593:120120](https://doi.org/10.1016/j.ijpharm.2021.120120), 2021.
2. Hajj, K., Melamed, J., Chaudhary, N., Lamson, N., Ball, R., Deluty, S., Yerneni, S., and Whitehead, K. A potent branched-tail lipid nanoparticle enables multiplexed mRNA delivery in vivo. *Nano Letters*, [20\(7\):5167-75](https://doi.org/10.1021/acs.nanolett.0c04175), 2020.
3. Cheng, Y., Shiwarski, D., Ball, R., Whitehead, K., and Feinberg, A. Engineering Aligned Human Skeletal Muscle Tissue Using Decellularized Plant-Derived Scaffolds. *ACS Biomaterials Science & Engineering*, [6\(5\):3046-3054](https://doi.org/10.1021/acscbi.0c01054), 2020.
4. Cochran, K., Lamson, N., and Whitehead, K. Expanding the utility of the dextran sulfate sodium (DSS) mouse model to induce less severe colitis symptoms. *PEERJ*, [8: e8681](https://doi.org/10.21963/peerj.8681), 2020.
5. Brown, T., Whitehead, K., and Mitragotri, S. Materials for oral delivery of proteins and peptides. *Nature Reviews Materials*, [5: 127-148](https://doi.org/10.1038/s41569-020-0048-2), 2020.
6. Zheng, S., Lavrenyuk, K., Fein, K., Lamson, G., Whitehead, K., and Dahl, K. Piperazine derivatives enhance epithelial cell monolayer permeability by increased cell force generation and loss of cadherin structures. *ACS Biomaterials Science & Engineering*, DOI: [10.1021/acscbi.0c01660](https://doi.org/10.1021/acscbi.0c01660), 2019.
7. Lamson, N., Berger, A., and Whitehead, K. Anionic nanoparticles enable the oral delivery of proteins by enhancing intestinal permeability. *Nature Biomedical Engineering*, DOI: [10.1038/s41551-019-0465-5](https://doi.org/10.1038/s41551-019-0465-5), 2019.
8. Levy, E., Samy, K., Lamson, N., Whitehead, K., Kroetz, D., and Desai, T. Reversible inhibition of efflux transporters by hydrogel microdevices. *European Journal of Pharmaceutics and Biopharmaceutics*, [145: 76-84](https://doi.org/10.1016/j.ejpb.2019.04.014), 2019.
9. Lamson, N., Ball, R., Fein, K., and Whitehead, K. Thrifty, rapid intestinal monolayers (TRIM) using Caco-2 epithelial cells for oral drug delivery experiments. *Pharmaceutical Research*, [36: 172](https://doi.org/10.1007/s12013-019-0172-1), 2019.
10. He, J., Hajj, K., Knapp, C., and Whitehead, K. Development of a clinically relevant chemoresistant mantle cell lymphoma cell culture model. *Experimental Biology and Medicine*, DOI: [10.1177/1535370219857594](https://doi.org/10.1177/1535370219857594), 2019.
11. Hajj, K., Ball, R., Deluty, S., Singh, S., Strelkova, D., Knapp, C., and Whitehead, K. Branched-tail lipid nanoparticles potently deliver mRNA due to enhanced ionization at endosomal pH. *Small*. DOI: [10.1002/sml.201805097](https://doi.org/10.1002/sml.201805097), 2019.
12. Kasiewicz, L. and Whitehead, K. Lipid nanoparticles silence TNF α to improve wound healing in diabetic mice. *Bioengineering and Translational Medicine*. DOI: [10.1002/btm2.10123](https://doi.org/10.1002/btm2.10123), 2018.
13. Ball, R., Hajj, K., Vizelman, J., Bajaj, P., and Whitehead, K. Lipid nanoparticle formulations for enhanced co-delivery of siRNA and mRNA. *Nano Letters* , DOI: [10.1021/acsnanolett.8b01101](https://doi.org/10.1021/acsnanolett.8b01101), 2018.
14. Knapp, C., He, J., Lister, J., and Whitehead, K. Lipid nanoparticle siRNA cocktails for the treatment of mantle cell lymphoma. *Bioengineering and Translational Medicine*, DOI: [10.1002/btm2.10088](https://doi.org/10.1002/btm2.10088), 2018.
15. Ball, R., Bajaj, P., and Whitehead, K. Oral delivery of siRNA lipid nanoparticles: Fate in the GI tract. *Scientific Reports*, [8:2178](https://doi.org/10.1038/s41598-018-2178-2), 2018.
16. Hajj, K. and Whitehead, K. Tools for translation: Non-viral materials for therapeutic mRNA delivery. *Nature Reviews Materials*, [2: 2:217056](https://doi.org/10.1038/nrmat217056), 2017.
17. Kasiewicz, L. and Whitehead, K. Recent advances in biomaterials for the treatment of diabetic foot ulcers. *Biomaterials Science*, [5: 1962-75](https://doi.org/10.1039/c6bm00054a), 2017.

