Sebastián L. Vega, Ph.D.

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Education

Rutgers University
Doctor of Philosophy in **Chemical and Biochemical Engineering** (2014)

Carnegie Mellon University
Bachelor of Science in **Chemical Engineering** (2006)

Carnegie Mellon University
Bachelor of Science in **Biomedical Engineering** (2006)

Research Appointments

Rowan University
Associate Professor (2024 – Present)
Department of Biomedical Engineering

Cooper Medical School of Rowan University
Associate Professor (2024 – Present)
Department of Orthopaedic Surgery

Cooper Medical School of Rowan University
Assistant Professor (2023 – 2024)
Department of Orthopaedic Surgery

Rowan University
Assistant Professor (2018 – 2024)
Department of Biomedical Engineering

University of Pennsylvania
Postdoctoral Researcher (2015 – 2018)
Department of Bioengineering
Advisor: Jason A. Burdick, Ph.D.

University of Twente
Visiting Scientist (2014)
Department of Tissue Regeneration
Advisor: Jan de Boer, Ph.D.

Rutgers University
Graduate Research Assistant (2008 – 2014)
Department of Chemical and Biochemical Engineering
Advisors: Prabhas V. Moghe, Ph.D. & Joachim Kohn, Ph.D.

Industry Experience

Samsung Austin Semiconductor
Process Engineer (2006 – 2008)

L'Oreal USA
Research and Development Intern (2005)

Westinghouse Electric Corporation
Risk Assessment Intern (2004)

Awards

- NSF CAREER Award (2023)
- NEBEC New Innovator Award (2023)
- CMBE Young Innovator Award (2022)
- ORS NIRA Finalist (2022)
- Frances R. Lax Fund for Faculty Development (2019)
- MIT Rising Star in Biomedical Engineering and Science (2017)
- SFB STAR Award (2017)
- Compact for Faculty Diversity Travel Award (2016)
- NSF STEM Cell IGERT International Travel Award (2014)

Publications

In Preparation

4. M Recktenwald, T Torres, H Jankowski, N Shah, M Lowe, MM Benmassaoud, **SL Vega**. Engineered cell-cell mimetic peptides attenuate matrix mechanosensing on mechanically defined hydrogels. *Annals of Biomedical Engineering*, **In Preparation**.
3. US Jalloh, M Sims, N Shah, S Yilmaz, J de Guzman, **SL Vega**. Hydrogels functionalized with BMP-2 mimetic peptides for orthopedic tissue engineering applications. *Journal of Biomedical Materials Research Part A*, **In Preparation**.
2. SA Love, Y Cardona-Torres, **SL Vega**. Recent advances in injectable Diels-Alder hydrogels for biomedical applications. *Biomaterials Science*, **In Preparation**.
1. D Ball, E Alvino, M Sozio, L Kim, G Ibbott, **SL Vega**. Injectable hydrogels that can measure radiation at body temperature. *PLOS ONE*, **In Preparation**.

In Progress

2. M Recktenwald, R Bhattacharya, MM Benmassaoud, J MacAulay, V Chauhan, L Davis, E Hutt, MM Staehle, PA Galie, NM Daringer, RJ Pantazes, **SL Vega**. Extracellular peptide-ligand dimerization actuator (EPDA) receptor design for reversible and spatially dosed 3D cell-material communication. *ACS Synthetic Biology*, **Under Review**.
1. LN Davis, E Hutt, M Recktenwald, S Patel, M Briggs, M Dunsmore, **SL Vega**, PA Galie, MM Staehle, NM Daringer. Harnessing split fluorescent proteins in engineered phosphorylation networks for dynamic cellular sensing in theranostic cells. *ACS Synthetic Biology*, **Under Review**.

Published

37. M Recktenwald, M Kaur, MM Benmassaoud, A Copling, T Khanna, M Curry, D Cortes, G Fleischer, VJ Carabetta, **SL Vega**. Antimicrobial peptide screening for designing custom bactericidal hydrogels. *Pharmaceutics*, **2024**.
36. JR Davis, J Solowiej-Wedderburn, **SL Vega**, JA Burdick, C Dunlop, N Tapon. Monolayer force generation and transmission is dictated by focal adhesion distribution. *BioRxiv* **2024**.
35. A Simon, GV Gilbert, AH Fisher, PH Johnsen, B Herb, **SL Vega**, E Bodofsky, DA Fuller. A comparison of 2 versus 5 epineural sutures to achieve successful polyethylene glycol (PEG) nerve fusion in a rat sciatic nerve repair model. *Surgical Neurology International* **2024**.
34. SA Pucha, M Hasson, H Solomon, GE McColgan, JL Robinson, **SL Vega**, JM Patel. Revealing early spatial patterns of cellular responsivity in fiber-reinforced microenvironments. *Tissue Engineering Part A* **2024**.
33. M Recktenwald, MM Benmassaoud, S Dalwadi, N Belanger, M Tang, M Deleg, V Beachley, **SL Vega**. Facile method for covalently binding peptides onto polycaprolactone films and nanofibers. *Materials Letters* **2024**.
32. US Jalloh, A Gsell, KA Gultian, J MacAulay, A Madden, J Smith, L Siri, **SL Vega**. Synthesis and photopatterning of synthetic thiol-norbornene hydrogels. *Gels* **2024**.

31. M Recktenwald, E Hutt, L Davis, J MacAulay, NM Daringer, PA Galie, MM Staehle, **SL Vega**. Engineering transcriptional regulation for cell-based therapies. *SLAS Technology* **2024**.

30. SA Love, KA Gultian, US Jalloh, A Stevens, TWB Kim, **SL Vega**. Mesenchymal stem cells enhance targeted bone growth from injectable hydrogels with BMP-2 peptides. *Journal of Orthopaedic Research* **2024**.

29. AH Fisher, PH Johnsen, A Simon, CJ Burns, V Romiyo, EB Bodofsky, **SL Vega**, DA Fuller. Fibrin glue neurorrhaphy acutely blocks distal muscle contraction after confirmed polyethylene glycol nerve fusion: an animal study. *Plastic and Reconstructive Surgery – Global Open* **2024**.

28. L Paone, MM Benmassaoud, A Curran, **SL Vega**, PA Galie. A 3D printed blood-brain barrier model with tunable topology and cell-matrix interactions. *Biofabrication* **2023**.

