

Kenneth S. Campbell, PhD

CONTACT DETAILS

Work Address

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URLs

<https://physiology.med.uky.edu/users/kscamp3>

<http://www.campbellmusclelab.org>

<http://www.myosim.org>

EDUCATION

1990- 1993	BA (Hons) Physics	University College, University of Oxford, United Kingdom Advanced options in modern optics and atomic physics Special commendation for experimental work
1993 - 1998	PhD Sports Science	Applied Physiology Research Group University of Birmingham, United Kingdom Thesis: "The analysis of cross-bridge activity in a stiffening relaxed muscle fiber" Supervisor: Martin Lakie, PhD Examiner: Andrew F. Huxley, OM, FRS (Trinity College, Cambridge))

TRAINING

1998 - 2003	Postdoc	Department of Physiology University of Wisconsin-Madison Mechanical properties of skeletal and cardiac muscles Mentor: Richard L. Moss, PhD
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EMPLOYMENT

2003 - 2004	Assistant Scientist	Department of Physiology University of Wisconsin-Madison, Madison, WI
2004 - 2009	Assistant Professor (Tenure-track)	Department of Physiology University of Kentucky, Lexington, KY
2009 - present	Associate Professor (With tenure)	Department of Physiology University of Kentucky, Lexington, KY
2015 - present	Associate Professor (Joint appointment)	Division of Cardiovascular Medicine University of Kentucky, Lexington, KY

FUNDING

Current

- 2015-2017 AHA 15GRNT25460003
American Heart Association Grant-in-Aid
Transmural variation in cellular level contraction
Total direct costs: \$140,000
Role: Principal Investigator
- 2015-2018 NSF 1538754
Multiscale modeling of left and right ventricular function
Role: Co-Investigator
PI: Jonathan Wenk
- 2016-2019 NIH UL1RR033173
Kentucky Center for Clinical and Translational Sciences
PI: Phillip Kern
Role: Co-Investigator, Translational technologies
Key Function Leader: Biospecimens
- 2015-2017 Lyman T. Johnson PhD student fellowship
University of Kentucky
PI: Cheavar Blair
Role: Mentor
- 2016-2021 NIH R01HD090642
CRNCS: Multiscale models of proprioceptive encoding for sensorimotor control
Role PI of Sub-Contract to the University of Kentucky
PI: Lena Ting, Emory University

Completed

- 1999-2001 AHA 992054Z
American Heart Association Northland Affiliate (Postdoctoral Fellowship)
"Thixotropic mechanical properties of relaxed cardiac muscle affect diastolic function"
Role: Principal Investigator
Total Direct Costs \$60,000
- 2001-2002 AHA 1020574Z
American Heart Association Northland Affiliate (Postdoctoral Fellowship)
"Myocardial diastolic compliance under conditions mimicking ischemic heart failure"
Role: Principal Investigator
Total Direct Costs \$37,500
- 2006-2009 AHA 0630079N
American Heart Association National Center (Scientist Development Grant)
"Cycling cross-bridges augment passive stiffness components during diastole"
Role: Principal Investigator
Total Direct Costs \$260,000

2006-2008 NIH 1R03AG028162-01
National Institute on Aging
"Myocardial stiffness in aging associated diastolic heart failure"
Role: Principal Investigator
Total Direct Costs \$100,000

2007-2010 WKURF 516202-08-02
KY NASA EPSCoR
"Gender differences in response to simulated microgravity with and without countermeasure"
Co-Principal Investigator (with Abhijit Patwardhan, PhD, UK Center for Biomedical Engineering)
Total Direct Costs \$50,000

2009-2011 AHA 09POST223406
American Heart Association Great Rivers Affiliate
"Sex specific mechanisms leading to elevated myocardial stiffness in type 1 diabetes"
Principal Investigator: Mihail I. Mitov
Role: Sponsor
Total Direct Costs: \$84,000

2009-2011 NIH 1RC1 ES01836
National Institute of Environmental Health Sciences
"Clock genes, environmental challenges and cardiopulmonary disease"
Principal Investigators: Karyn A. Esser and Francisco H. Andrade
Role: Co-Investigator
Total Direct Costs: \$1,000,000