18. Cummings, C., Fein, K., Murata, H., Ball, R., Russell, A., and Whitehead, K. ATRP-grown protein-polymer conjugates containing phenylpiperazine selectively enhance transepithelial protein transport. *Journal of Controlled Release*, [255: 270-278](#), 2017.
19. Fein, K., Lamson, N., and Whitehead, K. Structure-function analysis of phenylpiperazine derivatives as intestinal permeation enhancers. *Pharmaceutical Research*, [34: 1320-1329](#), 2017.
20. Ball, R., Bajaj, P., and Whitehead, K. Achieving long term stability of lipid nanoparticles: Examining the effect of pH, temperature, and lyophilization. *International Journal of Nanomedicine*, [12: 305-315](#), 2016.
21. Knapp, C., Guo, P., and Whitehead, K. Lipidoid tail structure strongly influences siRNA delivery activity. *Cellular and Molecular Bioengineering*, [9\(3\): 305-314](#), 2016.
22. Knapp, C., He, J., Lister, J., and Whitehead, K. Lipidoid nanoparticle mediated silencing of Mcl-1 induces apoptosis in mantle cell lymphoma. *Experimental Biology and Medicine*, [241:1007-1013](#), 2016.
23. Lamson, N., Cusimano, G., Suri, K., Zhang, A., and Whitehead, K. The pH of piperazine derivative solutions predicts their utility as transepithelial permeation enhancers. *Molecular Pharmaceutics*, [13\(2\):578-585](#), 2016.
24. Kasiewicz, L. and Whitehead, K. Silencing TNF alpha with lipidoid nanoparticles downregulates both TNF alpha and MCP-1 in an in vitro co-culture model of diabetic foot ulcers. *Acta Biomaterialia*, [32\(3\):120-128](#), 2016.
25. Ball, R., Knapp, C., and Whitehead, K. Lipidoid nanoparticles for siRNA delivery to the intestinal epithelium: in vitro investigations in a Caco-2 model. *PLOS One*, [10\(7\) DOI:10.1371/journal.pone.0133154](#), 2015.
26. Veiseh, O., Tang, B., Whitehead, K., Langer, R., and Anderson, D. Managing diabetes with nanomedicine: Challenges and opportunities. *Nature Reviews Drug Discovery*, [14: 45-57](#), 2015.
27. Knapp, C. and Whitehead, K. In pursuit of a moving target: Nanotherapeutics for the treatment of Non-Hodgkin B-cell lymphoma. *Expert Opinion on Drug Delivery*, [11\(12\): 1923-1937](#), 2014.
28. Whitehead, K., Dorkin, J., Vegas, A., Chang, P., Veiseh, O., Matthews, J., Fenton, O., Zhang, Y., Olejnik, K., Chen, D., Barros, S., Klebanov, B., Novobrantseva, T., Langer, R., and Anderson, D. Degradable lipid nanoparticles with predictable in vivo siRNA delivery activity. *Nature Communications*, [5: 4277 DOI:10.1038/ncomms5277](#), 2014.
29. Mizrahi, B., Shankarappa, S., Hickey, J., Dohlman, J., Timko, B., Whitehead, K., Lee, J. J., Langer, R., Anderson, D., and Kohane, D. A stiff injectable biodegradable elastomer. *Advanced Healthcare Materials*, [23\(12\): 1527-33](#), 2013.
30. Whitehead, K., Matthews, J., Chang, P., Dorkin, J. R., Niroui, F., Severgnini, M., Anderson, D. In vitro – in vivo translation of lipid nanoparticles for hepatocellular siRNA delivery. *ACS Nano*, [6\(8\): 6922-9](#), 2012.
31. Chen, D., Love, K., Chen, Y., Eltoukhy, A., Kastrop, C., Sahay, G., Jeon, A., Dong, Y., Whitehead, K., Langer, R., and Anderson, D. Rapid discovery of potent siRNA-containing lipid nanoparticles enabled by controlled microfluidic formulation. *JACS*, [134\(16\): 6948-51](#), 2012.
32. Kanasty, R., Whitehead, K., Vegas, A., Langer, R., and Anderson, D. Action and reaction: The biological response to siRNA and its delivery vehicles. *Molecular Therapy*, [20\(3\): 513-24](#), 2012.
33. Novobrantseva, T. I., Borodovsky, A., Wong, J., Klebanov, B., Zafari, M., Yucius, K., Querbes, W., Ge, P., Ruda, V., Milstein, S., Speciner, L., Duncan, R., Barros, S., Basha, G., Cullis, P., Akinc, A., Donahoe, J.S., Jayaprakash, N., Jayaraman, M., Bogorad, R.L., Love, K.T., Whitehead, K., Levins, C., Manoharan, M., Swirski, F.K., Weissleder, R., Langer, R., Anderson, D.G., de Fougères, A., Nahrendorf, M., Kotliansky, V. Systemic RNAi-mediated gene silencing in non-human primate and rodent myeloid cells. *Molecular Therapy Nucleic Acids*, [1, e4; DOI:10.1038/mtna.2011.3](#), 2012.
34. Whitehead, K., Sahay, G., Li, G., Love, K., Alabi, C., Ma, M., Zurenko, C., Querbes, W., Langer, R., and Anderson, D. Synergistic silencing: Binary combinations of lipid-like materials for efficacious siRNA delivery. *Molecular Therapy*, [19\(9\):1688-94](#), 2011.
35. Siegwart, D., Whitehead, K., Nuhn, L., Sahay, G., Cheng, H., Jiang, S., Ma, M., Lytton-Jean, A., Vegas, A., Fenton, P., Levins, C., Love, K., Lee, H., Cortez, C., Collins, S., Li, Y., Jang, J., Querbes, W., Zurenko, C., Novobrantseva, T., Langer, R., and Anderson, D. Combinatorial synthesis of chemically diverse core-shell nanoparticles for intracellular delivery. *PNAS*, [108:12996-13001](#), 2011.

36. Whitehead, K., Dahlman, J., Langer, R., and Anderson, D. Silencing or stimulation? siRNA delivery and the immune system. *Annual Review of Chemical and Biomolecular Engineering*, **2**:77-96, 2011.
37. Timko, B., Whitehead, K., Gao, W., Kohane, D., Farokhzad, O., Anderson, D., and Langer, R. Advances in drug delivery. *Annual Review of Materials Research*, **41**:1-20, 2011.
38. Mahon, K., Love, K., Whitehead, K., Akinc, A., Leshchiner, E., Leshchiner, I., Langer, R., and Anderson, D. A combinatorial approach to determine functional group effects on lipidoid-mediated siRNA delivery. *Bioconjugate Chemistry*, **21**(8):1448-54, 2010.
39. Love, K., Mahon, K., Levins, C., Whitehead, K., Querbes, W., Dorkin, R., Qin, J., Cantley, W., Qin, J., Racie, T., Frank-Kamesky, M., Yip, K. N., Alvarez, R., Sah, D., de Fougères, A., Fitzgerald, K., Kotliński, V., Akinc, A., Langer, R., and Anderson, D. Lipid-like materials for low dose, in vivo gene silencing. *PNAS*, **107**(5):1864-9, 2010.
40. Cheng, H., Kastrup, C., Ramanathan, R., Siegwart, D., Ma, M., Bogatyrev, S., Xu, Q., Whitehead, K., Langer, R., Anderson, D. Nanoparticulate cellular patches for cell-mediated tumortropic delivery. *ACS Nano*, **4**(2):625-31, 2010.
41. Whitehead, K., Langer, R., and Anderson, D. Knocking down barriers: Advances in siRNA delivery. *Nature Reviews Drug Discovery*, **8**(2):129-38, 2009.
42. Whitehead, K. and Mitragotri, S. Mechanistic analysis of chemical permeation enhancers for oral drug delivery. *Pharmaceutical Research*, **25**: 1412-9, 2008.
43. Whitehead, K., Karr, N., and Mitragotri, S. Discovery of synergistic permeation enhancers for oral drug delivery. *Journal of Controlled Release*, **128**: 128-33, 2008.
44. Whitehead, K., Karr, N., and Mitragotri, S. Safe and effective permeation enhancers for oral drug delivery. *Pharmaceutical Research*, **25**: 1782-8, 2008.
45. Whitehead, K. and Mitragotri, S. Oral delivery of macromolecules. *Drug Delivery Companies Report*, Pharmaventures. Spring/Summer 2005.
46. Whitehead, K., Shen, Z., and Mitragotri, S. Oral delivery of macromolecules using intestinal patches: Applications for insulin delivery. *Journal of Controlled Release*, **98**: 37-45, 2004.

