Nicole Sempertegui

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EDUCATION

Cornell University Fall 2019-Present
Ph.D. in Biomedical Engineering
Minor in Stem Cell Biology
Committee: Claudia Fischbach (chair), Lara Estroff, Ben Cosgrove
Areas: Cancer Biology, Tumor Microenvironment, Biomaterials

The University of Alabama Fall 2015-Spring 2019
Bachelor of Science in Chemical & Biological Engineering GPA: 4.0/4.0
Minor in Mathematics
Chemical & Biological Engineering Honors College Program

HONORS

Best Research Poster Award (Cornell BMES Student Chapter Annual Symposium)	Fall 2024
Best Poster Presentation Award (STEEM Gordon Research Conference)	Summer 2024
Conference Travel Award (14th International Conference on the Chemistry and Biology of Mineralized Tissues (ICCBMT))	Fall 2023
Pamela Delp Polashenski M.D. Breast Cancer Research Trainee Grant (Breast Cancer Coalition of Rochester)	Spring 2023
Visiting Graduate Student Travel Award (UW-Madison 17th Stem Cell Symposium)	Spring 2023
Cornell Stem Cell Research Training Fellowship (Cornell University)	Fall 2022
University Fellowship (Cornell University)	Fall 2019
Randall Outstanding Undergraduate Research Award (ChBE at Alabama)	Spring 2019
Chemical Engineering Student of The Year (Engineering Council of Birmingham)	Spring 2019
Future Leaders in Chemical Engineering National Award (ChBE at NC State)	Fall 2018
Princeton University Summer Undergraduate Chemistry Research Program	Summer 2018
Chemical Engineering Outstanding Junior Award (ChBE at Alabama)	Spring 2018
UA Scholar Award	Fall 2015 - Spring 2019
Engineering Leadership Scholarship	Fall 2015 - Spring 2019
President's Cabinet Engineering Tuition Supplement	Fall 2015 - Spring 2019

PUBLICATIONS

1. **N. D. Sempertegui**, Y.Yan, M. Whitman, S. Choi, A. Miller, L. Estroff, C. Fischbach. "Bone-Mimetic Intrafibrillar Collagen Mineralization Reduces Breast Cancer Cell Growth by Altering Mesenchymal Stem Cell Mechanosignaling and Matrix Deposition". Manuscript in preparation, 2024.
2. D. Van, C. Pereira, M. Liu, C. Li, K. Jones, **N.D. Sempertegui**, M. Whitman, J. Deng, P.Y. Tsai, A. Miller, J. Barrow, C. Fischbach, R.S. Weiss. "SIRT5 as a Key Modulator of Mitochondrial Activity and Metastatic Properties in Breast Cancer". Manuscript in preparation, 2024.
3. S. Choi, M. Whitman, A. Shimpi, **N. D. Sempertegui**, A. Chiou, J. Druso, A.Verma, S. Lux, Z. Cheng, M. Paszek, O. Elemento, L. Estroff, C. Fischbach."Bone-matrix mineralization dampens integrin-mediated mechanosignalling and metastatic progression in breast cancer". Nature Biomedical Engineering, 2023.
4. **N. D. Sempertegui**, C. Fischbach. "Tissue Engineered Models of Metastasis: Focus on Bone Metastasis". Biomaterial Based Approaches to Study the Tumour Microenvironment, Jessica O. Winter and Shreyas S. Rao (eds.), The Royal Society of Chemistry, 2022.
5. K. Coogan, P. Stone, **N. D. Sempertegui**, S. Rao. "Fabrication of micro-porous hyaluronic acid hydrogels through salt leaching". European Polymer Journal, 135, 2020.
6. **N. D. Sempertegui**, A. Narkhede, V. Thomas, S. Rao. "A combined compression molding, heating, and leaching process for fabrication of microporous polycaprolactone (PCL) scaffolds". Journal of Biomaterials Science: Polymer Edition., 2018.

PRESENTATIONS

1. **N. D. Sempertegui**, Y. Yan, M. Whitman, S. Choi, L. Estroff, C. Fischbach. "Intrafibrillar Collagen Mineralization Reduces Mesenchymal Stem Cell Differentiation into Myofibroblasts by Altering Mechanosignaling".*Cornell BMES Student Chapter Annual Symposium*, Ithaca, NY. August 2024. (Poster and Flash Talk)

2. **N. D. Sempertegui**, Y.Yan, M. Whitman, S. Choi, L. Estroff, C. Fischbach. "Intrafibrillar Collagen Mineralization Reduces Mesenchymal Stem Cell Differentiation into Myofibroblasts by Altering Mechanosignaling".*Signal Transduction by Engineered Extracellular Matrices (STEEM) Gordon Research Conference* Manchester, NH, July 2024. (Poster)

3. **N. D. Sempertegui**, Y.Yan, M. Whitman, S. Choi, L. Estroff, C. Fischbach. "Intrafibrillar Collagen Mineralization Reduces Mesenchymal Stem Cell Differentiation into Myofibroblasts by Altering Mechanosignaling". *Cornell Stem Cell Work-in-Progress Seminar Series*, Ithaca, NY, March 2024. (Talk)