27. A Copling, M Akantibila, R Kumaresan, G Fleisher, D Cortes, RS Tripathi, VJ Carabetta, **SL Vega**. Recent advances in antimicrobial peptide hydrogels. *International Journal of Molecular Sciences* **2023**.

26. KA Gultian, R Gandhi, TWB Kim, **SL Vega**. Self-forming norbornene-tetrazine hydrogels with independently tunable properties. *Macromolecular Bioscience* **2023**.
    ****Selected as Feature Cover.***

25. DE Mason, M Goeckel, **SL Vega**, PH Wu, D Johnson, SJ Heo, D Wirtz, JA Burdick, L Wood, BY Chow, AN Stratman, JD Boerckel. Mechanotransductive feedback control of endothelial cell motility and vascular morphogenesis. *eLife* **2023**.

24. K Driscoll, MS Butani, KA Gultian, A McSweeny, JM Patel, **SL Vega**. Plant tissue parenchyma and vascular bundles selectively regulate stem cell mechanosensing and differentiation. *Cellular and Molecular Bioengineering 2022 Young Innovators Special Issue* **2022**.
    ** ***CMBE Young Innovator Award.***

23. KA Gultian, R Gandhi, K DeCesari, V Romiyo, EP Kleinbart, K Martin, PM Gentile, TWB Kim, **SL Vega**. Injectable hydrogel with immobilized BMP-2 mimetic peptide for local bone regeneration. *Frontiers in Biomaterials Science* **2022**.

22. KA Gultian, R Gandhi, K Sarin, M Sladkova-Faure, M Zimmer, GM de Peppo, **SL Vega**. Human induced mesenchymal stem cells display increased sensitivity to matrix stiffness. *Scientific Reports* **2022**.

21. DE Mason, M Goeckel, **SL Vega**, PH Wu, D Johnson, SJ Heo, D Wirtz, JA Burdick, L Wood, BY Chow, AN Stratman, JD Boerckel. Mechanotransductive feedback control of endothelial cell motility and vascular morphogenesis. *BioRxiv* **2022**.

20. M DiCerbo, MM Benmassaoud, **SL Vega**. Porous scaffold-hydrogel composites spatially regulate 3D cellular mechanosensing. *Frontiers in Medical Technology* **2022**.

19. AP Liu, EA Appel, PD Ashby, BM Baker, E Franco, L Gu, K Haynes, NS Joshi, AM Kloxin, PHJ Kouwer, J Mittal, L Morsut, V Noireaux, S Parekh, R Shulman, SKY Tang, MT Valentine, **SL Vega**, W Weber, N Stephanopoulos, O Chaudhuri. The 'living interface': a bridge between synthetic biology and biomaterials. *Nature Materials* **2022**.

18. S Trujillo, **SL Vega**, KH Song, AS Félix, MJ Dalby, JA Burdick, M Salmeron-Sanchez. Engineered full-length fibronectin-hyaluronic acid hydrogels for stem cell engineering. *Advanced Healthcare Materials* **2020**.

17. MM Benmassaoud, KA Gultian, M DiCerbo, **SL Vega**. Hydrogel screening approaches for bone and cartilage tissue regeneration. *Annals of the New York Academy of Sciences* **2020**.

16. **SL Vega**, V Arvind, P Mishra, J Kohn, NS Murthy, PV Moghe. Substrate micropatterns produced by polymer demixing regulate focal adhesions, actin anisotropy, and lineage differentiation of stem cells. *Acta Biomaterialia* **2018**.

15. MY Kwon, **SL Vega**, WM Gramlich, M Kim, RL Mauck, JA Burdick. Dose and timing of N-cadherin mimetic peptides regulate MSC chondrogenesis within hydrogels. *Advanced Healthcare Materials* **2018**.

14. **SL Vega**, MY Kwon, KH Song, C Wang, L Han, RL Mauck, JA Burdick. Combinatorial hydrogels with biochemical gradients for screening 3D cellular microenvironments. *Nature Communications* **2018**.

13. YC Yeh, EA Corbin, SR Caliari, L Ouyang, **SL Vega**, R Truitt, L Han, KB Margulies, JA Burdick. Mechanically dynamic PDMS substrates to investigate changing cell environments. *Biomaterials* **2017**.

12. AM Rosales, **SL Vega**, FW DelRio, JA Burdick, KS Anseth. Hydrogels with reversible mechanics to probe dynamic cell microenvironments. *Angewandte Chemie* **2017**.

11. **SL Vega**, E Liu, V Arvind, J Bushman, HJ Sung, ML Becker, S Lelièvre, J Kohn, PA Vidi, PV Moghe. High-content image informatics of the structural protein NuMA parses trajectories for stem/progenitor cell lineages and oncogenic transformation. *Experimental Cell Research* **2017**.

10. **SL Vega**, MY Kwon, JA Burdick. Recent advances in hydrogels for cartilage tissue engineering. *European Cells and Materials* **2017**.

9. E Liu, **SL Vega**, A Dhaliwal, MD Treiser, HJ Sung, PV Moghe. High-resolution fluorescence imaging of cell-biomaterial interactions. In *Comprehensive Biomaterials II*, Elsevier, **2017**.

8. SR Caliari*, **SL Vega***, MY Kwon, EM Soulas, JA Burdick. Dimensionality and spreading influence MSC YAP/TAZ signaling in hydrogel environments. *Biomaterials* **2016**.

7. **SL Vega**, MY Kwon, RL Mauck, JA Burdick. Single cell imaging to probe mesenchymal stem cell N-cadherin mediated signaling within hydrogels. *Annals of Biomedical Engineering* **2016**.

6. **SL Vega***, A Dhaliwal*, V Arvind, PJ Patel, NRM Beijer, J de Boer, NS Murthy, J Kohn, PV Moghe. Organizational metrics of interchromatin speckle factor domains: integrative classifier for stem cell adhesion & lineage signaling. *Integrative Biology* **2015**.

5. SD Sommerfeld, Z Zhang, M Costache, **SL Vega**, J Kohn. Enzymatic surface erosion of high tensile strength polycarbonates based on natural phenols. *Biomacromolecules* **2014**.