2010-2011 NIH P20 RR021954
COBRE Award - Center of research in obesity and cardiovascular disease
"Obesity and Heart Failure"
Principal Investigator: Mark R. Bonnell
Role: Co-Investigator
Total Direct Costs: \$50,000

2011-2012 11POST7360038
American Heart Association Great Rivers Affiliate
Mechanisms of delayed relaxation in the aging heart
Postdoctoral Fellowship
PI: Stuart G. Campbell
Role: Sponsor

2008-2013 NIH 1R01 AR055246-01A1
National Institute for Arthritis and Musculoskeletal and Skin Diseases
"Circadian rhythms in skeletal muscle"
Principal Investigator: Karyn A. Esser Role: Co-Investigator
Role: Co-Investigator
Total Direct Costs \$1,250,000 (\$100,000 available to KSC)

2012-2012 Children's Miracle Cure Network
"Cell-driven simulations help detect abnormal ventricular remodeling"
Role: Co-PI (with Brandon Fornwalt MD, PhD)
Total Direct Costs: \$10,000

2012-2014 UK CCTS
"Mechanical unloading improves the function of failing hearts"
Role: PI
Total Direct Costs \$100,000

2010-2014 NIH 1R01 AR057868
National Institute for Arthritis and Musculoskeletal and Skin Diseases
"The growth hormone/IGF-1 axis in skeletal muscle"
Principle Investigator: Thomas Clemens (Johns Hopkins University)
Role: Co-Investigator (with Karyn Esser)
Total Direct Costs available to Drs. Campbell and Esser: \$125,000

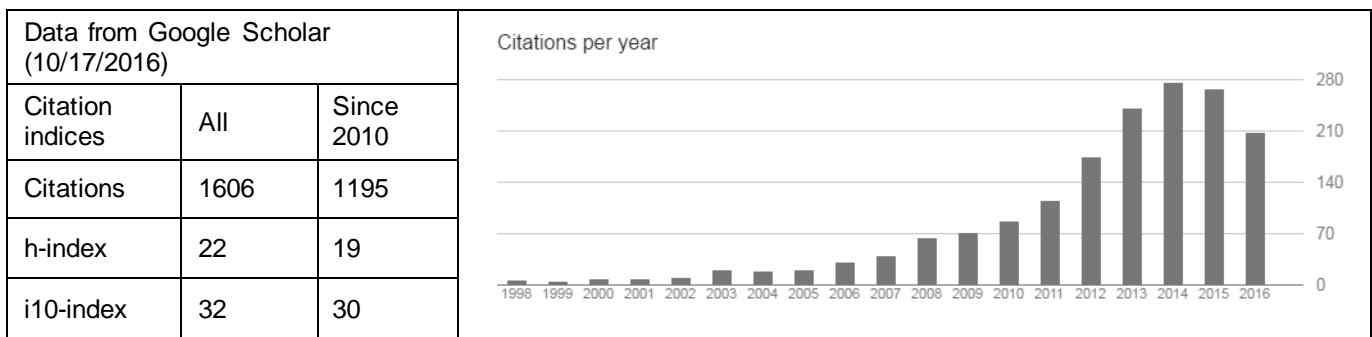
2014 International Mobility Fund for the USA
Royal Society of New Zealand
Role: Co-PI (with Andrew Taberner, PhD)

2008-2015 NIH 1R01 HL090749
National Heart, Lung and Blood Institute
"Myocardial stiffness in diastolic heart failure."
Role: Principal Investigator
Total Direct Costs \$1,125,000

2015 First contact initiative grant (declined by PI)
European Society of Cardiology
PI: Ewan Fowler
Role: Mentor

2014-2016 NIH P30GM110787
National Institute of General Medical Sciences
COBRE for the Center for Molecular Medicine
PI: Louis B. Hersh
Role: PI on pilot project, "Molecular mechanisms of cardiac dysfunction"