Other Articles

1. Karikó, K., Whitehead, K., and van der Meel, R. What does the success of mRNA vaccines tell us about the future of biological therapeutics? *Cell Systems*, **12**(8): 757-758, 2021.
2. Whitehead, K. A new lease on half-life. *Science Translational Medicine*, **8**: 369ec201, Dec. 14, 2016.
3. Whitehead, K. Muscling out gene mutations. *Science Translational Medicine*, **8**: 367ec193, Nov. 30, 2016.
4. Whitehead, K. Protecting kids with a patch. *Science Translational Medicine*, **8**: 361ec169, Oct. 19, 2016.
5. Whitehead, K. Gobbling up inflammation to ameliorate autoimmunity. *Science Translational Medicine*, **8**: 355ec145, Sept. 7, 2016.
6. Whitehead, K. A captive peptide for T cell activation. *Science Translational Medicine*, **8**: 349ec121, July 27, 2016.
7. Whitehead, K. Pancreatic cells play switcheroo. *Science Translational Medicine*, **8**: 343ec97, June 15, 2016.
8. Whitehead, K. A one-two punch for pain control. *Science Translational Medicine*, **8**: 336ec69, April 27, 2016.
9. Whitehead, K. A cage for pathogens. *Science Translational Medicine*, **8**: 331ec49, March 23, 2016.

INVITED PRESENTATIONS & SEMINARS

Universities

1. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Department of Biomedical Engineering, University of California, Irvine (virtual), April 2022.

2. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Children's Hospital, University of Pittsburgh (virtual), April 2022.
3. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Department of Chemical Engineering, Lehigh University (virtual), February 2022.
4. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Nanotechnology Seminar Series, Massachusetts Institute of Technology (virtual), December 2021.
5. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Department of Materials Science, Drexel University (virtual), October 2021.
6. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. College of Pharmacy, University of Texas at Austin (virtual), June 2021.
7. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Department of Chemical and Biomolecular Engineering, Cornell University (virtual), April 2021.
8. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Brain Immunology and Glia (BIG) Seminar Series, University of Missouri (virtual), April 2021.
9. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Department of Materials Science and Engineering, Korea University (virtual), March 2021.
10. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Department of Chemical and Biomolecular Engineering, Georgia Institute of Technology (virtual), March 2021.
11. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Department of Chemical Engineering, Stanford University (virtual), March 2021.
12. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Department of Chemical and Biomolecular Engineering, Johns Hopkins University (virtual), February 2021.
13. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Department of Biomedical Engineering, University of Southern California (virtual), February 2021.
14. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Department of Pharmaceutical Sciences, University of Michigan (virtual), February 2021.
15. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Science Foundation Ireland Centre for Research in Medical Devices (CÚRAM), National University of Ireland Galway (virtual), February 2021.
16. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Department of Chemical and Biomolecular Engineering, University of Illinois at Urbana Champaign (virtual), January 2021.
17. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Department of Chemical and Biomolecular Engineering, University of California, Berkeley (virtual), January 2021.
18. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Centre for Biosystems Science and Engineering, Indian Institute of Science (virtual), January 2021.
19. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. School of Pharmacy, Oregon State University & Oregon Health Sciences University (virtual), January 2021.
20. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. University of Cincinnati Oesper Symposium in honor of Nicholas Peppas (virtual), November 2020.
21. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Department of Drug Discovery and Development, School of Pharmacy, Auburn University (virtual), September 2020.
22. Whitehead, K. Enabling the medicines of tomorrow: Lipid nanoparticles for RNA delivery. Integrative Genomics Institute, University of California, Berkeley, CA, January 2020.
23. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, November 2019.
24. Whitehead, K. Lipid nanoparticles for RNA delivery: A how-to guide for hacking gene expression. Department of Chemical and Biomolecular Engineering, University of Notre Dame, South Bend, IN, October 2019.

25. Whitehead, K. Lipid nanoparticles for RNA delivery: A how-to guide for hacking gene expression. Department of Biomedical Engineering, Tufts University, Medford, MA, September 2019.
26. Whitehead, K. Lipid nanoparticles for RNA delivery: A how-to guide for hacking gene expression. Department of Chemical and Biomolecular Engineering, University of Pennsylvania, Philadelphia, PA, April 2019.
27. Whitehead, K. Lipid nanoparticles for RNA delivery: A how-to guide for hacking gene expression. Department of Chemical and Biomedical Engineering, West Virginia University, Morgantown, WV, March 2019.
28. Whitehead, K. Lipid nanoparticles for RNA delivery: A how-to guide for hacking gene expression. Department of Chemical Engineering, University of Florida, Gainesville, FL, February 2019.
29. Whitehead, K. Lipid nanoparticles for RNA delivery: A how-to guide for hacking gene expression. School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, February 2019.
30. Whitehead, K. Lipid nanoparticles for RNA delivery: A how-to guide for hacking gene expression. Department of Chemical Engineering, University of Delaware, Newark, DE, October 2018.
31. Whitehead, K. Lipid nanoparticles for RNA delivery: A how-to guide for hacking gene expression. Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA, September 2018.
32. Whitehead, K. Silica nanoparticles enable oral protein delivery. Merck Lecture, Langer Lab Seminar Series, Massachusetts Institute of Technology, June 2018.
33. Whitehead, K. Lipid nanoparticles for mRNA delivery: A how-to guide for hacking gene expression. University of British Columbia, Michael Scott Laboratories, May 2018.
34. Whitehead, K. Lipid-like materials for RNA delivery: A how-to guide for hacking gene expression. University of Pittsburgh Cancer Institute, January 2018.
35. Whitehead, K. Lipid-like materials for RNA delivery: A how-to guide for hacking gene expression. Center for Nanomedicine, Johns Hopkins University, June 2017.
36. Whitehead, K. Lipid-like materials for RNA delivery: A how-to guide for hacking gene expression. Department of Chemical Engineering, University of Washington, April 2017.
37. Whitehead, K. Enabling the medicine of tomorrow: Lipid nanoparticles for applications in RNA delivery. Center for Targeted Therapeutics and Translational Medicine, University of Pennsylvania, April 2017.
38. Whitehead, K. Giving genes the silent treatment: Engineering lipid materials for potent siRNA delivery. Molecular Biophysics and Structural Biology Program, University of Pittsburgh and Carnegie Mellon University, November 2016.
39. Whitehead, K. Giving genes the silent treatment: Lipid nanoparticles for siRNA delivery. Department of Biomedical Engineering, Penn State University, September 2016.
40. Whitehead, K. Giving genes the silent treatment: Lipid nanoparticles for siRNA delivery. Department of Chemical Engineering, Tufts University, February 2016.
41. K. Whitehead. Giving genes the silent treatment: Lipid nanoparticles for siRNA delivery. Department of Chemical Engineering, University of Rhode Island, April 2015.
42. K. Whitehead. Giving genes the silent treatment: Lipid nanoparticles for siRNA delivery. Department of Pharmaceutical Sciences, Duquesne University, December 2014.
43. K. Whitehead. Lipid-like materials for therapeutic gene silencing. University of Delaware, Department of Chemical Engineering Centennial Celebration, September 2014.
44. Whitehead, K. Giving genes the silent treatment: Lipid nanoparticles for siRNA delivery. Department of Biomedical Engineering, Carnegie Mellon University, October 2013.
45. Whitehead, K. Giving genes the silent treatment: Lipid nanoparticles for siRNA delivery. Colloids, Polymers, and Surfaces Seminar, Carnegie Mellon University, September 2013.

