Karen Christman, Ph.D.
UCSD Department of Bioengineering • 2880 Torrey Pines Scenic Drive
La Jolla, CA 92037 • Phone (858) 822-7863 • Email christman at eng.ucsd.edu

Education

2000	B.S. in Biomedical Engineering, Northwestern University
2003	Ph.D. in Bioengineering, University of California San Francisco and Berkeley
2004 - 2007	Postdoc in Polymers and Nanotechnology, University of California Los Angeles

Employment and Training

1998	Research Assistant, Department of Physiology, Northwestern University
1999	Summer Research Fellow, Department of Cancer Biology, M.D. Anderson Cancer Center
1999	Research Assistant, Department of Biomedical Engineering, Northwestern University
2000 - 2003	Graduate Student Researcher, Division of Bioengineering, UCSF
2004 - 2005	CNSI - HP Postdoctoral Fellow, Department of Chemistry and Biochemistry, UCLA
2005 - 2007	NIH Postdoctoral Fellow, Department of Chemistry and Biochemistry, UCLA
2007 - 2013	Assistant Professor, Department of Bioengineering, UCSD
2008 - Present	Faculty Affiliate, Department of Nanoengineering, UCSD
2008 - Present	Member, Materials Science Graduate Program, UCSD
2009 - Present	Member, Institute of Engineering and Medicine, UCSD
2011 - Present	Member, Clinical & Translational Research Institute, UCSD
2013 - 2016	Associate Professor, Department of Bioengineering, UCSD
2016 - Present	Professor of Bioengineering, UCSD
2017 - Present	Associate Dean for Students, Jacobs School of Engineering, UCSD

Awards and Honors

U.T. M.D. Anderson Summer Research Fellowship, 1999
UCSF Graduate Dean's Health Science Fellowship, 2000-2002
Berkeley-Stanford Innovator's Challenge Finalist, 2003
CNSI-HP Postdoctoral Fellowship, 2004-2005
NHLBI Postdoctoral Fellowship (NRSA), 2005-2007
NIH Director's New Innovator Award, 2008
Wallace H. Coulter Foundation Early Career Translational Research Award Phase I, 2009
3rd place, Best Poster Award Competition, American College of Cardiology Scientific Sessions, 2011
Wallace H. Coulter Foundation Translational Research Award Phase II, 2011
American Heart Association Western States Innovative Sciences Award, 2012
Tissue Engineering and Regenerative Medicine International Society Young Investigator Award, 2012
2nd place, 2nd Annual Wyss Institute - IEEE EMBS Award for Translational Research, 2012
NIH Director's Transformative Research Award, 2012
National Academy of Engineering (NAE) U.S. Frontiers in Engineering Invitee, 2013; Organizer, 2014
Fellow of the American Heart Association, 2014
NIH Bioengineering, Technology, and Surgical Sciences (BTSS) Study Section Standing Member, 2015
UC Center for Accelerated Innovation Technology Development Award, 2015
Professor Van Ruyven Penning award (University Medical Center Utrecht), 2015
Fellow of the American Institute for Medical and Biological Engineering, 2016
Biocom Life Science Catalyst Award, 2017
Tissue Engineering and Regenerative Medicine International Society Senior Scientist Award, 2018

Professional Activities

Member: Tissue Engineering & Regenerative Medicine International Society, Biomedical Engineering Society, Society for Biomaterials, Materials Research Society, American Heart Association, International Society for Cardiovascular Translational Research (advisory board member)

Conference: Chair of 2016 Society for Biological Engineering's International Conference on Stem Cell Engineering, Organizing committee for 2014 Stem Cell Meeting on the Mesa and 2016 Tissue Engineering Regenerative Medicine International Society (TERMIS) North America Meeting, Session chair/co-chair at numerous conferences including Society for Biomaterials, TERMIS, Biomedical Engineering Society, IEEE-Engineering in Medicine and Biology Society Meeting, Experimental Biology, and International Conference on Stem Cell Engineering.

Journals: Editorial consultant, *JACC: Basic to Translational Science*; International Advisory Board, *Advanced Therapeutics*

Instructor: UCSD Bioengineering: Principles of Biomaterials Design, Senior Design, Foundations of Tissue Engineering Science, Tissue Engineering Laboratory, Professional Issues in Bioengineering

Other: NIH BTSS Study Section (Standing Member: 2015 – 2019; Ad hoc: 2014 – 2015), Participant in NHLBI Bioartificial Heart Working Group (2013), AHA Bsc3 Peer Review Study Group (Co-chair: 2015- 2016; Member: 2012- 2016)