PUBLICATIONS



Published Articles

- 1) Campbell, K. S. & Lakie, M. (1998). A cross-bridge mechanism can explain the thixotropic short-range elastic component of relaxed frog skeletal muscle. *J Physiol.* 510 (Pt 3), 941-962. PMC PMC2231083.
- 2) Campbell, K. S. & Moss, R. L. (2000). A thixotropic effect in contracting rabbit psoas muscle: prior movement reduces the initial tension response to stretch. *J Physiol.* 525 Pt 2, 531-548. PMC PMC2269955.
- 3) Fitzsimons, D. P., Patel, J. R., Campbell, K. S. & Moss, R. L. (2001). Cooperative mechanisms in the activation dependence of the rate of force development in rabbit skinned skeletal muscle fibers. *J Gen Physiol.* 117, 133-148. PMC PMC2217243.
- 4) Campbell, K. S. & Moss, R. L. (2002). History-dependent mechanical properties of permeabilized rat soleus muscle fibers. *Biophys J.* 82, 929-943. PMC PMC1301901.
- 5) Campbell, K. S. & Moss, R. L. (2003). SLControl: PC-based data acquisition and analysis for muscle mechanics. *Am J Physiol Heart Circ Physiol.* 285, H2857-2864. PMC not available. PMID 12907419.
- 6) Campbell, K. S., Patel, J. R. & Moss, R. L. (2003). Cycling cross-bridges increase myocardial stiffness at submaximal levels of Ca²⁺ activation. *Biophys J.* 84, 3807-3815. PMC PMC1302962.
- 7) Warren, C. M., Krzesinski, P. R., Campbell, K. S., Moss, R. L. & Greaser, M. L. (2004). Titin isoform changes in rat myocardium during development. *Mech Dev.* 121, 1301-1312. PMC not available. PMID 15454261.
- 8) Greaser, M. L., Krzesinski, P. R., Warren, C. M., Kirkpatrick, B., Campbell, K. S. & Moss, R. L. (2005). Developmental changes in rat cardiac titin/connectin: transitions in normal animals and in mutants with a delayed pattern of isoform transition. *J Muscle Res Cell Motil.* 26, 325-332. PMC not available. PMID 16491431.
- 9) Campbell, K. S. (2006). Filament compliance effects can explain tension overshoots during force development. *Biophys J.* 91, 4102-4109. PMC PMC1635681.
- 10) Campbell, K. S. (2006). Tension recovery in permeabilized rat soleus muscle fibers after rapid shortening and restretch. *Biophys J.* 90, 1288-1294. PMC PMC1367280.
- 11) Campbell, K. S. & Holbrook, A. M. (2007). The rate of tension recovery in cardiac muscle correlates with the relative residual tension prevailing after restretch. *Am J Physiol Heart Circ Physiol.* 292, H2020-2022. PMC PMC2001153.
- 12) McCarthy, J. J., Andrews, J. L., McDearmon, E. L., Campbell, K. S., Barber, B. K., Miller, B. H., Walker, J. R., Hogenesch, J. B., Takahashi, J. S. & Esser, K. A. (2007). Identification of the

circadian transcriptome in adult mouse skeletal muscle. *Physiol Genomics*. 31, 86-95. PMC not available. PMID 17550994.