4. YJ Lee, **SL Vega**, PJ Patel, KA Aamer, PV Moghe, MT Cicerone. Quantitative, label-free characterization of stem cell differentiation at the single-cell level by broadband coherent anti-Stokes Raman scattering microscopy. *Tissue Engineering Part C: Methods* **2013**.

3. JJ Kim, **SL Vega**, PV Moghe. A high content imaging-based approach for classifying cellular phenotypes. *Methods in Molecular Biology* **2013**.

2. **SL Vega***, E Liu*, PJ Patel, AB Kulesa, AL Carlson, Y Ma, ML Becker, PV Moghe. High-content imaging-based screening of microenvironment-induced changes to stem cells. *Journal of Biomolecular Screening* **2012**.
   ****Selected as Feature Cover.***

1. E Liu, **SL Vega**, MD Treiser, HJ Sung, PV Moghe. Fluorescence imaging of cell-biomaterial interactions. In *Comprehensive Biomaterials*, Elsevier, **2011**.

* Authors contributed equally

Patents

5. J Carter, V Beachley, **SL Vega**. Hydrogel infiltration into sacrificial hydrogel nerve scaffold template with aligned nanofibers. *US Provisional Patent Application 63/682,667* filed on August 2024.

4. **SL Vega**, VJ Carabetta, M Recktenwald. Hydrogel compositions comprising synergistic antimicrobial peptides (AMPs) and methods of making same. *US Provisional Patent Application 63/598,782* filed on November 2023.

3. **SL Vega**, KA Gultian, TWB Kim. Hydrogels and methods of using the same. *US Provisional Patent Application 63/391,422* filed on July 2022; *International Patent Application PCT/US2023/70731* filed on July 2023; *International Publication Number WO 2024/020558 A1* assigned in January 2024.

2. **SL Vega**, KA Gultian, L Kim, I Malajovich, GS Ibbott. Injectable dosimeter compositions and methods of using same. *US Provisional Patent Application 63/348,920* filed on June 2022; *International Patent Application PCT/US2023/24285* filed on June 2023; *International Publication Number WO 2023/235561* assigned in December 2023.

1. V Beachley, **SL Vega**, D Jao. Synthetic aligned tissue grafts and methods of using same. *US Provisional Patent Application 63/194,316* filed on May 2021; *International Patent Application PCT/US2022/031429* filed on May 2022; *International Publication Number WO 2022/251694* assigned in December 2022; *US Patent Publication Number US 2024/0050626* assigned in February 2024.

Presentations

98. **SL Vega*** & TWB Kim. HydroPep Therapeutics: Hydrogels for targeted bone formation. Life Sciences Innovation Showcase, Nov. 2024, Princeton, NJ.

97. M Recktenwald* & **SL Vega**. Peptide responsive transmembrane receptor for reversible mammalian cell-biomaterial guided interactions. *Immune Modulation & Engineering Symposium (IMES)*, Nov. 2024, Philadelphia, PA.

96. H Jankowski*, M Recktenwald, **SL Vega**. Effects of stiffness and cell-cell mimetic peptides on stem cell phenotype and matrix mechanosensing. *Biomedical Engineering Society (BMES) Annual Meeting*, Oct. 2024, Baltimore, MD.

95. Y Cardona-Torres*, SA Love, E Dedkov, TWB Kim, **SL Vega**. Peptide-functionalized injectable hydrogels for long bone regeneration in critical-sized segmental defects. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.

94. N Shah*, US Jalloh, **SL Vega**. Effects of the BMP-2 mimetic peptide sequence and concentration on 3D stem cell spreading and osteogenic differentiation. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.

93. S Yilmaz*, US Jalloh, JM Patel, **SL Vega**. Understanding 3D cell-matrix interactions using microfiber-hydrogel composite materials. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.

92. US Jalloh*, A Gsell, A McSweeny, **SL Vega**. BMP-2 (bone morphogenetic protein-2) peptide-functionalized hydrogels to study 3D mechanosensing and osteogenic differentiation. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.

91. M Recktenwald*, R Bhattacharya, J MacAulay, NM Daringer, RJ Pantazes, **SL Vega**. Peptide-ligand responsive receptors that enable 3D cell-material communication. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.

90. D Concha-Ortiz*, M Sims, A Pokar, US Jalloh, **SL Vega**. Evaluating 3D viability and morphology of stem cells encapsulated in KIPKA peptide-functionalized HANor hydrogels. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.

89. D Prajapati*, Y Cardona-Torres, SA Love, EI Dedkov, TWB Kim, **SL Vega**. Enhancing bone healing in rat femur segmental defects with BMP-2 epitope-loaded hydrogels. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.

88. A Pokar*, N Shah, US Jalloh, DN Concha-Ortiz, M Sims, **SL Vega**. Design and evaluation of DWIVA-functionalized hydrogels for enhanced stem cell bone differentiation in 3D environments. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.

87. **SL Vega***. Injectable hydrogels for biomedical applications. *University of Pennsylvania Orthopaedic Research Club*, May 2024, Philadelphia, PA.

86. A Gsell*, US Jalloh, KA Gultian, J MacAulay, A Madden, J Smith, L Siri, **SL Vega**. Synthesis and photopatterning of synthetic thiol-norbornene hydrogels. *Northeast Bioengineering Conference (NEBEC)*, Apr. 2024, Hoboken, NJ.

85. **SL Vega***. Design of extracellular peptide-ligand dimerization actuator receptors for programming cell behavior. *Temple University Bioengineering Seminar*, Mar. 2024, Philadelphia, PA.

84. **SL Vega***. Injectable hydrogels that direct stem cell fates and induce targeted bone formation. *Carnegie Mellon University Biomedical Engineering Seminar*, Feb. 2024, Pittsburgh, PA.

83. SA Pucha*, **SL Vega**, JL Robinson, JM Patel. Revealing spatial responsivity in fiber-reinforced micro-environments for meniscus tissue engineering. *Orthopaedic Research Society (ORS) Annual Meeting*, Feb. 2024, Long Beach, CA.

82. **SL Vega***. Injectable hydrogels for biomedical applications. *Rutgers University Biomedical Engineering Seminar*, Jan. 2024, Piscataway, NJ.