Journal Publications

1. Jubilee R. Stewart, **Karen L. Christman**, and Catherine O'Brian. Effects of Resveratrol on the Autophosphorylation of Phorbol Ester-Responsive Protein Kinases: Inhibition of Protein Kinase D but Not Protein Kinase C Isozyme Autophosphorylation. *Biochemical Pharmacology.* 2000; 60(9):1355-9.
2. **Karen L. Christman**, Hubert H. Fok, Richard E. Sievers, Qizhi Fang, and Randall J. Lee. Fibrin Glue Alone and Skeletal Myoblasts in a Fibrin Scaffold Preserve Cardiac Function after Myocardial Infarction. *Tissue Engineering.* 2004; 10:403-9.
3. **Karen L. Christman**, Andrew J. Vardanian, Qizhi Fang, Richard E. Sievers, Hubert H. Fok, and Randall J. Lee. Injectable Fibrin Scaffold Improves Cell Transplant Survival, Reduces Infarct Expansion, and Induces Neovasculature Formation in Ischemic Myocardium. *Journal of the American College of Cardiology.* 2004; 44:654-60.
4. **Karen L. Christman**, Qizhi Fang, Michael S. Yee, Kandice R. Johnson, Richard E. Sievers, and Randall J. Lee. Enhanced Neovasculature Formation in Ischemic Myocardium Following Delivery of Pleiotrophin Plasmid in a Biopolymer. *Biomaterials.* 2005; 26:1139-44.
5. **Karen L. Christman,** Qizhi Fang, Anne J. Kim, Richard E. Sievers, Hubert H. Fok, Albert F. Candia, Kenneth J. Colley, Gonzalo Herradon, Laura Ezquerra, Thomas F. Deuel, and Randall J. Lee. Pleiotrophin Induces Formation of Functional Neovasculature In Vivo. *Biochemical and Biophysical Research Communications.* 2005; 332:1146-1152.
6. **Karen L. Christman** and Heather D. Maynard. Protein Micropatterns Using a pH-Responsive Polymer and Light. *Langmuir.* 2005; 21:8389-8393.
7. **Karen L. Christman** and Randall J. Lee. Biomaterials for Treatment of Myocardial Infarction. *Journal of the American College of Cardiology.* 2006; 48:907-913.
8. **Karen L. Christman**, Michael V. Requa, Vanessa D. Enriquez-Rios, Sabrina Ward, Kenneth A. Bradley, Kimberly L. Turner and Heather D. Maynard. Submicron Streptavidin Patterns for Protein Assembly. *Langmuir.* 2006; 22:7444 -7450.
9. **Karen L. Christman**, Vanessa D. Enriquez-Rios, and Heather D. Maynard. Nanopatterning Proteins and Peptides. *Soft Matter.* 2006; 2: 928-939. (One of the top 5 most cited biological Soft Matter articles since the journal launched in 2005 as of Sept. 2009)
10. Branden Brough*, **Karen L. Christman***, Tak Sing Wong, Chris M. Kolodziej, Jeffrey G. Forbes, Kuan Wang, Heather D. Maynard, and Chih-Ming Ho. Surface Initiated Actin Polymerization from Top-down Manufactured Nanopatterns. *Soft Matter.* 2007; 3: 541-546. ***Shared first author**.
11. **Karen L. Christman**,* Rebecca M. Broyer,* Zachary P. Tolstyka, and Heather D. Maynard. Site-specific Protein Immobilization through N-terminal Oxime Linkages. *Journal of Materials Chemistry*. 2007; 17:2021-2027. *Shared first author.
12. Paula M. Mendes, **Karen L. Christman**, Puru Parthasarathy, Eric Schopf, Jianyong Ouyang, Yang Yang, Jon A. Preece, Heather D. Maynard, Yong Chen, J. Fraser Stoddart. Electrochemically

Controllable Self-Assembly of Proteins: Spatial Surface Bioconjugation. *Bioconjugate Chemistry*. 2007; 18:1919-1923.