- 13) Robia, S. L., Campbell, K. S., Kelly, E. M., Hou, Z., Winters, D. L. & Thomas, D. D. (2007). Forster transfer recovery reveals that phospholamban exchanges slowly from pentamers but rapidly from the SERCA regulatory complex. *Circ Res*. 101, 1123-1129. PMC PMC2590498.
- 14) Campbell, K. S. & Lakie, M. (2008). Response to Bianco et al.: Interaction forces between F-actin and titin PEVK domain measured with optical tweezers. *Biophys J*. 94, 327-328; discussion 329-330. PMC PMC2134857.
- 15) Hardin, B. J., Campbell, K. S., Smith, J. D., Arbogast, S., Smith, J., Moylan, J. S. & Reid, M. B. (2008). TNF-alpha acts via TNFR1 and muscle-derived oxidants to depress myofibrillar force in murine skeletal muscle. *J Appl Physiol (1985)*. 104, 694-699. PMC not available. PMID 18187611.
- 16) Campbell, K. S. (2009). Interactions between connected half-sarcomeres produce emergent mechanical behavior in a mathematical model of muscle. *PLoS Comput Biol*. 5, e1000560. PMC PMC2770126.
- 17) Mitov, M. I., Greaser, M. L. & Campbell, K. S. (2009). GelBandFitter--a computer program for analysis of closely spaced electrophoretic and immunoblotted bands. *Electrophoresis*. 30, 848-851. PMC PMC2742644.
- 18) Mitov, M. I., Holbrook, A. M. & Campbell, K. S. (2009). Myocardial short-range force responses increase with age in F344 rats. *J Mol Cell Cardiol*. 46, 39-46. PMC PMC2633371.
- 19) Andrews, J. L., Zhang, X., Mccarthy, J. J., Mcdearmon, E. L., Hornberger, T. A., Russell, B., Campbell, K. S., Arbogast, S., Reid, M. B., Walker, J. R., Hogenesch, J. B., Takahashi, J. S. & Esser, K. A. (2010). CLOCK and BMAL1 regulate MyoD and are necessary for maintenance of skeletal muscle phenotype and function. *Proc Natl Acad Sci U S A*. 107, 19090-19095. PMC PMC2973897.
- 20) Campbell, K. S. (2010). Distorting the sarcomere. *J Gen Physiol*. 136, 155-157. PMC PMC2912064.
- 21) Campbell, K. S. (2010). Short-range mechanical properties of skeletal and cardiac muscles. *Adv Exp Med Biol*. 682, 223-246. PMC PMC3095648.
- 22) Campbell, S. G., Lionetti, F. V., Campbell, K. S. & Mcculloch, A. D. (2010). Coupling of adjacent tropomyosins enhances cross-bridge-mediated cooperative activation in a markov model of the cardiac thin filament. *Biophys J*. 98, 2254-2264. PMC PMC2872217.
- 23) Mavalli, M. D., Digirolamo, D. J., Fan, Y., Riddle, R. C., Campbell, K. S., Van Groen, T., Frank, S. J., Sperling, M. A., Esser, K. A., Bamman, M. M. & Clemens, T. L. (2010). Distinct growth hormone receptor signaling modes regulate skeletal muscle development and insulin sensitivity in mice. *J Clin Invest*. 120, 4007-4020. PMC PMC2964973.
- 24) Bossuyt, J., Chang, C. W., Helmstadter, K., Kunkel, M. T., Newton, A. C., Campbell, K. S., Martin, J. L., Bossuyt, S., Robia, S. L. & Bers, D. M. (2011). Spatiotemporally distinct protein kinase D activation in adult cardiomyocytes in response to phenylephrine and endothelin. *J Biol Chem*. 286, 33390-33400. PMC PMC3190922.
- 25) Campbell, K. S. (2011). Impact of myocyte strain on cardiac myofilament activation. *Pflugers Arch*. 462, 3-14. PMC PMC3115504.
- 26) Campbell, S. G. & Campbell, K. S. (2011). Mechanisms Of Residual Force Enhancement In Skeletal Muscle: Insights From Experiments And Mathematical Models. *Biophys Rev*. 3, 199-207. PMC PMC3237401.
- 27) Campbell, S. G., Hatfield, P. C. & Campbell, K. S. (2011). A mathematical model of muscle

containing heterogeneous half-sarcomeres exhibits residual force enhancement. *PLoS Comput Biol.* 7, e1002156. PMC PMC3182863.