Conferences

1. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. The 11th Symposium on Pharmaceutical Profiling in Drug Discovery (Uppsala, Sweden; virtual), January 2022.
2. Whitehead, K. The path to mRNA vaccines. Nano Drug Delivery Symposium/ NanoDDS (virtual), December 2021.
3. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. The National Institute for Pharmaceutical Technology & Education (NIPTE) Annual Conference (virtual), November 2021.
4. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. 9th International mRNA Health Conference (Berlin, Germany; virtual), November 2021.
5. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. 6th Bioengineering and Translational Medicine Conference, October 2021.
6. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Gordon Research Conferences (GRC) Connects: Preclinical Form and Formulation for Drug Discovery (virtual), June 2021.
7. Whitehead, K. Self-assembled Lipid Nanoparticles for RNA Delivery: A How-to Guide for Hacking Gene Expression. Foundations of Nanoscience (FNANO) Conference (virtual), April 2021.
8. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Plenary talk, Controlled Release Society – Spain Portugal Local Chapter Annual Meeting (virtual), January 2021.
9. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. The 15th Annual Peptide Therapeutics Symposium (virtual), October 2020.
10. Whitehead, K. Controlled Release Society Young Investigator Award Talk. Controlled Release Society Annual Meeting (virtual), June 2020.
11. Whitehead, K. A strawberry-derived solution for oral protein delivery. Area 15 D/E, American Institute of Chemical Engineers Annual Meeting, Orlando, FL, November 2019.
12. Whitehead, K. Enabling the medicines of tomorrow: Lipid nanoparticles for enhanced co-delivery of RNAs. Keystone Symposium on Delivering Therapeutics Across Biological Barriers, Dublin, Ireland, May 2019.
13. Whitehead, K. Next-generation mRNA delivery systems with precise spatial and temporal activity. DARPA PREPARE Meeting, New York City, NY, April 2019.
14. Whitehead, K. Lipid Nanoparticle Formulations for the Synergistic Co-Delivery of siRNA and mRNA. Area 15 D/E, American Institute of Chemical Engineers Annual Meeting, Pittsburgh, PA, October 2018.
15. Whitehead, K. Silica Nanoparticles Act as Permeation Enhancers to Enable Oral Protein Delivery. WIC 20th Anniversary Symposium, American Institute of Chemical Engineers Annual Meeting, Pittsburgh, PA, October 2018.
16. Whitehead, K. Lipid-like Materials for RNA Delivery: Predicting In Vivo Efficacy. 22B Bionanotechnology Plenary Session, American Institute of Chemical Engineers Annual Meeting, Pittsburgh, PA, October 2018.
17. Whitehead, K. Lipid nanoparticles for mRNA delivery: A how-to guide for hacking gene expression. Keynote presentation. Canadian Biomaterials Society Annual Meeting, May 2018.
18. Whitehead, K. Next-generation mRNA delivery systems with precise spatial and temporal activity. DARPA Safe Genes Meeting, April 2018.
19. Whitehead, K. Lipid-like materials for RNA delivery: A how-to guide for hacking gene expression. Materials Research Society Fall Meeting, November 2017.
20. Whitehead, K. Lipid-like materials for RNA delivery: A how-to guide for hacking gene expression. American Institute of Chemical Engineers Annual Meeting, October 2017.
21. Whitehead, K. Next-generation mRNA delivery systems with precise spatial and temporal activity. DARPA Safe Genes Meeting, May 2017.
22. Whitehead, K. Lipidoid tail structure strongly influences siRNA delivery activity. Biomedical Engineering Society Annual Meeting, October 2016.

23. Whitehead, K. Giving Genes the Silent Treatment: Lipid Nanoparticles for Potent siRNA Delivery. American Association for Pharmaceutical Sciences – National Biotechnology Conference, May 2016.
24. Whitehead, K. RNA Nanobiomaterials: Promise and Potential. McGowan Institute for Regenerative Medicine Scientific Retreat, 15, March 2016.
25. K. Whitehead. Lipidoid Nanoparticles for the treatment of Non-Hodgkin lymphoma. Gordon Research Conference, Biomaterials, July 2015. (invited short talk selected from posters)
26. K. Whitehead. RNA interference therapeutics using lipidoid nanoparticles. Biomedical Engineering Materials and Applications (BEMA) Roundtable of the National Academies, April 2015.
27. K. Whitehead. Lipid-like materials for siRNA delivery. ACS Central Regional Meeting, October 2014.
28. K. Whitehead. Lipid nanoparticles for the delivery of siRNA to immune cells. Nanomedicine and Drug Delivery Symposium (NanoDDS), October 2014.
29. K. Whitehead. Effective drug delivery systems. EmTech Conference, September 2014.
30. K. Whitehead. Lipid-like materials for drug delivery. SPARK Retreat on the Development of Next-Generation Biohybrids for Therapeutic Applications, September 2014.
31. Whitehead, K. Lipid nanoparticle siRNA delivery systems with predictable in vivo siRNA delivery activity. Biomedical Engineering Society Annual Meeting, September 2013.

Industry

1. Whitehead, K. Design of safe and effective RNA delivery systems. L'Oreal (virtual), July 2022.
2. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Tessera Therapeutics (virtual), March 2022.
3. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Scribe Therapeutics (virtual), October 2021.
4. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Luye Pharma Group (virtual), October 2021.
5. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Translate Bio (virtual), September 2021.
6. Whitehead, K. From farm to pharmacy: A strawberry-derived solution to oral protein delivery. Senda Biosciences (virtual), June 2021.
7. Whitehead, K. Lipid nanoparticles for RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond. Pittsburgh Bio Breakfast / LifeX Seminar Series (virtual), May 2021.
8. Whitehead, K. Oral Protein Delivery: New Solutions to a Longstanding Challenge. Merck (virtual), March 2021.
9. Whitehead, K. Oral Protein Delivery: New Solutions to a Longstanding Challenge. Flagship Pioneering (virtual), February 2021.
10. Whitehead, K. Enabling the medicines of tomorrow: Lipid nanoparticles for RNA delivery. Syngenta (virtual), August 2020.
11. Whitehead, K. Permeation Enhancement Strategies to Enable Oral Protein Delivery. Janssen Pharmaceuticals (Johnson and Johnson), Spring House, PA, December 2018.
12. Whitehead, K. Lipid-like materials for RNA delivery: An Update. Moderna Therapeutics, Cambridge, MA, September 2018.
13. Whitehead, K. Lipid nanoparticles for mRNA delivery: A how-to guide for hacking gene expression. Translate Bio, Lexington, MA, June 2018.
14. Whitehead, K. Lipid-like materials for RNA delivery: A how-to guide for hacking gene expression. Casebia Therapeutics, Cambridge, MA, November 2017.