13. **Karen L. Christman**, Vimary Vazquez-Dorbatt, Eric Schopf, Chris M. Kolodziej, Ronald C. Li, Rebecca M. Broyer, Yong Chen, and Heather D. Maynard. Nanoscale Growth Factor Patterns by Immobilization on a Heparin-Mimicking Polymer. Journal of the American Chemical Society. 2008; 130:16585-16591.
14. Jiashing Yu, **Karen L. Christman**, Eric Chin, Richard E. Sievers, Maythem Saeed, and Randall J. Lee. Restoration of Left Ventricular Geometry and Improvement of Left Ventricular Function in a Rodent Model of Chronic Ischemic Cardiomyopathy. *Journal of Thoracic and Cardiovascular Surgery.* 2009; 137:180-187.
15. **Karen L. Christman**, Eric Schopf, Rebecca M. Broyer, Ronald C. Li, Yong Chen, and Heather D. Maynard. Positioning Multiple Proteins at the Nanoscale with Electron Beam Cross-Linked Functional Polymers. Journal of the American Chemical Society. 2009; 131:521-527. (F1000 Factor 10)
16. Jennifer M. Singelyn, Jessica A. DeQuach, Sonya Seif-Naraghi, Robert B. Littlefield, Pamela J. Schup-Magoffin, **Karen L. Christman**. Naturally Derived Myocardial Matrix as an Injectable Scaffold for Cardiac Tissue Engineering. Biomaterials. 2009; 30:5409-5416.
17. Sonya B. Seif-Naraghi, Michael A. Salvatore, Pamela J. Schup-Magoffin, Diane P. Hu, and **Karen L. Christman**. Design and Characterization of an Injectable Pericardial Matrix Gel: A Potentially Autologous Scaffold for Cardiac Tissue Engineering. Tissue Engineering. 2010; 16:2017-2027.
18. Sonya B. Seif-Naraghi, Jennifer M. Singelyn, Jessica A. DeQuach, Pamela J. Schup-Magoffin, **Karen L. Christman**. Fabrication of Biologically Derived Injectable Materials for Myocardial Tissue Engineering. Journal of Visualized Experiments. 2010; 46: e2109.
19. Jennifer M. Singelyn and **Karen L. Christman**. Injectable Materials for the Treatment of Myocardial Infarction and Heart Failure: the Promise of Decellularized Matrices. Journal of the Cardiovascular Translational Research. 2010; 3:478-86.
20. Kevin Chung, Jessica A. DeQuach, and **Karen L. Christman**. Nanopatterned Interfaces for Controlling Cell Behavior. Nano-LIFE. 2010; 1: 63-77.
21. Jessica A. DeQuach, Valeria Mezzano, Amar Miglani, Stephan Lange, Gordon M. Keller, Farah Sheikh, and **Karen L. Christman**. Simple and high yielding method for preparing tissue specific extracellular matrix coatings for cell culture. PLoS One. 2010; 5: e13039.
22. D. Adam Young, Dina O. Ibrahim, Diane Hu, **Karen L. Christman**. Injectable hydrogel scaffold from decellularized human lipoaspirate. Acta Biomaterialia. 2010; 7: 1040-9.
23. D. Adam Young, Jessica A. DeQuach, and **Karen L. Christman**. Cardiomyogenesis of Human Stem Cells: What's Known and What's Unknown. Wiley Interdisciplinary Reviews: Systems Biology and Medicine. 2011; 3:666-80. (Invited paper)
24. **Karen L. Christman**, Rebecca Broyer, Eric Schopf, Chris Koldoziej, Yong Chen, and Heather Maynard. Protein Nanopatterns by Oxime Bond Formation. Langmuir. 2011; 27: 1415-8.
25. Jennifer M. Singelyn and **Karen L. Christman**. Modulation of material properties of a decellularized myocardial matrix scaffold. Macromolecular Bioscience. 2011; 11:731-8.
26. Aboli A. Rane, Joyce S. Chuang, Amul Shah, Diane P. Hu, Nancy D. Dalton, Yusu Gu, Kirk L. Peterson, Jeffrey H. Omens, **Karen L. Christman**. Increased Infarct Wall Thickness by a Bio-inert Injectable Material is Insufficient to Prevent Negative Left Ventricular Remodeling after Myocardial Infarction. PLoS One. 2011; 6: e21571.
27. Sonya B. Seif-Naraghi, Dinah Horn, Pam A. Schup-Magoffin, Michael M. Madani, **Karen L. Christman**. Patient-to-Patient Variability in Autologous Pericardial Matrix Scaffolds for Cardiac Repair. Journal of Cardiovascular Translational Research. 2011; 4:545-56. (Invited paper)
28. Jessica A. DeQuach, Shauna H. Yuan, Lawrence S. B. Goldstein, **Karen L. Christman**. Decellularized Porcine Brain Matrix for Cell Culture and Tissue Engineering Scaffolds. Tissue Engineering. 2011; 21-22:2583-92. With distinction for the 2011 Mary Ann Liebert, Inc. Outstanding Student Award of Tissue Engineering and Regenerative Medicine International Society–North America to Jessica DeQuach.
29. Todd D. Johnson, Stephen Y. Lin, **Karen L. Christman**. Tailoring material properties of a nanofibrous extracellular matrix derived hydrogel. Nanotechnology. 2011; 22: 494015. (Invited paper)
30. Airong Song, Aboli A. Rane, **Karen L. Christman.** Antibacterial and Cell-adhesive Polypeptide and Poly(ethylene glycol) Hydrogel as a Scaffold for Wound Healing. Acta Biomaterialia. 2012; 8:41-50.
31. Aboli A. Rane and **Karen L. Christman**. Biomaterials for Treatment of Myocardial Infarction: A 5-Year Update. Journal of the American College of Cardiology. 2011; 58: 2615-29.