- 28) Ferreira, L. F., Campbell, K. S. & Reid, M. B. (2011). Effectiveness of sulfur-containing antioxidants in delaying skeletal muscle fatigue. *Med Sci Sports Exerc.* 43, 1025-1031. PMC not available. PMID 20980926.
- 29) Ferreira, L. F., Campbell, K. S. & Reid, M. B. (2011). N-acetylcysteine in handgrip exercise: plasma thiols and adverse reactions. *Int J Sport Nutr Exerc Metab.* 21, 146-154. PMC PMC3374331.
- 30) Mccarthy, J. J., Mula, J., Miyazaki, M., Erfani, R., Garrison, K., Farooqui, A. B., Srikuea, R., Lawson, B. A., Grimes, B., Keller, C., Van Zant, G., Campbell, K. S., Esser, K. A., Dupont-Versteegden, E. E. & Peterson, C. A. (2011). Effective fiber hypertrophy in satellite cell-depleted skeletal muscle. *Development.* 138, 3657-3666. PMC PMC3152923.
- 31) Burgess, D. E., Bartos, D. C., Reloj, A. R., Campbell, K. S., Johnson, J. N., Tester, D. J., Ackerman, M. J., Fressart, V., Denjoy, I., Guicheney, P., Moss, A. J., Ohno, S., Horie, M. & Delisle, B. P. (2012). High-risk long QT syndrome mutations in the Kv7.1 (KCNQ1) pore disrupt the molecular basis for rapid K(+) permeation. *Biochemistry.* 51, 9076-9085. PMC PMC3613984.
- 32) Ferreira, L. F., Moylan, J. S., Stasko, S., Smith, J. D., Campbell, K. S. & Reid, M. B. (2012). Sphingomyelinase depresses force and calcium sensitivity of the contractile apparatus in mouse diaphragm muscle fibers. *J Appl Physiol (1985).* 112, 1538-1545. PMC PMC3362233.
- 33) Jackson, J. R., Mula, J., Kirby, T. J., Fry, C. S., Lee, J. D., Ubele, M. F., Campbell, K. S., Mccarthy, J. J., Peterson, C. A. & Dupont-Versteegden, E. E. (2012). Satellite cell depletion does not inhibit adult skeletal muscle regrowth following unloading-induced atrophy. *Am J Physiol Cell Physiol.* 303, C854-861. PMC PMC3469717.
- 34) Lefta, M., Campbell, K. S., Feng, H. Z., Jin, J. P. & Esser, K. A. (2012). Development of dilated cardiomyopathy in Bmal1-deficient mice. *Am J Physiol Heart Circ Physiol.* 303, H475-485. PMC PMC3423146.
- 35) Campbell, S. G., Haynes, P., Kelsey Snapp, W., Nava, K. E. & Campbell, K. S. (2013). Altered ventricular torsion and transmural patterns of myocyte relaxation precede heart failure in aging F344 rats. *Am J Physiol Heart Circ Physiol.* 305, H676-686. PMC PMC3761331.
- 36) Chung, C. S. & Campbell, K. S. (2013). Temperature and transmural region influence functional measurements in unloaded left ventricular cardiomyocytes. *Physiol Rep.* 1, e00158. PMC PMC3871472.
- 37) Milani-Nejad, N., Xu, Y., Davis, J. P., Campbell, K. S. & Janssen, P. M. (2013). Effect of muscle length on cross-bridge kinetics in intact cardiac trabeculae at body temperature. *J Gen Physiol.* 141, 133-139. PMC PMC3536524.
- 38) Weimer, K., Theobald, J., Campbell, K. S., Esser, K. A. & Dimario, J. X. (2013). Genome-wide expression analysis and EMX2 gene expression in embryonic myoblasts committed to diverse skeletal muscle fiber type fates. *Dev Dyn.* 242, 1001-1020. PMC PMC3763492.
- 39) Campbell, K. S. (2014). Dynamic coupling of regulated binding sites and cycling myosin heads in striated muscle. *J Gen Physiol.* 143, 387-399. PMC PMC3933939.
- 40) Chung, C. S., Mitov, M. I., Callahan, L. A. & Campbell, K. S. (2014). Increased myocardial short-range forces in a rodent model of diabetes reflect elevated content of beta myosin heavy chain. *Arch Biochem Biophys.* 552-553, 92-99. PMC PMC3942377.
- 41) Haynes, P. & Campbell, K. S. (2014). Myocardial hypertrophy reduces transmural variation in mitochondrial function. *Front Physiol.* 5, 178. PMC PMC4019838.
- 42) Haynes, P., Nava, K. E., Lawson, B. A., Chung, C. S., Mitov, M. I., Campbell, S. G., Stromberg,