4. **N. D. Sempertegui**, Y.Yan, M. Whitman, S. Choi, L. Estroff, C. Fischbach. "Bone matrix mineral content regulates early-stage metastasis by altering mesenchymal stem cell fate". *International Conference on the Chemistry and Biology of Mineralized Tissues (ICCBMT).* Oosterbeek, The Netherlands, October 2023. (Poster and Flash Talk)

5. **N. D. Sempertegui**, Y. Yan, M. Whitman, S. Choi, L. Estroff, Claudia Fischbach. "Bone Matrix Mineralization and Breast-Cancer Derived Factors Synergistically Regulate Mesenchymal Stem Cell Behavior in Osteogenic Niches". *Biomedical Engineering Society (BMES) Annual Meeting.* Seattle, WA, October 2023. (Talk)

6. **N. D. Sempertegui**, Y. Yan, M. Whitman, S. Choi, L. Estroff, Claudia Fischbach. "Bone Matrix Mineralization and Breast-Cancer Derived Factors Synergistically Regulate Mesenchymal Stem Cell Behavior in Osteogenic Niches". *Cornell Nanoscale Facility Annual Meeting.* Ithaca, NY, September 2023. (Poster)

7. **N. D. Sempertegui**, Y. Yan, M. Whitman, S. Choi, L. Estroff, Claudia Fischbach."Bone Matrix Mineralization and Breast-Cancer Derived Factors Synergistically Regulate Mesenchymal Stem Cell Behavior in Osteogenic Niches". *University of Wisconsin-Madison 17th Annual Stem Cell Symposium.* Madison, WI, April 2023. (Poster)

8. **N. D. Sempertegui**, S. Lux, M. Whitman, S. Choi and C. Fischbach. "Collagen Mineralization and Breast Cancer-Derived Factors Regulate MSC Behavior". *Bones and Teeth Gordon Research Conference.* Ventura, CA, September 2022. (Poster)

9. **N. D. Sempertegui**, S. Lux, M. Whitman, S. Choi and C. Fischbach. "Collagen Mineralization and Breast Cancer-Derived Factors Regulate MSC Behavior". *3rd Intercampus Research Cancer Symposium.* Ithaca, NY, May 2022. (Poster)

10. **N. D. Sempertegui**, S. Lux, M. Whitman, S. Choi and C. Fischbach. "Collagen Mineralization and Breast Cancer-Derived Factors Regulate MSC Behavior". *Biomedical Engineering Society (BMES) Annual Meeting.* Orlando, FL, October 2021. (Poster)

11. **N. D. Sempertegui**, A. A. Narkhede, S. S. Rao. "A combined compression molding, heating, and leaching process for fabrication of micro-porous polycaprolactone scaffolds". *Future Leaders in Chemical Engineering National Award Symposium.* North Carolina State University, Raleigh, NC. October 2018. (Poster)

12. **N. D. Sempertegui**, Muhammad J. Amin, H. Yang. "Experimental investigation of emergent behavior of active colloids". *Summer 2018 Undergraduate Chemistry Research Program.* Princeton University, Princeton, NJ. August 2018. (Poster)

13. **N. D. Sempertegui**, A. A. Narkhede, S. S. Rao. "A combined compression molding, heating, and leaching process for fabrication of micro-porous polycaprolactone scaffolds". *Undergraduate Research and Creative Activity (URCA) Conference.* The University of Alabama, Tuscaloosa, AL. March 2018. (Poster)

14. **N. D. Sempertegui**, A. A. Narkhede, S. S. Rao. "A combined compression molding, heating, and leaching process for fabrication of micro-porous polycaprolactone scaffolds". *Materials Science Research Symposium 2017.* The University of Alabama in Huntsville, Huntsville, AL. November 2017. (Talk)

TEACHING EXPERIENCE

Cornell University Ithaca, NY
Teaching Assistant Fall 2021
BME 4190: *Laboratory Techniques for Molecular, Cellular, and Systems Engineering*
This course introduces senior-level Biomedical Engineering undergraduate students to laboratory techniques, including cell culture, confocal imaging and flow cytometry. My work consisted on preparing materials needed for the lab course, grading assignments and holding office hours.

The University of Alabama Tuscaloosa, AL
Teaching Assistant Spring 2018
CHE 304: *Fluid Flow Operations*
This course introduces junior-level Chemical Engineering undergraduate students to equations of momentum and energy transport. My work consisted on grading assignments and holding office hours for students that needed assistance with homework and class material.

Tutor for the College of Engineering Fall 2017-Spring 2018
ENGenuity Lab
The *ENGenuity Lab* provides tutoring services for undergraduate students in a wide variety of introductory courses, including Organic Chemistry I and II, Physics I and II, Calculus and advanced undergraduate Chemical Engineering courses.

REVIEW CONTRIBUTIONS

Proceedings of the National Academy of Sciences (PNAS)

Science Advances

LEADERSHIP

Cornell Biomedical Engineering Women Society (BMEW), Lunch Series Coordinator Fall 2019-2020

Cornell BMES Student Chapter, Communications Director Fall 2019-2020

OUTREACH

Cornell Research Education and Activities for Community Teachers (REACT) Program, Lab Tour Content Fall 2023

Cornell Pre-Collegiate Summer Scholar Program, Power Lab Event Summer 2023

GRASSHOPPR Fellow, Teaching K-5th Grade Ithaca Students Spring 2020

Girl Scout Engineering Day (GSED), Science Activity Volunteer Fall 2019