BIOGRAPHICAL SKETCH

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NAME	POSITION TITLE
Abilez, Oscar J.	Instructor, Stanford University
eRA COMMONS USER NAME ABILEZ.OSCAR	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Texas, Austin, TX	B.S.	1992	Mechanical Engineering
Cornell University, New York, NY	M.D.	2002	Medicine
Stanford University Medical Center, Stanford, CA	-	2002-2004	Surgery Residency
Stanford University, Stanford, CA	-	2004-2007	Postdoctoral Training
Stanford University, Stanford, CA	Ph.D.	2007-2012	Bioengineering
Stanford University, Stanford, CA	-	2012-2013	Postdoctoral Training

A. Personal Statement.

My research interests are aimed at elucidating how various biophysical stimuli regulate cardiovascular development across time and length scales that span several orders of magnitude, using human pluripotent stem cells as a model system. Currently, my research focuses on applying biochemical, electrical, mechanical, and optogenetic stimulation to control and manipulate the directed differentiation, maturation, and organization of human pluripotent stem cell-derived cardiovascular cells. My areas of expertise are in fluorescence microscopy, optogenetics, long-term live cell imaging, directed differentiation, electrophysiology, microfluidics, computational simulation, and multiscale engineering. Within fluorescence microscopy, I have significant experience in calcium imaging, particularly with human pluripotent stem cell-derived cardiomyocytes and human heart slices.

B. Positions and Honors.

Positions and Employment:

1989-1990 Engineering Co-op, General Motors Assembly Plant, Shreveport, LA
1991 Engineering Co-op, General Motors Desert Proving Ground, Mesa, AZ
1993-1996 Engineering Staff, CarboMedics, Inc., Austin, TX
1994-1996 Bioengineering Graduate Student, University of Texas, Austin, TX
1998-2000 Medical Student Research Fellow, Cornell University, New York, NY
2002-2004 Surgery Resident, Stanford University Medical Center, Stanford, CA
2004-2007 Postdoctoral Fellow, Stanford University, Stanford, CA
2007-2012 PhD Student, Stanford University, Stanford, CA
2012-2013 Postdoctoral Fellow, Stanford University, Stanford, CA

Professional Memberships and Activities:

1999 American Society for Cell Biology (ASCB)
1994-2000 Biomedical Engineering Society (BMES)
1995-2000 American Society of Artificial Internal Organs (ASAIO)
1996-1998 Class President, Cornell University Medical School
2000-2002 President, Stimson Surgical Society, Cornell University Medical School
2005-2006 American College of Surgery (ACS)
2005-present Tissue Engineering & Regenerative Medicine International Society (TERMIS)
2006-present Biomedical Engineering Society (BMES)
2007-present International Society for Applied Cardiovascular Biology (ISACB)
2007-present International Society for Stem Cell Research (ISSCR)
2010-present Biophysical Society (BPS)

Honors and Awards:

1987	Valedictorian, Junction High School
1987-1992	Texas Achievement Award, University of Texas
1988-1991	Dean's List, University of Texas
1988-1991	Engineering Honor Roll, University of Texas
1989	General Motors Scholarship, University of Texas
1991	Pi Tau Sigma Mechanical Engineering Honor Society, University of Texas
1995	Biomedical Engineering Scholarship, University of Texas
1996-1997	NIH Molecular Mechanism of Neurological Disease Predoctoral Training Fellowship, Cornell
1998-1999	Lucille P. Markey Foundation Predoctoral Research Training Fellowship, Cornell
1999-2000	NIH-NHLBI Predoctoral Research Training Fellowship, Cornell
2002	American Austrian Foundation/Max Kade Foundation Fellowship, Cornell
2002	United States-European Medical Education Exchange (US-EUMEE) Fellowship, Cornell
2002	Student Leadership Award -Class President, Cornell
2002	Franklyn Ellenbogen Prize in Hematology/Oncology, Cornell
2005-2006	Ethicon Endo-Surgery, Inc (Johnson & Johnson) Fellowship, Stanford
2005-2006	Dean's Postdoctoral Fellowship, Stanford
2006	Laboratory Science Category, Endovascular Fellows' Research Award Competition, 1st Place,
2007-2011	Advanced Residency Training at Stanford (ARTS) Fellowship, Stanford
2010	California Institute for Regenerative Medicine (CIRM) Travel Award for International Society for Stem Cell Annual Meeting
2010	Stanford Bio-X Travel Award
2011	Keystone Conference Scholarship
2011	Keystone Conference Research Competition Finalist
2011	Gordon Research Conference Scholarship
2011	Siebel Scholar
2011	New York Stem Cell Foundation 6th Annual Meeting-1st Place Poster