81. SA Love*, M Recktenwald, **SL Vega**. Facile method to functionalize injectable hyaluronic acid hydrogels with BMP-2 mimetic peptides. *Penn Center for Musculoskeletal Disorders Symposium*, Nov. 2023, Philadelphia, PA.

80. US Jalloh*, A McSweeny, A Gsell, **SL Vega**. The effect of bone morphogenetic protein-2 peptides on 3D stem matrix mechanosensing. *Penn Center for Musculoskeletal Disorders Symposium*, Nov. 2023, Philadelphia, PA.

79. T Torres*, M Recktenwald, **SL Vega**. Effects of stiffness and cell-cell mimetic peptides on stemness and matrix mechanosensing. *BMES Annual Meeting*, Oct. 2023, Seattle, WA.

78. J MacAulay*, M Recktenwald, **SL Vega**. Evaluation of transmembrane extracellular ligand dimerization actuator (ELDA) receptors activated by stimulatory ligand peptides. *BMES Annual Meeting*, Oct. 2023, Seattle, WA.

77. KE Byrne*, MC Sozio, M Patel, SA Love, **SL Vega**. Evaluating the effects of extrusion parameters on injectable hydrogel dispersion within osteoporotic analogs. *BMES Annual Meeting*, Oct. 2023, Seattle, WA.

76. A Gsell*, US Jalloh, **SL Vega**. Evaluating the effects of enzymatic degradation and BMP-2 peptides on 3D adult stem cell morphology and bone differentiation. *BMES Annual Meeting*, Oct. 2023, Seattle, WA.

75. M Recktenwald*, N Daringer, **SL Vega**. Evaluating receptor-ligand communication between programmed cells with synthetic transmembrane receptors and orthogonal peptide ligands conjugated to hyaluronic acid hydrogels. *BMES Annual Meeting*, Oct. 2023, Seattle, WA.

74. SA Love*, MC Sozio, KE Byrne, TWB Kim, **SL Vega**. Injectable hydrogels that locally strengthen bones prone to fragility fractures. *Carnegie Mellon Forum on Biomedical Engineering*, Sept. 2023, Virtual.

73. M Recktenwald*, J MacAulay, **SL Vega**. Engineering transmembrane ELDA (Extracellular Ligand Dimerization Actuator) receptors activated by peptide ligands. *Carnegie Mellon Forum on Biomedical Engineering*, Sept. 2023, Virtual.

72. M Recktenwald*, **SL Vega**, N Daringer. Engineering synthetic transmembrane receptor-peptide ligand interactions in programmed Mammalian cells. *Synthetic Biology: Engineering, Evolution & Design (SEED) Symposium*, May 2023, Los Angeles, CA.

71. KA Gultian, TWB Kim, **SL Vega***. Injectable hydrogels with BMP-2 mimetic peptides for targeted bone formation. *NEBEC*, Mar. 2023, Philadelphia, PA.
*****NEBEC New Innovator Award Recipient.***

70. M Recktenwald*, **SL Vega**, N Daringer. Evaluating synthetic transmembrane receptor-peptide ligand interaction in programmed Mammalian cells. *NEBEC*, Mar. 2023, Philadelphia, PA.

69. N Belanger*, B Herb, J Carter, S Dalwadi, **SL Vega**, V Beachley. Effects of aligned nanofiber/hydrogel composite scaffolds on single cell morphology. *NEBEC*, Mar. 2023, Philadelphia, PA.

68. A Pucha*, GE McColgan, **SL Vega**, JM Patel. Micro-scale cellular and mechano-response in composite scaffolds for meniscus replacement. *ORS Annual Meeting*, Feb. 2023, Dallas, TX.

67. KA Gultian, GS Ibbott, LH Kim*, **SL Vega**. An injectable dosimeter for real-time, in vivo verification of MR-guided radiation therapy: proof of concept. *The 9th MR in RT Symposium*, Feb. 2023, Los Angeles, CA.

66. **SL Vega***. Plant tissue parenchyma and vascular bundles selectively regulate stem cell mechanosensing and differentiation. *BMES Annual Meeting*, Oct. 2022, San Antonio, TX.
    ****CMBE Young Innovator Award Recipient*.**

65. **SL Vega***. Injectable hydrogels for biomedical applications. *George Mason University Biomedical Engineering Seminar*, Sept. 2022, Fairfax, VA.

64. B Herb*, S Dalwadi, N Belanger, V Beachley, **SL Vega**. Hydrogel thickness and nanofiber connectivity influence cell alignment and morphology in hydrogel-nanofiber composites. *Society for Biomaterials (SFB) Annual Meeting*, April 2022, Baltimore, MD.

63. MM Benmassaoud*, N Belanger, M Tang, M Deleg, V Beachley, **SL Vega**. Norbornene-modified polycaprolactone for covalent peptide photopatterning. *SFB Annual Meeting*, April 2022, Baltimore, MD.

62. N Belanger*, B Herb, C Burns, J Carter, S Dalwadi, G Gilbert, D Fuller, **SL Vega**, V Beachley. Aligned nanofiber/hydrogel composite scaffolds for peripheral nerve regeneration. *SFB Annual Meeting*, April 2022, Baltimore, MD.

61. K Gultian, R Gandhi, K DeCesari, TWB Kim, **SL Vega***. Injectable hydrogel with immobilized BMP-2 mimetic peptides and stem cells for local bone regeneration. *ORS Annual Meeting*, Feb. 2022, Tampa, FL.
    ****New Investigator Recognition Award (NIRA) Finalist*.**

60. K Gultian*, R Gandhi, TWB Kim, **SL Vega**. Self-forming hydrogels for tissue engineering applications. *BMES Annual Meeting*, Oct. 2021, Orlando, FL.

59. R Gandhi*, K Gultian, K Sarin, M Sladkova, GM de Peppo, **SL Vega**. Assessing the morphology and mechanosensing ability of induced pluripotent stem cells. *BMES Annual Meeting*, Oct. 2021, Orlando, FL.

58. M Butani*, K Driscoll, **SL Vega**. Decellularized plant tissue microtopography regulates stem cell behavior. *BMES Annual Meeting*, Oct. 2021, Orlando, FL.

57. K Driscoll*, M Butani, **SL Vega**. Decellularized plant tissues for biomedical applications. *BMES Annual Meeting*, Oct. 2021, Orlando, FL.