32. Jennifer M. Singelyn, Priya Sundaramurthy, Pamela J. Schup-Magoffin, Diane P. Hu, Denver M. Faulk, Jean Wang, Todd Johnson, Kristine M. Mayle, Kendra Bartels, Anthony N. DeMaria, Nabil Dib, and **Karen L. Christman**. Catheter-deliverable hydrogel derived from decellularized ventricular extracellular matrix increases endogenous cardiomyocytes and preserves cardiac function post-myocardial infarction. Journal of the American College of Cardiology. 2012; 59:751-63. Highlighted in the San Diego Union Tribune, Chicago Tribune (website), Huffington Post (website), Scientific American (website), *Interventional Cardiology,* SanDiegoBiotechnology.com, Veja (largest magazine in Brazil), KPBS/NPR, Reuters, CBS Radio (Osgood File), and numerous other science and news outlets.
33. D. Adam Young and **Karen L. Christman**. Injectable Biomaterials for Adipose Tissue Engineering. Biomedical Materials. 2012; 024104. (Invited paper)
34. Jessica A. DeQuach, Joy E. Lin, Cynthia Cam, Diane Hu, Michael A. Salvatore, Farah Sheikh, **Karen L. Christman**. Injectable skeletal muscle matrix hydrogel promotes neovascularization and muscle cell infiltration in a hindlimb ischemia model. European Cells & Materials. 2012; 23:400-12.
35. Sonya B. Seif-Naraghi, Dinah Horn, Pam A. Schup-Magoffin, and **Karen L. Christman**. Injectable extracellular matrix derived hydrogel provides a platform for enhanced retention and delivery of a heparin-binding growth factor. *Acta Biomaterialia.* 2012; 8:3695-703.
36. Kristin M. French, Archana V. Boopathy, Jessica A. DeQuach, Loice Chingozha, Hang Lu, **Karen L. Christman**, and Michael E. Davis. A naturally derived cardiac extracellular matrix enhances cardiac progenitor cell behavior in vitro. *Acta Biomaterialia.* 2012; 8:4357-64
37. **Karen L. Christman**. Treating the leading killer. *Science Translational Medicine*. 2012; 4:146fs26.
38. Nikhil Rao, Samantha Evans, Danique Stewart, Katrina H. Spencer, Farah Sheikh, Elliot E. Hui, **Karen L**. **Christman.** Fibroblasts influence muscle progenitor differentiation and alignment in contact independent and dependent manners in organized co-culture devices. *Biomedical Microdevices*. 2013; 15:161-9.
39. Todd D. Johnson and **Karen L. Christman**. Injectable hydrogel therapies and their delivery strategies for treating myocardial infarction. *Expert Opinion on Drug Delivery.* 2013; 10:59-72.
40. Sonya B. Seif-Naraghi*, Jennifer M. Singelyn*, Michael A. Salvatore, Kent G. Osborn, Jean J. Wang, Unatti Sampat, Oi Ling Kwan, G. Monet Strachan, Jonathan Wong, Pamela J. Schup-Magoffin, Rebecca L. Braden, Kendra Bartels, Jessica A. DeQuach, Mark Preul, Adam M. Kinsey, Anthony N. DeMaria, Nabil Dib, and **Karen L. Christman**. Safety and efficacy of an injectable extracellular matrix hydrogel for treating myocardial infarction. *Science Translational Medicine.* 2013; 5:173ra25. *Shared first author. Highlighted in U.S. News and World Report, Bloomberg, San Diego Tribune, Nature Medicine blogs, and numerous other science and news outlets.
41. Gregory N. Grover, Rebecca L. Braden, and **Karen L. Christman**. Oxime cross-linked injectable hydrogels for catheter delivery. *Advanced Materials.* 2013; 25:2937-42
42. Jennifer L. Young, Jerry Tuler, Rebecca Braden, Pamela Schüp-Magoffin, Jacquelyn Schaefer, Kyle Kretchmer, **Karen L. Christman**, Adam J. Engler. In vivo response to dynamic hyaluronic acid hydrogels. *Acta biomaterialia*. 2013; 9: 7151-7.
43. Milica Radisic and Karen L. Christman. Material Science and Tissue Engineering: Repairing the Heart. Mayo Clinic Proceedings. 2013; 88: 884-98.
44. D. Adam Young, Yu Suk Choi, Adam J. Engler, and **Karen L. Christman**. Stimulation of adipogenesis of adult adipose-derived stem cells using substrates that mimic the stiffness of adipose tissue. *Biomaterials*. 2013; 34: 8581-88.
45. Gregory N. Grover, Nikhil Rao, and **Karen L. Christman**. Myocardial matrix-polyethylene glycol hybrid hydrogels for tissue engineering. Nanotechnology. 2013; 25:014011. 25th anniversary issue.
46. Nikhil Rao, Gregory N. Grover, Ludovic G. Vincent, Samantha C. Evans, Yu Suk Choi, Ludovic G. Vincent, Katrina H. Spencer, Elliot E. Hui, Adam J. Engler, and **Karen L. Christman**. A co-culture device with a tunable stiffness to understand combinatorial cell-cell and cell-matrix interactions. *Integrative Biology.* 2013; 5:1344-54. Inside cover article.
47. Sophia Suarez, Gregory Grover, Rebecca Braden, **Karen L. Christman***, and Adah Almutairi*. Tunable protein release from acetalated dextran microparticles: a platform for delivery of protein therapeutics to the heart post-MI. *Biomacromolecules.* 2013; 14:3927-35. *Co-corresponding authors.
48. D. Adam Young, Vaibhav Bajaj, and **Karen L. Christman**. Decellularized adipose matrix hydrogels stimulate in vivo neovascularization and adipose formation. *Journal of Biomedical Materials Research*

Part A. 2014; 102: 1641-51. With distinction as the Award winner for outstanding research in the PhD category at the 2014 Society for Biomaterials annual meeting to Adam Young.