15. Whitehead, K. Lipid-like materials for RNA delivery: A how-to guide for hacking gene expression. Moderna Therapeutics, Cambridge, MA, November 2017.
16. Whitehead, K. Giving genes the silent treatment: Lipid-like materials for siRNA delivery. Bristol-Myers Squibb, August 2017.

CONTRIBUTED PRESENTATIONS (Award-winning, presenter underlined)

Selected from >90 presentations

1. Melamed, J., Arral, M., Chaudhary, N., and Whitehead, K. Lipid nanoparticles deliver mRNA to pancreatic islets following intraperitoneal injection. Oral presentation, Biomedical Engineering Society Annual Meetings (virtual), October 2021.
**Finalist for Future Faculty Presentation Award.*
2. Arral, M. and Whitehead, K. CD-1 outbred mice are a cost-effective model for mRNA lipid nanoparticle efficacy. Poster presentation, Controlled Release Society Annual Meeting (virtual), July 2021.
**Winner of Controlled Release Society Poster Prize.*
3. Melamed, J., Hajj, K., and Whitehead, K. A potent branched tail lipid nanoparticle enables multiplexed mRNA delivery and gene editing in vivo. Oral presentation, Society for Biomaterials (virtual), April 2021.
Oral presentation, Society for Biomaterials (virtual), April 2021.
**Winner of the Society for Biomaterials Postdoctoral Recognition Award.*
4. Melamed, J., Hajj, K., and Whitehead, K. Nucleoside base modifications improve mRNA delivery in carrier-dependent manner. Oral presentation, Controlled Release Society Annual Meeting (virtual), June 2020.
**Winner of the Gene Editing and Gene Delivery Focus Group Trainee Award.*
5. Friis, K., Kunalingam, L., Whitehead, K., and Bak, A. Applying Design of Experiment in screening new lipid nanoparticle formulations for functional mRNA delivery. Poster presentation, Gordon Research Conference on Preclinical Form and Formulation for Drug Discovery, June 2019.
**Winner of People's Choice Award.*
6. Hajj, K. and Whitehead, K. 22B Bionanotechnology Award Session: Lipid Nanoparticle Ionization at Endosomal pH Is a Cell-Free Predictor of mRNA Delivery Efficacy In Vivo. Podium presentation, American Institute of Chemical Engineers Annual Meeting, October 2018.
**Winner of AIChE 22B Graduate Student First Place Presentation Prize.*
7. Fein, K., Cummings, C., Murata, H., Ball, R., Russell, A., and Whitehead, K. Proteins Covalently Conjugated to Phenylpiperazine-Containing Polymers Experience Selectively Enhanced Intestinal Epithelial Transport. Poster presentation, American Institute of Chemical Engineers Annual Meeting, October 2018.
**Winner of AIChE Division 15 Poster Presentation Award.*
8. Hajj, K., Ball, R., Knapp, C., and Whitehead, K. Lipid nanoparticle ionization at endosomal pH is a cell-free predictor of mRNA delivery efficacy in vivo. Poster presentation, Gordon Research Conference, Drug Carriers in Medicine and Biology, August 2018.
**Winner of Gordon Research Symposium Poster Prize.*
9. Hajj, K., Ball, R., Knapp, C., and Whitehead, K. Lipid nanoparticle ionization at endosomal pH is a cell-free predictor of mRNA delivery efficacy in vivo. Podium presentation, Controlled Release Society Annual Meeting, July 2018.
**Winner of Controlled Release Society Poster Prize.*
10. Ball, R., Bajaj, P., and Whitehead, K. 22B Graduate Award Session: Oral delivery of siRNA lipid nanoparticles: Fate in the GI tract. Podium presentation, American Institute of Chemical Engineers Annual Meeting, October 2017.
**Winner of AIChE 22B Graduate Student First Place Presentation Prize.*
11. Kasiewicz, L. and Whitehead, K. 8B Graduate Award Session: Understanding how lipid nanoparticle structure affects immune response. Podium presentation, American Institute of Chemical Engineers Annual Meeting, October 2017.
**Winner of AIChE 8B Graduate Student First Place Presentation Prize.*

12. [Ball, R.](#) and Whitehead, K. Lipidoid siRNA Nanoparticles for Intestinal Disease Therapeutics. Poster presentation. McGowan Institute for Regenerative Medicine Scientific Retreat, March 2015.
**Winner of Best Poster Award.*
13. Whitehead, K., Shen, Z. and Mitragotri, S. Oral insulin delivery using intestinal patches. Poster presentation, Diabetes Technology Society Meeting, 4, October 2004.
**Winner of Peterson Research Award.*
14. Whitehead, K., Shen, Z., and Mitragotri, S. Oral delivery of macromolecules using intestinal patches: Applications for insulin delivery. Podium presentation, Proceedings of the Controlled Release Society, 31, July 2004.
**Winner of Capsugel/Pfizer Innovative Aspects of Oral Delivery Award. Winner of Peterson Research Award.*

PATENTS (Awarded)

1. Mahon, K., Love, K., Levins, C., Whitehead, K., Langer, R., and Anderson, D. Amino alcohol lipidoids and uses thereof, US Patent 11,414,393.
2. Anderson, D., Langer, R., Levins, C., Love, K., Mahon, K., and Whitehead, K. Aminoalcohol lipidoids and uses thereof, US Patent 10,844,028.
3. Anderson, D., Langer, R., Levins, C., Love, K., Mahon, K., and Whitehead, K. Aminoalcohol lipidoids and uses thereof, US Patent 10,189,802.
4. Anderson, D., Whitehead, K., Dorkin, J., Vegas, A., Zhang, Y., and Langer, R. Amine-containing lipidoids and uses thereof, US Patent 9,439,968.
5. Anderson, D., Whitehead, K., Dorkin, J., Vegas, A., Zhang, Y., and Langer, R. Amine-containing lipidoids and uses thereof, US Patent 9,227,917.
6. Vegas, A., Whitehead, K., Dorkin, J., Langer, R., and Anderson, D. Alpha-aminoamidine polymers and uses thereof, US Patent 9,872,911.
7. Mahon, K., Love, K., Levins, C., Whitehead, K., Langer, R., and Anderson, D. Amino alcohol lipidoids and uses thereof, US Patent 9,556,110.
8. Mahon, K., Love, K., Levins, C., Whitehead, K., Langer, R., and Anderson, D. Amino alcohol lipidoids and uses thereof, US Patent 8,969,353.
9. Mahon, K., Love, K., Levins, C., Whitehead, K., Langer, R., and Anderson, D. Amino alcohol lipidoids and uses thereof, US Patent 8,450,298.