56. A Pacheco Benitez*, B Herb, **SL Vega**. 3D light-degradable hydrogels to study dynamic cell environments. *BMES Annual Meeting*, Oct. 2021, Orlando, FL.

55. M Benmassaoud*, V Carabetta, **SL Vega**. Antimicrobial peptide screening to develop Staphylococcal-resistant films. *The 2021 New York Bacillus Interest Group Annual Symposium*, June 2021, New York, NY.

54. **SL Vega***. Self-forming hyaluronic acid hydrogels for biomedical applications. *Center for Engineering MechanoBiology Seminar*, May 2021, Philadelphia, PA.

53. M Dicerbo, M Benmassaoud, K Gultian, S Miskiel, TWB Kim, **SL Vega***. Porous scaffold-hydrogel composite for osteochondral tissue engineering. *Society for Biomaterials World Biomaterials Congress 2020*, Dec. 2020, Virtual.

52. **SL Vega***. Peptide-functionalized hydrogels for biomedical applications. *Cooper Medical School of Rowan University Seminar*, Nov. 2020, Virtual.

51. K Driscoll*, M Butani, **SL Vega**. Stem cell behavior and osteogenic differentiation in plant tissue scaffold materials. *BMES Annual Meeting*, Oct. 2020, Virtual.

50. N Belanger*, C Burns, **SL Vega**, V Beachley. Creating aligned polycaprolactone nanofiber hydrogel composites through layer-by-layer assembly. *BMES Annual Meeting*, Oct. 2020, Virtual.

49. R Gandhi*, K Gultian, TWB Kim, **SL Vega**. Gelatin-based bioactive hydrogels for bone tissue engineering applications. *BMES Annual Meeting*, Oct. 2020, Virtual.

48. **SL Vega***. Stem cell therapy: Basic science and current regulations overview. *Regenerative Medicine and Orthobiologics Symposium*, Sept. 2020, Cherry Hill, NJ.

47. **SL Vega***. Hydrogel-based engineering of cellular microenvironments. *Cooper Cancer Research Showcase*, March 2020, Camden, NJ.

46. K Gultian, A Quinones, S Miskiel, TWB Kim, **SL Vega***. Osteogenic biomarker expression of mesenchymal stem cells in response to substrate dimensionality and stiffness. *ORS Annual Meeting*, Feb. 2020, Phoenix, AZ.

45. M Dicerbo, M Benmassaoud, S Miskiel, TWB Kim, **SL Vega***. Scaffold-hydrogel composite for osteochondral tissue engineering. *ORS Annual Meeting*, Feb. 2020, Phoenix, AZ.

44. **SL Vega***. Hydrogels to investigate stem cell-material interactions. *New York Stem Cell Foundation Seminar*, Oct. 2019, New York, NY.

43. K Gultian*, **SL Vega**. Injectable gelatin-based hydrogels for biomedical applications. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.

42. M Benmassaoud*, K Driscoll, GM de Peppo, **SL Vega**. Differences in mechanosensing between MSCs and iPSC derived MSCs. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.

41. CJ Robinson*, ME Lowe, M Benmassaoud, **SL Vega**. Stiffness-mediated changes in cell-to-nuclear area of mesenchymal stem cells. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.

40. A Quinones*, K Gultian, S Miskiel, TWB Kim, **SL Vega**. Effects of dimensionality and stiffness on osteogenic biomarker expression of mesenchymal stem cells. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.

39. S Naranjo*, A Venkatakrishnan, **SL Vega**, D Jariwala. Graphene-based microdevices to probe effects of electrical stimulation on stem cell behavior. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.

38. DE Mason*, **SL Vega**, SJ Heo, R Daniels, ED Bonnevie, JA Burdick, RL Mauck, JD Boerckel. Transcriptional control of cytoskeletal remodeling and cell motility. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.

37. DE Mason*, **SL Vega**, SJ Heo, R Daniels, ED Bonnevie, JA Burdick, RL Mauck, JD Boerckel. Transcriptional control of cytoskeletal remodeling and cell motility. *Society of Engineering Science Annual Meeting*, Oct. 2019, St. Louis, MO.

36. K Gultian*, A Quinones, S Miskiel, TWB Kim, **SL Vega**. Single-cell osteogenic biomarkers to evaluate biomaterials for bone tissue engineering. *Life Sciences Future – BioPharm*, Oct. 2019, King of Prussia, PA.

35. M Dicerbo*, M Benmassaoud, S Miskiel, TWB Kim, **SL Vega**. Biomaterial composite to recreate the osteochondral interface. *Carnegie Mellon Forum on Biomedical Engineering*, Sept. 2019, Pittsburgh, PA.

34. K Gultian*, A Quinones, S Miskiel, TWB Kim, **SL Vega**. Evaluating the progression of mesenchymal stem cell osteogenic biomarker expression in response to biomaterial properties. *Carnegie Mellon Forum on Biomedical Engineering*, Sept. 2019, Pittsburgh, PA.

33. **SL Vega***. Hydrogels for bone and cartilage tissue engineering. *Cooper Bone and Joint Institute Research Day*, June 2019, Camden, NJ.

32. JH Galarraga*, **SL Vega**, MY Kwon, JA Burdick. Combinatorial screening of 3D printable bioinks for cartilage repair. *SFB Annual Meeting*, April 2019, Seattle, WA.

31. S Furman*, S Naranjo, K Gultian, A Loneker, RG Wells, **SL Vega**. Effects of substrate stiffness and cell-cell contact area on stem cell signaling. *NEBEC*, March 2019, Piscataway, NJ.

30. **SL Vega***. Gelatin-based hydrogels for musculoskeletal tissue engineering. *NEBEC*, March 2019, Piscataway, NJ.

29. **SL Vega***. Engineering stem cell microenvironments for tissue engineering applications. *Society of Hispanic Professional Engineers (SHPE) Engineering Science Symposium*, Nov. 2018, Cleveland, OH.

28. AM Rosales*, **SL Vega**, FW DelRio, JA Burdick, KS Anseth. Reversible control of hydrogel mechanics with irreversible photo-mediated reactions. *American Institute of Chemical Engineers (AIChE) Annual Meeting*, Oct. 2018, Pittsburgh, PA.