C. Publications and Inventions.

Publications Related to Current Research:

1. ***Abilez O**, Wong J, Prakash R, Deisseroth K, Zarins CK, Kuhl E*. Multiscale computational models for optogenetic control of cardiac function. Biophysical Journal. 2011 Sep 21;101(6):1326-34. PubMed PMID: 21943413
2. ***Abilez O***. Cardiac optogenetics. Conf Proc IEEE Eng Med Biol Soc. 2012:1386-9. PubMed PMID: 2336615.
3. ***Abilez OJ***. Optogenetic LED array for perturbing cardiac electrophysiology. Conf Proc IEEE Eng Med Biol Soc. 2013 Jul;2013:1619-22. PubMed PMID: 24110013.
4. *Wong J, **Abilez O**, Kuhl E.* Computational optogenetics: A novel continuum framework for the photoelectrochemistry of living systems. J Mechanics and Physics of Solids. 2012 Jun 1;60(6):1158-1178. PubMed PMID: 22773861.
5. ***Abilez OJ**, Wu JC*. Stem cell isolation: Differential stickiness. Nat Mater. 2013 Jun;12(6):474-6. doi: 10.1038/nmat3664. PubMed PMID: 23695740.
6. Myers FB, Silver JS, Zhuge Y, Beygui RE, Zarins CK, Lee LP, ***Abilez OJ***. Robust pluripotent stem cell expansion and cardiomyocyte differentiation via geometric patterning. Integr Biol (Camb). 2013 Oct 18. [Epub ahead of print] PubMed PMID: 24141327.
7. *Sun N, Yazawa M, Liu J, Han L, Sanchez-Freire V, **Abilez OJ**, Navarrete EG, Hu S, Wang L, Lee A, Pavlovic A, Lin S, Chen R, Hajjar RJ, Snyder MP, Dolmetsch RE, Butte MJ, Ashley EA, Longaker MT, Robbins RC, Wu JC*. Patient-specific induced pluripotent stem cells as a model for familial dilated cardiomyopathy. Science Translational Med. 2012; 4 (130): 130ra47. PubMed PMID: 22517884.
8. *Lan F, Lee AS, Liang P, Sanchez-Freire V, Nguyen PK, Wang L, Han L, Yen M, Wang Y, Sun N, **Abilez OJ**, Hu S, Ebert AD, Navarrete EG, Simmons CS, Wheeler M, Pruitt B, Lewis R, Yamaguchi Y, Ashley EA, Bers DM, Robbins RC, Longaker MT, Wu JC.* Abnormal calcium

handling properties underlie familial hypertrophic cardiomyopathy pathology in patient-specific induced pluripotent stem cells. Cell Stem Cell. 2013 Jan 3;12(1):101-13. doi: 10.1016/j.stem.2012.10.010. PubMed PMID: 23290139.

9. *Ardehali R, Ali SR, Inlay MA, **Abilez OJ**, Chen MQ, Blauwkamp TA, Yazawa M, Gong Y, Nusse R, Drukker M, Weissman IL*. Prospective isolation of human embryonic stem cell-derived cardiovascular progenitors that integrate into human fetal heart tissue. Proc Natl Acad Sci U S A. 2013 Feb 7. [Epub ahead of print] PubMed PMID: 23391730.