- A. J., Sadayappan, S., Bonnell, M. R., Hoopes, C. W. & Campbell, K. S. (2014). Transmural heterogeneity of cellular level power output is reduced in human heart failure. *J Mol Cell Cardiol.* 72, 1-8. PMC PMC4037376.
- 43) Campbell, K. S. & Sorrell, V. L. (2015). Cell- and molecular-level mechanisms contributing to diastolic dysfunction in HFpEF. *J Appl Physiol (1985)*. 119, 1228-1232. PMC PMC4816411.
- 44) Chung, C. S., Mechas, C. & Campbell, K. S. (2015). Myocyte contractility can be maintained by storing cells with the myosin ATPase inhibitor 2,3 butanedione monoxime. *Physiological Reports*. In press. PMC PMC4522161.
- 45) Nance, M. E., Whitfield, J. T., Zhu, Y., Gibson, A. K., Hanft, L. M., Campbell, K. S., Meining, G. A., McDonald, K. S., Segal, S. S. & Domeier, T. L. (2015). Attenuated sarcomere lengthening of the aged murine left ventricle observed using two-photon fluorescence microscopy. *Am J Physiol Heart Circ Physiol*. 309, H918-925. PMC PMC4591408.
- 46) Zhang, X., Haynes, P., Campbell, K. S. & Wenk, J. F. (2015). Numerical evaluation of myofiber orientation and transmural contractile strength on left ventricular function. *J Biomech Eng.* 137, 044502. PMC not available. PMID 25367232.
- 47) Blair, C. A., Haynes, P., Campbell, S. G., Chung, C., Mitov, M. I., Dennis, D., Bonnell, M. R., Hoopes, C. W., Guglin, M. & Campbell, K. S. (2016). A protocol for collecting human cardiac tissue for research. *The VAD Journal*. 2, Article 12. <http://uknowledge.uky.edu/vad/vol12/iss11/12>. PMC not available. PMID Not available.
- 48) Campbell, K. S. (2016). Compliance accelerates relaxation in muscle by allowing myosin heads to move relative to actin. *Biophys J*. 110, 661-668. PMC PMC4744171.
- 49) Wang, H., Zhang, X., Dorsey, S. M., Mcgarvey, J. R., Campbell, K. S., Burdick, J. A., Gorman, J. H., 3rd, Pilla, J. J., Gorman, R. C. & Wenk, J. F. (2016). Computational Investigation of Transmural Differences in Left Ventricular Contractility. *J Biomech Eng.* DOI 10.1115/1.4034558. PMC not available. PMID 27591094.

Submitted

Chung, S. G., Hoopes, C. W., & **CAMPBELL, K. S.** Move quickly to relax: myocardial strain rate modulates relaxation.

Zhang, X, **CAMPBELL, K. S.**, & Wenk, J. F. Evaluation of a novel finite element model of cardiac muscle contraction.

INVENTION DISCLOSURES

- 2002 Disclosure to the Wisconsin Alumni Research Foundation
“SLControl: a computer system that controls muscle physiology experiments”
- 2008 Disclosure to the University of Kentucky Intellectual Property Committee
“Quantification of overlapping bands in gel electrophoresis”
- 2015 Disclosure to the University of Kentucky Intellectual Property Committee
(with Yuan Wen and John McCarthy)
“In vitro high-throughput screen of skeletal muscle hypertrophy and atrophy”

COMPUTER SOFTWARE

- 2000 - present SLControl
<http://www.slcontrol.org>
SLControl is software for the acquisition and analysis of experimental data describing the mechanical properties of muscles.
- 2009 - present GelBandFitter
<http://www.gelbandfitter.org>
GelBandFitter is a computer program that uses non-linear regression techniques to fit mathematical functions to densitometry profiles of protein gels. This allows for improved quantification of gels with partially overlapping and potentially asymmetric protein bands. The program can also be used to analyze immunoblots with closely-spaced bands
- 2007 - present DEngine
<http://www.dengine.org>
DEngine (which stands for Distributed computing ENGINE) is a collection of computer programs that allows multiple machines to work together (using 'spare' screen-saver processing power) to solve large-scale mathematical problems.
- 2013 - present MyoSim
<http://www.myosim.org>
MyoSim is computer software that can be used to simulate the mechanical properties (force, shortening, power output, etc.) of striated muscles. It was developed in the Campbell lab and is feely available under the GNU General Public License.

WEBSITES

- 2008 - 2011 Center for Muscle Biology
<http://www.mc.uky.edu/muscle>
I was solely responsible for the development of the website for the Center for Muscle Biology in December 2008 and maintained the resource until 2011. I created more than 90% of the content for the original site which had about 100 pages.
- 2010 - 2012 Department of Physiology grants database
<http://www.ukpgygrants.org>
UKPGYGrants.org was a website where members of the University of Kentucky Physiology department could view grant applications submitted by other colleagues and post their own proposals for others to view. The goal was to provide a simple way of sharing knowledge and experience so that departmental members could submit stronger and better grant applications. I created the original site in 2010 and maintained it for 2 years