49. Todd D. Johnson, Jessica A. DeQuach, Roberto Gaetani, Jessica Ungerleider, Dean Elhag, Vishal Nigam, Atta Behfar, and **Karen L. Christman**. Human versus porcine tissue sourcing for an injectable myocardial matrix. *Biomaterials Science*. 2014; 2: 735-44. Emerging Investigators Issue.
50. Jessica Ungerleider and **Karen L. Christman**. Injectable biomaterials for the treatment of myocardial infarction and peripheral artery disease: translational challenges and progress. *Stem Cells Translational Medicine*. 2014: 3: 1090-9.
51. Todd D. Johnson, Rebecca Braden, and **Karen L. Christman**. Injectable ECM scaffolds for cardiac repair. *Methods in Molecular Biology*. 2014; 1181:109-20.
52. Sonya Sonnenberg, Aboli A. Rane, Cassie J. Liu, Nikhil Rao, Gillie Agmon, Sophia Suarez, Raymond Wang, Adam Munoz, Vaibhav Bajaj, Shirley Zhang, Rebecca Braden, Pamela J. Schup-Magoffin, Oi Ling Kwan, Anthony N. DeMaria, Jennifer R. Cochran, and **Karen L. Christman**. Delivery of an engineered HGF fragment in an extracellular matrix-derived hydrogel prevents negative LV remodeling post-myocardial infarction. *Biomaterials.* 2015; 45:56-63.
53. Sophia Suarez, Adah Almutairi, and **Karen L. Christman**. Micro- and nanoparticles for treating cardiovascular disease. *Biomaterials Science*. 2015; 3: 564-580.
54. Mary M. Nguyen, Nathan C. Gianneschi, and **Karen L. Christman**. Developing injectable nanomaterials to repair the heart. *Current Opinion in Biotechnology.* 2015; 34: 225-31.
55. Jessica L. Ungerleider, Todd D. Johnson, Nikhil Rao, and **Karen L. Christman**. Fabrication and characterization of injectable hydrogels derived from decellularized skeletal muscle and cardiac muscle. *Methods*. 2015: 84: 53–59.
56. Gregory N. Grover, Julian Garcia, Mary M. Nguyen, Matthew Zanotelli, Michael M. Madani, and **Karen L. Christman**. Binding of anti-cell adhesive oxime-crosslinked PEG hydrogels to cardiac tissues. *Advanced Healthcare Materials*. 2015; 4:1327-31.
57. Nick Merna, Kelsey M. Fung, Jean J. Wang, Cristi R. King, Kirk C. Hansen, **Karen L. Christman**, and Steven C. George. Differential β3 Integrin Expression Regulates the Response of Human Lung and Cardiac Fibroblasts to Extracellular Matrix and Its Components. *Tissue Engineering*. 2015**;** 21: 2195-205.
58. Roberto Gaetani, Dries AM Feyen, Vera Verhage, Rolf Slaats, Elisa Messina, **Karen L. Christman**, Alessandro Giacomello, Pieter AFM Doevendans, and Joost P.G. Sluijter. Epicardial application of cardiac progenitor cells in a 3D-printed gelatin/hyaluronic acid patch preserves cardiac function after myocardial infarction. *Biomaterials*. 2015; 61:339-48.
59. Raymond M. Wang and **Karen L. Christman**. Decellularized myocardial matrix hydrogels: in basic research and preclinical studies. *Advanced Drug Delivery Reviews*. 2016; 96:77-82.
60. Jean W. Wassenaar, Gerry R. Boss*, and **Karen L. Christman***. Decellularized skeletal muscle as an in vitro model for studying drug-extracellular matrix interactions. *Biomaterials*. 2015; 64: 108-14. *Co-corresponding authors.
61. Mary M. Nguyen*, Andrea S. Carlini*, Miao-Ping Chien, Sonya Sonnenberg, Colin Luo, Rebecca L. Braden, Kent G. Osborn, Yiwen Li, Nathan C. Gianneschi**, and **Karen L. Christman****. Enzyme-responsive nanoparticles for targeted accumulation and prolonged retention in heart tissue after myocardial infarction. *Advanced Materials.* 2015; 27:5447-52. *Shared first author. **Co-corresponding authors.
62. Sophia Suarez, Aboli A. Rane, Adam Munoz, Adam T. Wright, Shirley X. Zhang, Rebecca L. Braden, Adah Almutairi*, Andrew McCulloch, and **Karen L. Christman***. Intramyocardial injection of hydrogel with high interstitial spread does not impact action potential propagation. *Acta Biomaterialia.* 2015; 26:13-22. *Co-corresponding authors.
63. Todd D. Johnson*, Ryan C. Hill*, Monika Dzieciatkowska, Vishal Nigam, Atta Behfar, **Karen L. Christman****, and Kirk C. Hansen**. Quantification of decellularized human myocardial matrix: a comparison of six patients. Proteomics Clinical Applications. 2016; 10:75-83 *Shared first author. **Co-corresponding authors.
64. Roberto Gaetani, Christopher Yin, Neha Srikumar, Rebecca Braden, Pieter A. Doevendans, Joost P. Sluijter, and **Karen L. Christman**. Cardiac derived extracellular matrix enhances cardiogenic properties of human cardiac progenitor cells. Cell Transplantation. 2016; 25:1653-63.