27. **SL Vega***, JA Burdick. Engineering stem cell microenvironments for cartilage repair. *7th Annual Musculoskeletal Repair and Regeneration Symposium*, Oct. 2018, New York, NY.

26. **SL Vega***. Hydrogels formed by click chemistry for investigating cellular microenvironments. *Advancing Research in Camden: A Rowan University-Wide Research Symposium*, Oct. 2018, Camden, NJ.

25. **SL Vega***. A hydrogel screening platform for cartilage tissue engineering. *2018 Cartilage Repair Symposium*, Sept. 2018, Philadelphia, PA.

24. J Galarraga, **SL Vega**, L Ouyang, C Highley, JA Burdick*. Extrusion-based 3D printing of biodegradable hydrogels. *8th World Congress of Biomechanics*, July 2018, Dublin, Ireland.

23. AM Rosales*, **SL Vega**, FW DelRio, JA Burdick, KS Anseth. Recapitulating physical changes in the extracellular matrix with dynamic hydrogels. *SFB Annual Meeting*, April 2018, Atlanta, GA.

22. **SL Vega***, MY Kwon, J Durel, KH Song, C Wang, RL Mauck, L Han, JA Burdick. A hydrogel platform to probe the influence of engineered microenvironments on stem cell fate. *NEBEC*, March 2018, Philadelphia, PA.

21. **SL Vega***, J Durel, MY Kwon, RL Mauck, JA Burdick. Combinatorial hydrogels with biochemical gradients for probing cell-ECM interactions. *Penn Center for Musculoskeletal Disorders Symposium*, Nov. 2017, Philadelphia, PA.

20. L Chin*, **SL Vega**, AE Loneker, JA Burdick, PA Janmey, RG Wells. Mechanics and hepatocyte behavior in non-alcoholic fatty liver disease. *Physical Sciences-Oncology Network Annual Investigators Meeting*, Oct. 2017, Boston, MA.

19. J Durel*, **SL Vega**, JA Burdick. High-throughput single-cell analysis of MSC mechanosensing. *BMES Annual Meeting*, Oct. 2017, Phoenix, AZ.

18. S Trujillo*, **SL Vega**, JA Burdick, MJ Dalby, M Salmerón-Sánchez. Fibronectin-based hydrogel systems as new 3-dimensional microenvironments for tissue regeneration. *Federation of European Biomedical Societies Workshop: Biological Surfaces and Interfaces*, July 2017, Catalonia, Spain.

17. **SL Vega***, KH Song, C Wang, L Han, JA Burdick. Combinatorial hydrogels and rapid single cell imaging to investigate chondrogenesis in 3D." *Penn Orthopaedics Cartilage Repair Symposium*, April 2017, Philadelphia, PA.

16. **SL Vega***, KH Song, JA Burdick. Combinatorial hydrogels for deciphering the role of cell-hydrogel interactions in MSC chondrogenesis. *SFB Annual Meeting*, April 2017, Minneapolis, MN.

15. YC Yeh*, SR Caliari, **SL Vega**, L Ouyang, L Han, JA Burdick. Modulation of cellular response using mechanically dynamic PDMS substrates. *SFB Annual Meeting*, April 2017, Minneapolis, MN.

14. **SL Vega***, KH Song, C Wang, L Han, JA Burdick. Combinatorial hydrogels and rapid single cell imaging to investigate chondrogenesis in 3D. *Penn Center for Musculoskeletal Disorders Symposium*, Nov. 2016, Philadelphia, PA.

13. **SL Vega***, KH Song, C Wang, L Han, JA Burdick. A combinatorial hydrogel platform to probe stem cell chondrogenesis in 3D. *New Jersey Center for Biomaterials Symposium*, Oct. 2016, Iselin, NJ.

12. **SL Vega***, KH Song, JA Burdick. Development of a combinatorial hydrogel platform for screening 3D cell-biomaterial interactions. *BMES Annual Meeting*, Oct. 2016, Minneapolis, MN.

11. **SL Vega***, SR Caliari, JA Burdick. Cell spreading in 3D hydrogels regulates YAP localization. *Society for Biomaterials World Biomaterials Congress*, May 2016, Montreal, Canada.

10. V Arvind*, **SL Vega**, L McCabe, PV Moghe, NS Murthy, J Kohn. Modulating stem cell-substrate interactions and differentiation by controlling substrate topography via microphase separation. *Society for Biomaterials World Biomaterials Congress*, May 2016, Montreal, Canada.

9. **SL Vega***, MY Kwon, JA Burdick. Single cell imaging to probe early stem cell chondrogenesis in hydrogels. *Penn Center for Musculoskeletal Disorders Symposium*, Nov. 2015, Philadelphia, PA.

8. **SL Vega***, MY Kwon, JA Burdick. Fluorescent imaging to probe MSC chondrogenesis and matrix production in hydrogels. *BMES Annual Meeting*, Oct. 2015, Tampa, FL.

7. MY Kwon*, **SL Vega**, RL Mauck, JA Burdick. Influence of N-cadherin peptide dose and timing on MSC chondrogenesis in 3D HA hydrogels. *BMES Annual Meeting*, Oct. 2015, Tampa, FL.

6. **SL Vega***, PJ Patel, A Freitag, NS Murthy, PV Moghe, J Kohn. Modulating the cellular response by controlling substrate topography via demixing. *New Jersey Center for Biomaterials Symposium*, Oct. 2012, New Brunswick, NJ.

5. E Liu*, **SL Vega**, A Kulesa, H-J Sung, M Becker, J Kohn, PV Moghe. High content imaging-based mapping of stem cell phenotypes. *Stem Cells & Regenerative Medicine World Congress*, Jan. 2011, San Diego, CA.

4. **SL Vega***, E Liu, S Gordonov, PV Moghe. Parsing stem cell behaviors in complex microenvironments via high content imaging and modeling. *BMES Annual Meeting*, Oct. 2010, Austin, TX.

3. **SL Vega***, P Patel, S Gordonov, J Kim, J Kohn, PV Moghe. Utilizing early high-content nuclear features to elucidate downstream stem cell behaviors. *New Jersey Center for Biomaterials Symposium*, Oct. 2010, Bridgewater, NJ.