MEDIA

Television and Video

1. CBS Evening News, Segment with Chief Medical Correspondent Dr. Jonathan LaPook, "[The decades of development behind mRNA vaccine technology](#)", February 27, 2022.
2. MIT.nano Seminar, "[RNA delivery: SARS-CoV2 vaccines, chemistry, and beyond](#)", December 2021.
3. TED Talk, TEDMonterey, "[The tiny balls of fat that could revolutionize medicine](#)", August 2021.
4. *Nature* Webinar, "[Lipid nanoparticles for mRNA vaccine delivery](#)", February 2021.
5. Cheddar TV, Cheddar Innovates program, TV interview. "[Researchers are testing alternative treatments for individuals with diabetes](#)", October 2019.
6. MIT Technology Review, EmTech talk. "[Meet the Innovators Under 35](#)", September 2014.

Podcasts and Radio

1. Nature Biotechnology, podcast interview. "[Drug delivery roundtable: Langer and Whitehead](#)", December 2021.

2. National Public Radio (NPR) TED Radio Hour, radio and podcast interview. "[How can we safely delivery vaccines to the right cells?](#)", September 2021.
3. Sciencious Soundwaves, podcast interview. "[How RNA nanotherapeutics may revolutionize medicine](#)", September 2021.
4. TED Talks Daily podcast. "[The tiny balls of fat that could revolutionize medicine](#)", August 2021.
5. 90.5 WESA Pittsburgh NPR, radio interview and news article. "[Breast milk might hold key to better infant intake of medicines](#)", March 2020.
6. People Behind the Science, podcast interview. "[Dr. Kathryn Whitehead: Developing novel nature-inspired drug delivery systems](#)", November 2018.
7. Innovation Unleashed podcast interview. "[Using nanoparticles to discover, develop and create new drugs to treat disease](#)", March 2017.
8. 90.5 WESA Pittsburgh NPR, radio interview and news article. "[Engineered nanoparticles show promise for targeted cancer therapy](#)", October 2016.
9. McGowan Institute for Regenerative Medicine, podcast interview. "[Podcast #140: Kathryn Whitehead, Ph.D.](#)", October 2014.

News Features, Blog Posts, and Journal Articles

1. Axios Science, news article on Gleeson et al., *Science Advances* (2022). "[Breast milk's cellular ingredients](#)", July 2022.
2. Pittsburgh Business Times, news article. "[Dr. Kathryn Whitehead is on the cutting edge of vaccine development](#)", February 2022.
3. BBC News, news article. "[Could mRNA make us superhuman?](#)", November 2021.
4. Pittsburgh Business Times, news article, "[CMU on the front lines of improving messenger RNA vaccine delivery](#)", September 2021.
5. Reuters, Fact Check, "[No evidence graphene oxide is present in available COVID-19 vaccines via lipid nanoparticles](#)", August 2021.
6. Chemical & Engineering News, news article, "[Without these lipid shells, there would be no mRNA vaccines for COVID-19](#)", March 2021.
7. Integrative Genomics Institute, University of California, Berkeley, written interview (2020). "[Spotlight: Kathryn Whitehead](#)", February 2020.
8. *Nature Biomedical Engineering*, News and Views article on Lamson et al., *Nature BME* (2019). "[A new opening for orally taken peptide drugs](#)", January 2020.
9. Curious Science Writers, news article. "[A sip of medicine with every glass: Engineering milk cells to deliver drugs](#)", January 2020.
10. Chemical & Engineering News, news article on Lamson et al., *Nature BME* (2019). "[Nanoparticles enable oral insulin delivery in mice](#)", November 2019.
11. Biotechnika, "[Pelargonidin in strawberries – key for developing insulin pills](#)", August 2019.
12. PR Newswire, news article on He et al., *Exp Biol Med* (2019). "[A new model for lymphoma drug discovery](#)", August 2019. Picked up by Yahoo! Finance and CISION PR Newswire.
13. Chemical & Engineering News, news article. "[These scientists want to engineering breast-milk cells to deliver drugs to babies](#)", February 2019.
14. STAT News, news article. "[Scientists turn to breast milk, and Mother Nature, to develop new therapeutics](#)", December 2018.
15. *Bioengineering and Translational Medicine*, BioTM Buzz article. "[Multiplexed siRNA delivery](#)", April 2018.
16. Phys.org, news article. "[How does your immune system react to nanomedicine?](#)", October 2016.

17. Pittsburgh Post-Gazette Newspaper, news article. "[CMU scientist determined to find nanoparticles that fight disease](#)", October 2015.
18. inPharma Technologist, Q&A article. "[Conventional wisdom yields conventional outcomes, says 'Brilliant' drug delivery professor](#)", October 2015.
19. Popular Science Magazine, news article, "[Kathryn Whitehead designs drugs to wipe out disease](#)", September 2015.
20. Pittsburgh Post-Gazette Newspaper, news article. "[Two 'brilliant' Pittsburgh scientists](#)", September 2015.
21. Pittsburgh Business Times, news article, "[CMU professor, Duolingo co-founder among MIT's Innovators Under 35](#)", August 2014.

CMU Articles

1. Carnegie Mellon University, press release. "[Whitehead is engineering breast milk to treat sick infants](#)", October 16, 2019.
2. Carnegie Mellon University, press release. "[Strawberries may be key to developing an insulin pill](#)", August 28, 2019. Picked up by HortiDaily, Vegetable Growers News, Lab Manager.com.
3. Carnegie Mellon University, press release. "[Whitehead's research could revolutionize medicine with cutting-edge science](#)", July 20, 2018. Picked up by myScience.
4. Carnegie Mellon University, press release. "[Researchers look for novel ways to deliver diabetes treatments](#)", August 14, 2017.
5. Carnegie Mellon University, article. "[Studying how the immune system reacts to nanomedicine](#)", October 5, 2016. Picked up by RD World Online.
6. Carnegie Mellon University, press release. "[Unorthodox approach to drug delivery research lands CMU professor on Popular Science's 2015 Brilliant 10 list](#)", September 24, 2015.
7. Carnegie Mellon University, press release. "[Kathryn Whitehead named a Pioneer on MIT Technology Review's Innovators Under 35 list](#)", August 19, 2014.

SPONSORED RESEARCH

Current Research Support

1. FRAXA Research Foundation, *mRNA Therapy for Fragile X Syndrome*, Whitehead (PI), 7/1/22 – 6/30/24.
2. NIIMBL, *Rapid Electrophoretic Assay of mRNA Vaccine Quality Attributes*, Schneider (PI), 10/1/21 – 12/31/22.
3. NIIMBL, *LNP-mRNA Vaccine Stability: Reference Materials, Rapid Stability Assessment and Lyophilized Formulation Development*, Przybycien (PI), 10/1/21 – 9/30/22.
4. Syngenta, *Discovery of transfection reagents to enable RNAi in Lepidoptera*, Whitehead (PI), 8/1/21 – 7/30/23.
5. NIH 1DP2HD098860, *Fate, Function, and Genetic Engineering of Breast Milk Cells for Infant Therapy*, Whitehead (PI), 9/30/18 – 5/31/23.