65. Gillie Agmon and **Karen L. Christman**. Controlling stem cell behavior with decellularized extracellular matrix scaffolds. Current Opinion in Solid State and Materials Science. 2016; 20:193-201.
66. Sophia L. Suarez, Adam Muñoz, Aaron Mitchell, Rebecca L. Braden, Colin Luo, Jennifer R. Cochran, Adah Almutairi*, and **Karen L. Christman***. Degradable acetalated dextran microparticles for tunable release of an engineered hepatocyte growth factor fragment. ACS Biomaterials Science & Engineering. 2016; 2:197-204. *Co-corresponding authors.
67. Jean W. Wassenaar, Roberto Gaetani, Julian Garcia, Rebecca L. Braden, Colin Luo, Diane Huang, Anthony N. DeMaria, Jeffrey H. Omens, and **Karen L. Christman**. Transcriptional and histological evidence for the mechanisms underlying the functional benefits of a myocardial matrix hydrogel for post-myocardial infarction treatment. Journal of the American College of Cardiology. 2016; 67:1074-86.
68. Jessica L. Ungerleider*, Todd D. Johnson*, Melissa J. Hernandez, Dean I. Elhag, Rebecca L. Braden, Monika Dzieciatkowska, Kent G. Osborn, Kirk C. Hansen, Ehtisham Mahmud, **Karen L. Christman**. Extracellular matrix hydrogel promotes tissue remodeling, arteriogenesis, and perfusion in a rat hindlimb ischemia model. Journal of the American College of Cardiology: Basic to Translational Science. 2016; 1: 32-44. *Shared first author.
69. Jean W. Wassenaar, Rebecca L. Braden, Kent G. Osborn, and **Karen L. Christman**. Modulating in vivo degradation rate of injectable extracellular matrix hydrogels. Journal of Materials Chemistry B. 2016; 4:2794-2802.
70. Kristin M. French, Joshua T. Maxwell, Shrishti Bhutani, Shohini Ghosh-Choudhary, Marcos J. Fierro, Todd D. Johnson, **Karen L. Christman**, W. Robert Taylor, and Michael E. Davis. Fibronectin and cyclic strain improve cardiac progenitor cell regenerative potential in vitro. Stem Cells International. 2016; 2016:8364382.
71. Raymond M. Wang*, Todd D. Johnson*, Jingjin He, Zhili Rong, Michelle Wong, Vishal Nigam, Atta Behfar, Yang Xu, and **Karen L. Christman**. Humanized mouse model for assessing the human immune response to Xenogeneic and Allogeneic Biomaterials. Biomaterials. 2017; 129:98-110. *Shared first author.
72. Melissa J. Hernandez, **Karen L. Christman**. Designing acellular injectable biomaterial therapeutics for treating myocardial infarction and peripheral artery disease. Journal of the American College of Cardiology: Basic to Translational Science. 2017; 2: 212-226.
73. Nikhil Rao, Gillie Agmon, Matthew T. Tierney, Jessica L. Ungerleider, Rebecca Braden, Alessandra Sacco, and **Karen L. Christman**. Engineering an injectable muscle-specific microenvironment for improved cell delivery using a nanofibrous extracellular matrix hydrogel. ACS Nano. 2017; 11:3851-3859.
74. Jessica L. Ungerleider*, Jacquelin Kammeyer*, Rebecca Braden, **Karen L. Christman****, and Nathan C. Gianneschi**. Enzyme-targeted nanoparticles for delivery to ischemic skeletal muscle. Polymer Chemistry. 2017; 8: 5212-19. *Shared first author. **Co-corresponding authors. Pioneering Investigators issue.
75. Yue Zhang, Weiwei Gao, Yijie Chen, Tamara Escajadillo, Jessica Ungerleider, Ronnie H. Fang, **Karen L. Christman**, Victor Nizet, and Liangfang Zhang. Self-assembled colloidal gel using cell membrane-coated nanosponges as building blocks. ACS Nano. 2017; 11: 11932-30.
76. Martin T. Spang, **Karen L. Christman**. Extracellular matrix hydrogel therapies: In vivo applications and development. Acta Biomaterialia. 2018; 68:1-14.
77. Melissa J. Hernandez*, Roberto Gaetani*, Vera M. Pieters, Nathan W. Ng, Audrey E. Chang, Taylor R. Martin, Eva van Ingen, Emma A. Mol, Joost P.G. Sluijter, **Karen L. Christman**. Decellularized extracellular matrix hydrogels as a delivery platform for microRNA and extracellular vesicle therapeutics. Advanced Therapeutics. 2018; 7:1800672. *Shared first author.
78. Roberto Gaetani, Soraya Aouad, Lea L. Demaddalena, Heinz Straessle, Monika Dzieciatkowska, Matthew Wortham, Hugh R.T. Bender Kim-Vy Nguyen-Ngoc, Geert W. Schmid-Schoenbein, Steven C. George, Christopher C.W. Hughes, Maike Sander, Kirk C. Hansen, and **Karen L. Christman**. Evaluation of different decellularization protocols on the generation of pancreas-derived hydrogels. Tissue Engineering Part C. 2018; 24(12):697-708.
79. Donald Bejleri, Benjamin W. Streeter, Aline L.Y. Nachlas, Milton E. Brown, Roberto Gaetani, **Karen L. Christman**, and Michael E. Davis. A bioprinted cardiac patch composed of cardiac-specific extracellular matrix and progenitor cells for heart repair. Advanced Healthcare Materials. 2018; 7:1800672.

80. Vipul Sheth, Pamela Duran, Jonathan Wong, Sameer Shah, Jiang Du, **Karen L. Christman**, Eric Y. Chang, and Marianna Alperin. Multimodal imaging assessment and histologic correlation of the female rat pelvic floor muscles' anatomy. Journal of Anatomy. 2019; 234:543-550.
81. **Karen L. Christman**. Biomaterials for tissue repair. Science. 2019; 363:340-341.
82. Pamela Duran, Samuel R. Ward, **Karen L. Christman***, and Marianna Alperin*. Mechanical impact of parturition-related strains on rat pelvic striated sphincters. Neurourology and Urodynamics. 2019; 38:912-919. *Co-corresponding authors.
83. Andrea Carlini, Roberto Gaetani, Rebecca Braden, Colin Luo, **Karen L. Christman***, and Nathan C. Gianneschi*. Enzyme-responsive progelator cyclic peptides for minimally invasive delivery to the heart post-myocardial infarction. Nature Communications. 2019; in press. *Co-corresponding authors.