2. S Gordonov*, **SL Vega**, J Kohn, PV Moghe. Investigation of mesenchymal stem cell proliferation, viability, and differentiation in 3D polymeric scaffolds for tissue regeneration. *Annual National Conference on Undergraduate Research*, April 2010, Missoula, MN.

1. **SL Vega***, S Gordonov, M Treiser, D Cohen, I Androulakis, J Kohn, CS Chen, PV Moghe. Cytoskeleton-based early parsing of human mesenchymal stem cell lineage fates on biomaterials. *BMES Annual Meeting*, Oct. 2009, Pittsburgh, PA.

* Presenting author

Funding

Current

4. **Foundation Venture Capital Group**
Hydrogels for Targeted Bone Formation
PI: **SL Vega** Co-PI: TWB Kim
November 2024 to November 2025.

3. **New Jersey Health Foundation (PC 67-24)**
Evaluating Efficacy of Injectable BMP-2 Hydrogels in Healing Non-Union Femur Fractures
PI: **SL Vega**
February 2024 to February 2025.

2. **National Science Foundation (2239922)**
Understanding the Effects of Mechanical Dosing on Mesenchymal Stem Cell Identity
PI: **SL Vega**
(CAREER) NSF Division of Civil, Mechanical & Manufacturing Innovation
April 2023 to March 2028.

1. **The Cooper Foundation (402860)**
Injectable Hydrogels with Immobilized Peptides and Stem Cells for Local Orthopedic Tissue Regeneration.
PI: **SL Vega** Co-PI: TWB Kim
August 2022 to July 2025.

Previous

4. **National Institutes of Health (R21DC018818)**
   Handheld 3D Bioprinting of Self-Healing Hydrogels for Vocal Fold Reconstruction
   PI: A Miri Co-PI: **SL Vega**
   (R21) National Institute of Deafness and Other Communication Disorders
   August 2020 to July 2024.

3. **National Science Foundation (2037055)**
   Peptide-Functionalized Hydrogels that Communicate with Preprogrammed Cells
   PI: **SL Vega** Co-PI: NM Daringer
   (EAGER) NSF Division of Materials Research
   September 2020 to June 2023.

2. **Graduate School of Biomedical Sciences Seed Funding**
   Development of Novel Biofilm-Resistant Hydrogel Coatings
   PI: VJ Carabetta Co-PI: **SL Vega**
   November 2021 to October 2022.

1. **Camden Health Research Initiative**
   Injectable Hydrogels for Delivering Biologics to Reduce the Incidence of Osteoporosis-Related Hip Fractures
   PI: **SL Vega** Co-PI: TWB Kim
   January 2019 to June 2022.

Teaching and Mentoring Experience

Courses at Rowan University

Professor, Chemical Foundations in Biomedical Engineering (BME 11.201)
Fall 2022, Summer 2023, Fall 2023, Summer 2024, Fall 2024

Professor, Biological Transport Phenomena (BME 11.610)
Fall 2018, Fall 2019, Fall 2020, Spring 2022, Spring 2024

Professor, Introduction to Stem Cell Engineering (BME 11.490)
Spring 2020, Fall 2020, Fall 2021

Professor, Advanced Stem Cell Engineering (BME 11.590)
Spring 2020, Fall 2020, Fall 2021

Courses at Rutgers University

Teaching Assistant, Chemical Engineering Design & Economics I (CBE 14.155.427) (2010)
Instructor: Alkis Constantinides, Ph.D.

Teaching Assistant, Thermodynamics I (CBE 14.155.208) (2010)
Instructor: Silvina Tomassone, Ph.D.

Postdocs & Graduate Students mentored at Rowan University

Current

- Stacy Love, BME Postdoctoral Trainee (2022 – Present)
- Kebisha Basukala, BME Ph.D. (2024 – Present)
- Myranda Sims, BME Ph.D. (2023 – Present)
- Matthias Recktenwald, BME Ph.D. (2023 – Present)
- Umu Jalloh, BME Ph.D. (2022 – Present)

Past

- Daniel Ball, BME M.S. (2022 – 2024)
- Kirstene Gultian, BME Ph.D. (2018 – 2022)
- Mehdi Benmassaoud, BME Ph.D. (2018 – 2022)
- Matthew Lowe, BME M.S. (2021 – 2022)
- Sarah Furman, BME M.S. (2020 – 2021)
- Matthew DiCerbo, BME M.S. (2018 – 2021)

Undergraduate Students mentored at Rowan University

Current

- Ryan Vankawala, BME B.S. (2024 – Present)
- Grace Huang, Biological Sciences B.S. (2024 – Present)
- Christian Torres, BME B.S. (2024 – Present)
- Shishir Patel, BME B.S. (2024 – Present)
- Niva Shah, BME B.S. (2024 – Present)
- Sabriye Yilmaz, BME B.S. (2023 – Present)
- Yeisanai Cardona, BME B.S. (2023 – Present)
- Tyler Torres, BME B.S. (2023 – Present)
- Hayley Jankowski, BME B.S. (2023 – Present)
- Josh de Guzman, BME B.S. (2022 – Present)
- Marissa Pestritto, BME B.S. (2022 – Present)
- Raaha Kumaresan, BME B.S. (2022 – Present)

Past

- Mackenzie Sozio, Biological Sciences B.S. (2023 – 2024)
- Tulika Khanna, Biological Sciences B.S. (2022 – 2024)
- Arielle Gsell, BME B.S. (2022 – 2024) ***2024 da Vinci Medallion for Excellence Award***
- James MacAulay, BME B.S. (2022 – 2024)
- Abigail McSweeny, BME B.S. (2021 – 2024)
- Aryanna Copling, Translational Biomedical Sciences B.S. (2021 – 2024)
- Shrey Dalwadi, BME B.S. ***Class of 2023 Valedictorian*** (2020 – 2023)
- Kayla DeCesari, BME B.S. (2021 – 2022)
- Abby Madden, BME B.S. (2021 – 2022)
- Katie Driscoll, BME B.S., ***2020 Goldwater Scholar; 2022 da Vinci Medallion for Excellence Award*** (2018 – 2022)
- Matthew Lowe, BME B.S. (2019 – 2021)
- Gatha Adhikari, BME B.S. (2019 – 2021)
- Roshni Gandhi, BME B.S. (2019 – 2021) ***2021 da Vinci Medallion for Excellence Award***
- Khushi Sarin, BME B.S. (2019 – 2021)
- Sarah Furman, BME B.S. (2018 – 2020)
- Sebastian Naranjo, BME B.S. (2018 – 2020)
- Jennifer Depka (Summer 2023)
- Katherine Byrne (Summer 2023)
- Alexis Pacheco Benitez, NSF REU (Summer 2021)
- Antonio Quinones, NSF REU (Summer 2019)