Completed Research Support

1. NSF 1807983, *Protein-Piperazine Polymer Conjugates as a New Platform for Oral Protein Therapy*, Whitehead (PI), 7/15/18 – 12/31/21.
2. Translate Bio, *Prediction of lipidoid nanoparticle mRNA delivery efficacy and immunogenicity across animal models*, Whitehead (PI), 10/1/19 – 9/30/21.

3. DARPA HR0011-19-2-0007, *An IND-Enabling Platform for CBRN Threat Protection via Transient, RNA-guided, Targeted Epigenome Editing In Vivo*, Weissman (PI), 4/1/19 – 7/31/21.
4. Wadhvani Foundation, *Determining the Effect of Liposomal Molecular Structure on Immune Response*, Whitehead (PI), 8/1/16 – 12/31/20.
5. DARPA HR0011-17-2-0043, *Next-Generation CRISPR and anti-CRISPR Tools and Delivery Systems for Safely Engineering the Genome and Epigenome*, Doudna (PI), 9/1/18 – 10/31/20.
6. Curci Foundation, *Enabling mRNA Therapy through Potent mRNA Design*, Whitehead (PI), 4/1/18 – 12/31/19.
7. DARPA D16AP00143, *Next Generation mRNA Delivery Systems with Precise Spatial and Temporal Activity*, Whitehead (PI), 9/15/16 – 9/14/19.
8. NIH 1R01DK112836, *Endogenous Alpha to Beta Cell Transdifferentiation in Diabetes*, Gittes (PI), 4/1/17 – 3/31/19.
9. Highmark / Disruptive Health Technology Initiative, *A Raspberry-Derived Therapeutic for Inflammatory Bowel Disease*, Whitehead (PI), 9/1/16 – 3/1/19.
10. DSF Charitable Foundation, *RNA Interference Mediated Treatment of Inflammatory Bowel Disease*, Whitehead (PI), 1/1/15 – 8/31/17.
11. Highmark / Disruptive Health Technology Initiative, *Therapeutic Polymer Dressings for Wound Healing*, Whitehead (PI), 9/1/13 – 12/31/14.
12. Carnegie Mellon University Infrastructure Investment Grant, *Perkin Elmer IVIS Spectrum CT Animal Imaging System*, Whitehead (PI), 5/1/13 – 4/30/14.

RESEARCH GROUP – CURRENT

Postdoctoral Associates and Fellows

1. **Katherine Fein**, Department of Chemical Engineering, 2021 – present.
Recognition: Bradford and Diane Smith Graduate Fellowship (2017 – 2018); Division 15 Poster Presentation Award Winner, AIChE Annual Meeting (2018); Geoffrey D. Parfitt Memorial 1st place Speaking Award, ChEGSA Annual Symposium (2019).
2. **Saigopalakrishna Yerneni**, Department of Chemical Engineering, 2021 – present.
Recognition: FRAXA Foundation Fellowship (2022-2024), American Chemical Society CAS Future Leader (2022).

Ph.D. Students

1. **Rose Doerfler**, Department of Chemical Engineering, 2017 – present.
Recognition: Symposium Presentation Award, ChEGSA Annual Symposium (2020).
2. **Daria Strelkova**, Department of Biomedical Engineering, 2017 – present.
3. **Mariah Arral**, Department of Chemical Engineering, 2018 – present.
Recognition: NSF Graduate Fellowship (2018 – 2021); Poster Award, Controlled Release Society Annual Meeting (2021).
4. **Alexandra Newby**, Department of Chemical Engineering, 2019 – present.
Recognition: Busnell Fellowship in Engineering (2021), Sharbaugh Presidential Fellowship (2022).

Undergraduate Students

1. **Roshan Paul**, Department of Chemical Engineering, 2020 – present.
Mentor: Mariah Arral
Recognition: CMU Small Undergraduate Research Grant (2021)
2. **Adam Lammi**, Department of Chemistry, 2021 – present.
Mentor: Mariah Arral

Recognition: CMU Small Undergraduate Research Grant (2022); Summer Undergraduate Research Fellowship (2022)

RESEARCH GROUP – ALUMNI

Postdoctoral Associates and Fellows

1. **Ryan Weiss**, Department of Chemical Engineering, 2016 – 2019.
Employment: faculty in the Department of Chemistry, Carlow University
2. **Kristina Friis**, AstraZeneca collaborative postdoc program, 2017 – 2020.
Employment: AstraZeneca
Recognition: People's Choice Award, GRC on Preclinical Form and Formulation (2019).
3. **John Gleeson**, Department of Chemical Engineering, 2019 – 2020.
Employment: Merck.
4. **Jilian Melamed**, Department of Chemical Engineering, 2018 – present.
Employment: Postdoc, Drew Weissman Lab, University of Pennsylvania
Recognition: NIH F32 Ruth L. Kirschstein Postdoctoral Fellowship (2019 – 2021); Controlled Release Society Gene Delivery and Gene Editing Focus Group Trainee Award (2020); Society of Biomaterials Postdoctoral Recognition Award (2021).
5. **Samuel LoPresti**, Department of Chemical Engineering, 2019 – 2022.
Employment: Orna Therapeutics

Ph.D. Students

1. **Christopher Knapp**, Department of Chemical Engineering, 2012 – 2017.
Employment: Moderna Therapeutics
Recognition: Dowd-ICES Fellowship (2014 – 2015); Bertucci Fellowship (2016 – 2017); Rothfus Graduate Fellowship (2016 – 2017).
2. **Rebecca Ball**, Department of Chemical Engineering, 2013 – 2018.
Employment: Translate Bio (now Sanofi)
Recognition: Best Poster Award, McGowan Institute for Regenerative Medicine Retreat (2015); Honorable Mention Speaking Award, ChEGSA Annual Symposium (2016); 1st place Graduate Student Speaking Award, Division 22B Bionanotechnology, AIChE Annual Meeting (2017); Bhutta Graduate Fellowship (2017 – 2018).
3. **Lisa Kasiewicz**, Department of Chemical Engineering, 2013 – 2018.
Employment: AMU LifeTech; Verve Therapeutics
Recognition: Gulf Oil Fellowship (2013 – 2014); Geoffrey D. Parfitt 1st place Memorial Podium Presentation Award, ChEGSA Annual Symposium (2016); 1st place Graduate Student Podium Presentation Award, Division 8B Biomaterials, AIChE Annual Meeting (2017).
4. **Khalid Hajj**, Department of Chemical Engineering, 2014 – 2019.
Employment: Nitto BioPharma; Poseida Therapeutics
Recognition: Gary Powers 1st Place Poster Award, ChEGSA Annual Symposium (2015); Poster Award, Controlled Release Society Annual Meeting (2018); Poster Award, Gordon Research Symposium – Drug Carriers in Medicine and Biology (2018); Honorable Mention Speaking Award, ChEGSA Annual Symposium (2018); 1st place Graduate Student Speaking Award, Division 22B Bionanotechnology, AIChE Annual Meeting (2018).
5. **Nicholas Lamson**, Department of Chemical Engineering, 2014 – 2019.
Employment: postdoc, Hammond Lab, MIT
Recognition: Klopack Graduate Fellowship (2014 – 2015); NSF Graduate Fellowship (2016 – 2019); Honorable Mention Speaking Award, ChEGSA Annual Symposium (2017); Geoffrey D. Parfitt 1st place Memorial Speaking Award, ChEGSA Annual Symposium (2018); 2nd place Graduate Student Speaking Award, Division 8B Biomaterials, AIChE Annual Meeting (2018); Ken Meyer Ph.D. Thesis Award (2019).
5. **Katherine Fein**, Department of Chemical Engineering, 2015 – 2020.
Employment: postdoc in our group.
Recognition: Bradford and Diane Smith Graduate Fellowship (2017 – 2018); Division 15 Poster Presentation