Book Chapters

1. **Karen L. Christman** and Heather D. Maynard. “Surface Patterning for Generating Defined Nano-Scale Matrices” in *Methods in Molecular Biology: Stem Cells for Myocardial Repair and Regeneration.* Randall J. Lee, Editor. Humana Press, New Jersey. 2010; 660: 255-263.
2. Jennifer L. Young, **Karen L. Christman**, and Adam J. Engler. “Stem Cells for Cardiac Tissue Engineering” in *Stem Cells and Tissue Engineering*. Song Li, Editor. World Scientific Publishing Company, New Jersey, 2011.
3. Jennifer Singelyn and **Karen L. Christman**. “Injectable Biomaterials for Myocardial Tissue Engineering” in *Myocardial Tissue Engineering (Studies in Mechanobioogy, Tissue Engineering and Biomaterials 6)*. Aldo R. Boccaccini, Editor. Springer, 2012.
4. Sonya Seif-Naraghi, and **Karen L. Christman**. “Tissue Engineering and the Role of Biomaterial Scaffolds: The Evolution of Cardiac Tissue Engineering” in *Resident Stem Cells and Regenerative Therapy*. Regina Coeli dos Santos Goldenberg, Editor. Elsevier, 2013.
5. Jean J. Wang and **Karen L. Christman**. “Hydrogels for cardiac repair” in *Cardiac Regeneration and Repair (Volume 2: Biomaterials and Tissue Engineering)*, Ren-Ke Li and Richard D. Weisel, Editors. Woodhead Publishing, 2014.
6. Todd D. Johnson, Rebecca L. Braden, and **Karen L. Christman**. “Injectable ECM scaffolds for cardiac repair” in *Cardiac Tissue Engineering Methods and Protocols* (*Methods in Molecular Biology).* Milica Radisic and Lauren Black, Editors. Humana Press/Springer Protocols, 2014.
7. Gregory N. Grover and **Karen L. Christman**. “Injectable hydrogels for cardiac tissue regeneration post-myocardial infarction” in *Injectable Hydrogels for Tissue Regeneration*. Lakshmi Nair, Editor. The Imperial College Press, 2015.
8. Roberto Gaetani, Jessica Ungerleider, and **Karen L. Christman. “**Acellular injectable biomaterials for treating cardiovascular disease” in *Stem Cell and Gene Therapy for Cardiovascular Disease.* Emerson Perin, Leslie Miller, and Jim Willerson, editors. Elsevier, 2015.
9. Adam D. Young, Brian Mailey, Jennifer Baker, Anne M. Wallace, and **Karen L. Christman**. “Adipose tissue engineering and stem cells” in *Engineering Stem Cells for Tissue Regeneration.* Ngan F. Huang and Nicolas L’Heureux, editors. World Scientific, 2018.
10. Jennifer L. Young, **Karen L. Christman**, and Adam J. Engler. “Stem Cells for Cardiac Tissue Engineering” in *Engineering Stem Cells for Tissue Regeneration.* Ngan F. Huang and Nicolas L’Heureux, editors. World Scientific, 2018.

Patents and Patent Applications

1. Randall J. Lee, **Karen L. Christman**, and Richard E. Sievers. Material Compositions and Related Systems and Methods for Treating Cardiac Conditions. PCT/US2003/023162.
2. Randall J. Lee, **Karen L. Christman**, and Richard E. Sievers. System and Method for Forming a Non-ablative Cardiac Conduction Block. PCT/US2003/014879. AU2003239418B2.
3. **Karen L. Christman**, Jennifer Singelyn, Jessica DeQuach. Cardiac extracellular matrix and methods of use thereof. PCT/US09/59015. AU2009298560. GB2476624. CN102227225B.
4. D. Adam Young, **Karen L. Christman**. Decellularized and Delipidized Extracellular Matrix and Methods of Use. PCT/US2010/061436.

5. **Karen L. Christman**, Jennifer Singelyn, Jessica DeQuach, Adam Kinsey. Compositions and Methods for Cardiac Therapy. PCT/US2011/049026. CA2808225C. JP2017095493A.
6. Jessica DeQuach and **Karen L. Christman**. Brain Extracellular Matrix Compositions and Methods of Use Thereof. Provisional #61452870.
7. Jessica DeQuach and **Karen L. Christman**. Compositions and Methods for Tissue Repair with Extracellular Matrices. PCT/US2012/054058. US9592256B2.
8. Karen L. Christman and Gregory Grover, Compositions and Methods for Injectable Therapy and In Vitro Cell Culture. Provisional #61881,031.
9. Gerry Boss, Adriana Chan, Matthew Brenner, Sari Brenner-Mahon, Vikhyat Bebarta, Jingjing Jiang, **Karen Christman**, Jean Wang. Methods and Compositions for Treatment of Cyanide and Hydrogen Sulfide Toxicity. PCT/US2013/077632. US9534007B2
10. **Karen L. Christman**, Gregory Grover, Michael Madani, Masaki Fujita. Oxime cross-linked biocompatible polymer hydrogels and methods of use thereof. PCT/US2015/064749.
11. Nathan C. Gianneschi, **Karen L. Christman**. Enzyme-responsive nanoparticles. PCT/US2016/028711.
12. Nathan C. Gianneschi, **Karen L. Christman**, Andrea Carlini. Catheter injectable cyclic peptide pro-gelators for myocardial tissue engineering. PCT/US2018/036901.
13. **Karen L. Christman**, Masaki Fujita, Michael Madani. Oxime cross-linked biocompatible polymer hydrogels and methods of use thereof. PCT/US2018/024503.
14. **Karen L. Christman**, Samuel Ward, Marianna Alperin, Pamela Duran. Extracellular matrix for treating pelvic floor disorders and skeletal muscle degeneration. PCT/US2018/032866.
15. **Karen L. Christman**, Martin Spang, Gregory Grover. Extracellular matrix for intravascular infusion. Provisional #62/750,303.