High School Students mentored at Rowan University

- Daniella Concha-Ortiz, RISER Summer Scholar (2024)
- Divya Prajapati, RISER Summer Scholar (2024)
- Aabha Pokar, RISER Summer Scholar (2024)
- Misha Patel, RISER Summer Scholar (2023)
- Gavi Melman, RISER Summer Scholar (2022)
- Maya Butani, Research Assistant (2019 – 2022)
- Leila Quatorze, Summer Volunteer (2021, 2022)
- Jillian Smith, Summer Volunteer (2021, 2022)
- Luke Siri, Summer Volunteer (2021)
- Matthew Rondinella, RISER Summer Scholar (2019)
- Roshan Patel, RISER Summer Scholar (2019)

Students mentored at the University of Pennsylvania

- John Durel, NSF Center for Engineering MechanoBiology REU Program (2017)
- Sara Trujillo-Muñoz, Visiting Scholar, BME graduate at University of Glasgow (2016)

– John Bricker, NSF Research Experience for Teachers Program (2016)
– Evan Herlihy, BE M.S. (2015)

Students mentored at Rutgers University
– Alejandra Aguilar, NSF REU (2013)
– Varun Arvind, BME B.S. (2012 – 2014)
– Erica Harris, NSF REU (2012)
– Adam Freitag, CBE B.S. (2011 – 2012)
– Gabriel Suarez, NSF REU (2011)
– Parth Patel, BME B.S. (2010 – 2012)
– Anthony Kulesa, BME B.S. (2010 – 2012)
– Simon Gordonov, BME B.S. (2008 – 2010)

Professional Service

Institutional & Organizational Appointments

Treasurer, BMES Council of Diversity (2023 – present)
Executive Committee Member, U-RISE (Undergraduate Research Training Initiative for Student Enhancement) (2022 – 2023)
BME Representative, Diversity, Equity, and Inclusion (DEI) Steering Committee (2022 – present)
Committee Member, Office of Health Professions (2020 – 2024)
Committee Member, Institutional Animal Care and Use Committee (IACUC) (2019 – 2024)

Academic Outreach

Chair, BME Outreach & Community Engagement (2020 – present)
Founder & Program Director, BEAM (BioEngineering And Me) Program (2021 – present)
Program Director, RISER (Research Immersion in biomedical Science and Engineering at Rowan) Program (2019 – present)

Conference Organization & Service

Session chair & organizer, SFB World Biomaterials Congress Meeting (2020)
Session co-chair, BMES Annual Meeting (2019, 2020, 2021, 2022, 2023, 2024)
Session co-chair, SFB Annual Meeting (2017)
Abstract Reviewer, BMES & ORS Annual Meetings (2019 – present)

Editorial Boards

Review Editor, Frontiers in Biomaterials Science (2021 – present)
Guest Editor, JoVE Methods Collection "Recent Advances in Hydrogel Design and Imaging-Based Analysis to Probe Cell-Material Interactions" (2020 – present)

Proposal Reviewer

VA Scientific Merit Reviewer (2024)
DoD CDMRP Peer Reviewed Medical Research Program (PRMRP) Reviewer (2023, 2024)
NIH Reviewer (2023, 2024)
NSF Reviewer (2021, 2023, 2024)

Journal Reviewer

ACS Applied Bio Materials (2021 – present)
ACS Applied Materials & Interfaces (2019 – present)
ACS Biomaterials Science & Engineering (2018 – present)
Acta Biomaterialia (2017 – present)
Advanced Biology (2023 – present)
Advanced Healthcare Materials (2022 – present)
Advanced Materials (2022 – present)
Annals of Biomedical Engineering (2022 – present)
Biomacromolecules (2023 – present)
Biomaterials (2024 – present)
Chemical Reviews (2021 – present)
Communications Materials (2021 – present)

Current Opinion in Biomedical Engineering (2021 – present)
Drug Delivery and Translational Research (2021 – present)
Frontiers in Bioengineering and Biotechnology (2021 – present)
Frontiers in Biomaterials Science (2023 – present)
Frontiers in Materials (2024 – present)
Frontiers in Medical Engineering (2023 – present)
Frontiers in Medical Technology (2022 – present)
Journal of Biomedical Materials Research Part A (2024 – present)
Journal of Cellular Physiology (2020 – present)
Journal of Materials Chemistry B (2020 – present)
Materials Horizons (2020 – present)
Materials Science & Engineering C (2020 – present)
RSC Advances (2019 – present)
Scientific Reports (2024 – present)

Professional Memberships

Affiliate Member, Center for Engineering MechanoBiology (CEMB)
Affiliate Member, Penn Center for Musculoskeletal Diseases (PCMD)
Member, Biomedical Engineering Society (BMES)
Member, Society for Biomaterials (SFB)
Member, Orthopaedic Research Society (ORS)
Member, American Institute of Chemical Engineers (AIChE)
Member, American Chemical Society (ACS)

Professional Development

- Biomedical Engineering Educational Summit (2024)
  Newark, NJ
- NSF Square-Table 2: Programmable Interfaces Workshop (2019)
  Arlington, VA
- NSF ENG CAREER Proposal Writing Workshop (2019)
  Organized by Kansas State University, Arlington, VA
- National Effective Teaching Institute (2019)
  Organized by ASEE, San Diego, CA
- Faculty Development Symposium (2018)
  Organized by SHPE, Cleveland, OH
- Rising Stars in Biomedical Workshop (2017)
  MIT, Boston, MA
- Institute on Teaching and Mentoring (2016)
  Organized by Compact for Faculty Diversity, Tampa, FL
- Future Faculty Career Exploration Program (2013)
  RIT, Rochester, NY