Award Winner, AIChE Annual Meeting (2018); Geoffrey D. Parfitt Memorial 1st place Speaking Award, ChEGSA Annual Symposium (2019).

6. **Namit Chaudhary**, Department of Chemical Engineering, 2017 – 2022.
Employment: postdoc, Irvine Lab, MIT
Recognition: Weiland Graduate Fellowship (2017 – 2018); Bradford and Diane Smith Graduate Fellowship (2019 – 2020); Geoffrey D. Parfitt Memorial 1st place Speaking Award, ChEGSA Annual Symposium (2020).

M.S. Students

1. **Penghong Guo**, Department of Chemical Engineering, 2012 – 2013.
Next: Arizona State University (Ph.D.)
2. **Gabrielle Cusimano**, Department of Chemical Engineering, 2012 – 2014.
Next: MedImmune, Inc.
3. **Daniel Lee**, Department of Biomedical Engineering, 2013 – 2015.
Next: University of Illinois, Chicago (Ph.D.)
4. **Chang Liu**, Department of Chemical Engineering, 2013 – 2014.
Next: University of Illinois, Chicago (Ph.D.)
5. **Jia He**, Department of Biomedical Engineering, 2014 – 2016.
Next: University of Connecticut (Ph.D.)
6. **Kanika Suri**, Department of Chemical Engineering, 2014 – 2015.
Next: Teva Pharmaceuticals
7. **Yan Zhang**, Department of Biomedical Engineering, 2015 – 2017.
8. **Yawen Cheng**, Department of Biomedical Engineering, 2015 – 2017.
Next: University of Pittsburgh (Ph.D.)
9. **Chinedu Okorafor**, Department of Chemical Engineering, 2017 – 2018.
Next: Northeastern University (Ph.D.)
10. **Sijie Xian**, Department of Chemical Engineering, 2017 – 2018.
Next: University of Notre Dame (Ph.D.)
11. **Shena Marshall**, Department of Chemical Engineering, 2018 – 2019.
12. **Shiv Reki**, Department of Chemical Engineering, 2018 – 2019.
13. **Kyle Cochran**, Department of Chemical Engineering, 2016 – 2019.
14. **Chenmin Ni**, Department of Biomedical Engineering, 2018 – 2020.

Undergraduate Students

1. **Anna Zhang**, Departments of Chemical and Biomedical Engineering, mentors: Rebecca Ball and Nicholas Lamson, 2013 - 2017.
Next: Tufts University (M.D.)
2. **George Degen**, Department of Chemical Engineering, mentor: Christopher Knapp, 2014 – 2015.
Next: University of California, Santa Barbara (Ph.D.)
3. **Vishal Ahuja**, Departments of Chemical and Biomedical Engineering, mentor: Nicholas Lamson, 2014 – 2017.
Next: Downstream Process Development Engineer, Shire
4. **Palak Bajaj**, Departments of Chemical and Biomedical Engineering, mentor: Rebecca Ball, 2014 – 2017.
Next: Engineer, Eli Lilly and Company
5. **Himali Ranade**, Departments of Chemical and Biomedical Engineering, mentor: Lisa Kasiewicz, 2015 – 2017.
Next: Product Supply Engineer, Proctor and Gamble

6. **Sevahn Vorperian**, Departments of Chemical and Biomedical Engineering, mentor: Rebecca Ball, 2015.
7. **Lucine (Lucy) Gabriel**, Department of Chemistry (MIT), mentor: Christopher Knapp, 2015.
8. **Shridhar Singh**, Departments of Chemical and Biomedical Engineering, mentor: Khalid Hajj, 2015 – 2018.
Next: NIH Post-baccalaureate program
9. **Kye Stapleton-Gray**, Departments of Chemical and Biomedical Engineering, mentor: Christopher Knapp, 2016 – 2017.
10. **Sarah Deluty**, Departments of Chemistry and Neuroscience, mentor: Khalid Hajj, 2016 – 2017.
Next: Colorado State University (D.V.M.)
11. **Emily Parks**, Departments of Chemical and Biomedical Engineering, mentor: Katherine Fein, 2017.
12. **Adrian Berger**, Departments of Chemical and Biomedical Engineering, mentor: Nicholas Lamson, 2016 – 2019.
Next: Associate, Strategy& Consulting Firm
13. **Jamie Vizelman**, Departments of Chemical and Biomedical Engineering, mentor: Rebecca Ball, 2016 – 2019.
Next: NIH Post-baccalaureate program
14. **Natasha Shukla**, Departments of Chemical and Biomedical Engineering, mentor: Jilian Melamed, 2019 – 2020.
15. **James Kirkby**, Departments of Chemical and Biomedical Engineering, mentor: Samuel LoPresti, 2019 – 2020.
16. **Bryce Yeazell**, Department of Chemistry, mentors: John Gleeson and Alex Newby, 2019 – 2020.
17. **Douglas Gearhart**, Department of Materials Science and Engineering, 2020.
18. **Lily Wang**, Departments of Chemical and Biomedical Engineering, mentor: Samuel LoPresti and Namit Chaudhary, 2020.
19. **Pooja Pandya**, Department of Chemistry, mentor: Mariah Arral, 2019 – 2021.
Next: Ph.D. Program, Weill Cornell Medical College.
20. **Mia Hartman**, Departments of Chemical and Biomedical Engineering, mentor: Namit Chaudhary, 2020 – 2021.
Recognition: Summer Undergraduate Research Fellowship (2020)
21. **Ashley Shu**, Departments of Chemical and Biomedical Engineering, mentor: Rose Doerfler, 2020 – 2022.
Recognition: Summer Undergraduate Research Fellowship (2020)
22. **Swathi Damodaran**, Departments of Chemical and Biomedical Engineering, mentors: John Gleeson, Katherine Fein, and Alex Newby, 2020 – 2022.
Recognition: Summer Undergraduate Research Fellowship (2020), CMU Small Undergraduate Research Grant (2022)