Trainees

Masters Students

1. Kevin Chung; 2007 - 2009
2. Priya Sundaramurthy; 2009 - 2010
3. Kristina Javor (EPFL); 2009 - 2010
4. Stephen Lin; 2010 - 2012
5. Aubrey Smith (Cal Poly CIRM Intern); 2010 - 2011
6. Heinz Strassle (EPFL); 2014 - 2015
7. Hillary Lam; thesis advisor; 2015 - 2017
8. Soraya Aouad (EPFL); 2016-2017
9. Eva van Ingen (Utrecht); 2016-2017
10. Lea de Maddalena (EPFL); thesis advisor; 2016-2017
11. Vera Pieters (Utrecht); 2017
12. Pamela Duran; 2016- 2017
13. Austin Burdick; 2017 – 2018
14. Laura Healey; 2018 - current

Doctoral Students

1. Jennifer Singelyn; 2007 - 2010
2. Jessica DeQuach; 2008 - 2012
3. Aboli Rane; 2008 - 2012
4. Sonya Seif-Naraghi; 2008 - 2012
5. Adam Young; 2008 - 2013
6. Joel Grondek (Interfaces Program, Chemistry, co-research advisor); 2009 - 2014
7. Nikhil Rao; 2009 - 2014
8. Sophia Suarez; 2010 - 2015
9. Todd Johnson; 2010 - 2015
10. Jean Wang (MSTP); 2011 - 2016
11. Jessica Ungerleider; 2013 - 2018

12. Melissa Hernandez; 2014 - current
13. Raymond Wang; 2014 - current
14. Marty Spang; 2015 – current
15. Pamela Duran; 2017 - current
16. Holly Sullivan; 2017 – current
17. Miranda Diaz; 2017 - current
18. Jervaughn Hunter; 2018 - current

Postdocs

1. Airong Song; 2010 - 2012
2. Gregory Grover; 2011 - 2015
3. Roberto Gaetani; 2013 - 2015
4. Mary Nguyen; 2013 - 2014
5. Andrea Luthi; 2014 - 2017
6. Gina Policastro; 2016 - 2018

Research and Visiting Scientists

7. Roberto Gaetani; 2015 – 2018
8. Masaki Fujita; 2015 - 2017
9. Takayuki Kato; 2018 - present

Research Support

Active

NIH 2R01HL113468 (PI: Christman) 12/01/16-11/30/20
National Institutes of Health (NHLBI)
Extracellular matrix hydrogels for treating cardiomyopathy
The goal of this proposal is to examine the potential for extracellular matrix based hydrogels for treating acute myocardial infarction, and ischemic and non-ischemic heart failure.

1R01HL139001 (MPI: Christman and Gianneschi) 09/01/17-8/31/21
National Institutes of Health (NHLBI)
MMP responsive nanoparticles for treating acute myocardial infarction
The goal of this proposal is to develop degradable enzyme responsive polymeric nanoparticles for treating acute myocardial infarction.

1UC4DK104202 (MPI: Sander, Christman, George, and Hughes) 09/20/14-06/30/19
National Institutes of Health (NHLBI)/Office of the Director
A 3-D biomimetic human islet to model beta cell function in health and disease
The goal of this proposal is a 3D *in vitro* model of a human islet for research and drug screening

TRAN1-09814 (PI: Christman) 07/01/17-12/31/19
California Institute for Regenerative Medicine (CIRM)
Injectable pro-regenerative scaffold for treating symptomatic peripheral artery disease.
The goal of this proposal is to generate cGMP material, perform safety studies, and plan a Phase I clinical trial to prepare for a pre-IND meeting for using a skeletal muscle ECM hydrogel in peripheral artery disease patients.

1R21 AR072523-01A1 (MPI: Ward and Christman) 12/01/17-11/30/19
National Institutes of Health (NIAMS)
Promotion of Skeletal Muscle Recovery Using an Extracellular Matrix Hydrogel in a Rabbit Model of Chronic Rotator Cuff Injury
The goal of this proposal is to examine the potential for extracellular matrix based hydrogels for treating damaged rotator cuff muscles.

1R21HD094566-01 (MPI: Alperin and Christman) 4/01/18-3/31/20
National Institutes of Health (NICHD)
Injectable Tissue-Specific Extracellular Matrix Hydrogel for Pelvic Skeletal Muscle Regeneration Following Birth Injury
The goal of this proposal is to examine the potential for extracellular matrix based hydrogels for treating pelvic floor muscles.

NIH R01HL146147 (MPI: Davis and Christman) 1/01/19-12/31/2022
National Institutes of Health (NHLBI)
Injectable Biomaterial for Treating Hypoplastic Left Heart Syndrome
The goal of this proposal is to examine the potential for extracellular matrix based hydrogels with and without stem cells for treating acute hypoplastic left heart syndrome.

Completed (last 3 years)

NIH 1R01HL113468 (PI: Christman) 07/01/12-04/30/16
National Institutes of Health (NHLBI)
Extracellular matrix hydrogels for treating ischemia
The goal of this proposal is to examine the potential for extracellular matrix based hydrogels for treating myocardial infarction and peripheral artery disease.

NIH 1R01HL117326 (co-PIs: Christman and Gianneschi) 09/20/12-08/01/17
National Institutes of Health (NHLBI)/Office of the Director
Autonomously Assembling Nanomaterial Scaffolds for Treating Myocardial Infarction
The goal of this proposal is to develop autonomously assembling synthetic nanoparticles, which can be delivered via IV injection, target the area of acute myocardial infarction, and deliver therapeutics.