Other Relevant Publications:

1. ***Abilez O**, Benharash P, Mehrotra M, Miyamoto E, Gale A, Picquet J, Xu C, Zarins C*. A novel culture system shows that stem cells can be grown in 3D and under physiologic pulsatile conditions for tissue engineering of vascular grafts. J Surg Res. 2006 May 15;132(2):170-8. Epub 2006 Mar 20. PubMed PMID: 16542683.
2. ***Abilez O**, Benharash P, Miyamoto E, Gale A, Xu C, Zarins CK*. P19 progenitor cells progress to organized contracting myocytes after chemical and electrical stimulation: implications for vascular tissue engineering. J Endovasc Ther. 2006 Jun;13(3):377-88. PubMed PMID: 16784327.
3. *Cao F, Sadrzadeh Rafie AH, **Abilez O**, Wang H, Blundo JT, Pruitt B, Zarins C, Wu JC*. In vivo imaging and evaluation of different biomatrices for improvement of stem cell survival. J Tissue Eng Regen Med. 2007 Nov-Dec;1(6):465-8. PubMed PMID: 18163533.
4. *Göktepe S, **Abilez O**, Parker KK, Kuhl E*. A multiscale model for eccentric and concentric cardiac growth through sarcomerogenesis. J Theor Biol. 2010 Aug 7;265(3):433-42. Epub 2010 May 4. PubMed PMID: 20447409.
5. *Huang NF*, Patlolla B*, **Abilez O***, Sharma H, Rajadas J, Beygui RE, Zarins CK, Cooke JP*. A matrix micropatterning platform for cell localization and stem cell fate determination. Acta Biomater. 2010 Jul 1. [Epub ahead of print] PubMed PMID: 20601236. (* equal contribution)
6. *Göktepe S, **Abilez O**, Kuhl E*. A generic approach towards finite growth with examples of athlete's heart, cardiac dilation, and cardiac wall thickening. Journal of the Mechanics and Physics of Solids. 2010 Oct;58:1661-1680.
7. *Wilson KD, Venkatasubrahmanyam S, Fu J, Sun N, **Abilez O**, Baugh JA, Jia F, Ghosh Z, Li RA, Butte AJ, Wu J*. Dynamic microRNA expression programs during cardiac differentiation of human embryonic stem cells. Circulation Cardiovascular Genetics. 2010 Aug 23. [Epub ahead of print] PubMed PMID: 20733065.
8. *Rausch MK, Dam A, Göktepe S, **Abilez O**, Kuhl E*. Computational modeling of growth: systemic and pulmonary hypertension in the heart. Biomechanics and Modeling in Mechanobiology. 2011 Dec; 10(6):799-811. PubMedID: 21188611).
9. *Wei P, Taylor R, Ding Z, Chung C, **Abilez O**, Higgs G, Pruitt B, Ziaie B*. Stretchable microelectrode array using room-temperature liquid alloy interconnects. Journal of Micromechanics and Microengineering. 21, 054015. 2011.
10. *Chang EI, Galvez MG, Glotzbach JP, Hamou CD, El-ftesi S, Rappleye CT, Sommer K, Rajadas J, **Abilez OJ**, Fuller GG, Longaker MT, Gurtner GC*. Vascular anastomosis using controlled phase transitions in poloxamer gels. Nature Medicine. 2011 Aug 28;17(9):1147-52. doi: 10.1038/nm.2424.
11. *Myers F, **Abilez O**, Zarins CK, Lee LP*. Stimulation and artifact-free extracellular electrophysiological recording of cells in suspension. Conf Proc IEEE Eng Med Biol Soc. 2011 Aug;2011:4030-3.
12. *Böl M, **Abilez O**, Assar AN, Zarins CK, Kuhl E*. Active and passive stresses in electro-active cardiac muscle-a robust in vitro/in silico model to study isometric contractions. International Journal for Multiscale Computational Engineering. 2012: 10(2):171-188.
13. *Myers FB, Zarins CK, **Abilez OJ***, Lee LP*.* Label-free electrophysiological cytometry for stem cell-derived cardiomyocyte clusters. Lab Chip. 2013 Jan 21;13(2):220-8. doi: 10.1039/c2lc40905d. Epub 2012 Dec 3. PubMed PMID: 23207961. (*co-corresponding authors) (cover article)

Inventions:

1. ***Abilez O***, Stanford University. "Systems, Methods, and Apparatus Configurations Using Genetic Algorithms to Design Cells, Tissues, and Tissue Systems." USA. 2004. (Disclosed to Stanford Office of Technology Licensing, Docket S04-293).
2. ***Abilez O***, Stanford University. "Tools and Instruments with Locking Mechanism that Allows Both Left and Right Handed Use." USA. 2004. (Disclosed to Stanford Office of Technology Licensing, Docket S04-303).
3. ***Abilez O***, *Zarins C*, Stanford University. "Methods and Techniques for Creating *in situ* Biological Structures by Using Autologous Biological Materials in Combination with Intra- or Extra-Corporeal Bio-Mechanical, Bio-Chemical, Bio-Electric, and Bio-Thermal Conditioning." USA. 2005. (Disclosed to Stanford Office of Technology Licensing, Docket S05-067).
4. ***Abilez O****, Hochberg L, Vase A, Velan A*, Stanford University. "Systems and Methods for Temporally Regulating Agent Delivery to the Central Nervous System." USA. 2005. (Disclosed to Stanford Office of Technology Licensing, Docket S05-105).
5. ***Abilez O****, Benharash P, Zarins C*, Stanford University. "Cell Sorter and Culture System." USA. 2005. (Disclosed to Stanford Office of Technology Licensing, Docket S05-377, USPTO Patent Pending 11/732,911, Filed 4/05/2007).
6. ***Abilez O****, Benharash P, Zarins C*, Stanford University. "Magnetic Drug Delivery System." USA. 2006. (Disclosed to Stanford Office of Technology Licensing, Docket S06-044).
7. ***Abilez O****, Benharash P, Zarins C*, Stanford University. "Computer-Controlled Physiologic Pump." USA. 2006. (Disclosed to Stanford Office of Technology Licensing, Docket S06-097).
8. *Zarins C, Benharash P,* ***Abilez O***, Stanford University. "Mechanism to Prevent Lateral Displacement of Stent-Grafts within Aneurysms." USA. 2006. (Disclosed to Stanford Office of Technology Licensing, Docket S06-208, USPTO Patent Pending 12/112,852, Filed 4/30/2008).
9. ***Abilez O****, Myers F, Lee L, Zarins C*, Stanford University. "Systems and Methods for Electrophysiological Cell Sorting and Cytometry." USA. 2010. (Disclosed to Stanford Office of Technology Licensing, Docket S10-370, USPTO Patent Pending 61/474,213).
10. ***Abilez O****, Kuhl E, Zarins C*, Stanford University. "Optical Biological Pacemaker and Defibrillator." USA. 2011. (Disclosed to Stanford Office of Technology Licensing, Docket S11-204).
11. *Lee L, Myers FB, Silver JS, Zarins CK,* ***Abilez OJ***, UC Berkeley and Stanford University. "Stencil Patterning Method for Generating Highly Uniform Stem Cell Colonies." USA. 2012. (Disclosed to UC Berkley Office of Technology Licensing, Docket BK-2012-020-1 and Stanford Office of Technology Licensing, Docket S11-387, USPTO Patent Pending 61/585,097).

D. Research Support.

Training & Research Support:

2007-2011 California Institute for Regenerative Medicine (CIRM): RC1-00151-1, Comprehensive Research Grant (RFA 06-02), Zarins C-PI, Wu J-CoPI, Pruitt B-CoPI, "Engineering a Cardiovascular Tissue Graft from Human Embryonic Stem Cells"
Part of these funds was used for my salary support and research supplies.

2007-2012 NIH: HL089027, Innovative Application of Nanotechnology to Heart, Lung, Blood, and Sleep Disorders (R21/33 PAR-06-287), Wu J-PI, Pruitt B-CoPI, Zarins C-CoPI, "Nanostructuring and Molecular Imaging of Engineered Cardiovascular Tissues"
Part of these funds was used for my salary support and research supplies.

2011-2013. NIH: PA-10-069, Exploratory Developmental Research Grant Program (R21) Beygui R-PI, "Cardiac Differentiation of Adipose Tissue-Derived Stem Cells by Light Stimulation"
Part of these funds was used for my salary support and research supplies.

2012-2015. NSF: Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE), Kuhl E-PI, "INSPIRE: Optogenetic Control of the Human Heart - Turning Light into Force"
Part of these funds was used for my salary support and research supplies.