TEACHING

University of Kentucky

2005	Spring	Physiology 604	Advanced cardiovascular physiology	2 lectures
		Physiology 818	Electrocardiogram workshop	
	Fall	Physiology 502	Muscle/Cardiovascular physiology	9 lectures
		Physiology 602	Muscle/Cardiovascular physiology	3 lectures
2006	Spring	Physiology 630	Advanced skeletal muscle physiology	3 lectures
	Fall	Physiology 412G	Cardiovascular physiology	8 lectures
2007	Spring	Physiology 412G	Cardiovascular physiology	8 lectures
		Physiology 604	Advanced cardiovascular physiology	3 lectures
		Physiology 630	Advanced skeletal muscle physiology	3 lectures
	Fall	Physiology 412G	Cardiovascular physiology	8 lectures
2008	Spring	Physiology 412G	Cardiovascular physiology	8 lectures
	Fall	Physiology 412G	Cardiovascular physiology	8 lectures
2009	Spring	Physiology 412G	Cardiovascular physiology	8 lectures
		Physiology 630	Advanced skeletal muscle physiology	18 lectures
		Physiology 604	Advanced cardiovascular physiology	2 lectures
	Fall	Physiology 412G	Cardiovascular physiology	8 lectures
2010	Spring	Physiology 412G	Cardiovascular physiology	8 lectures
	Fall	Physiology 412G	Cardiovascular physiology	8 lectures
2011	Spring	Physiology 412G	Cardiovascular physiology	8 lectures
		Physiology 604	Advanced cardiovascular physiology	4 lectures
	Fall	Physiology 412G	Cardiovascular physiology	8 lectures
2012	Spring	Physiology 412G	Cardiovascular physiology	8 lectures
	Fall	Physiology 412G	Cardiovascular physiology	8 lectures
2013	Spring	Physiology 412G	Cardiovascular physiology	8 lectures
		Physiology 604	Advanced cardiovascular physiology	3 lectures
		Physiology 412G	Cardiovascular physiology	8 lectures
2014	Spring	Physiology 412G	Cardiovascular physiology	8 lectures
		Integrated Biomedical Sciences 608	Digital imaging for biomedical scientists	7 lectures
		Physiology 412G	Cardiovascular physiology	8 lectures
2015	Spring	Physiology 412G	Cardiovascular physiology	7 lectures
		Physiology 412G	Cardiovascular physiology	7 lectures (online)
		Physiology 604	Advanced cardiovascular physiology	1 lecture
		Integrated Biomedical Sciences 608	Digital imaging for biomedical scientists	7 lectures

	Summer	Physiology 412G	Cardiovascular physiology	7 lectures (online)
	Fall	Physiology 412G	Cardiovascular physiology and striated muscle	11 lectures
2016	Spring	Physiology 412G	Cardiovascular physiology and striated muscle	11 lectures
		Physiology 412G	Cardiovascular physiology and striated muscle	11 lectures (online)
		Physiology 604	Advanced cardiovascular physiology	1 lecture
		Integrated Biomedical Sciences 608	Digital imaging for biomedical scientists	7 lectures
	Fall	Physiology 412G	Cardiovascular physiology and striated muscle	11 lectures
		Physiology 412G	Cardiovascular physiology and striated muscle	11 lectures (online)
		Physiology 413G	Cardiovascular physiology and striated muscle	3 lectures
2017	Spring	MD 826	Medical School Cardiology	8 lectures

Purdue University

2006	Spring	Animal sciences 551	Skeletal and cardiac muscle mechanics	2 lectures
2008	Spring	Animal sciences 551	Skeletal and cardiac muscle mechanics	2 lectures

Asbury College, Wilmore, Kentucky

2007	Spring	Biology 352	Muscle physiology and biological kinetics	1 lecture and 1 demonstration
2008	Spring	Biology 352	Muscle physiology and biological kinetics	1 lecture and 1 demonstration
2009	Spring	Biology 352	Muscle physiology and biological kinetics	1 lecture and 1 demonstration
2010	Spring	Biology 352	Muscle physiology and biological kinetics	1 lecture and 1 demonstration
2011	Spring	Biology 352	Muscle physiology and biological kinetics	1 lecture and 1 demonstration
2012	Spring	Biology 352	Muscle physiology and biological kinetics	1 lecture and 1 demonstration
2013	Spring	Biology 352	Muscle physiology and biological kinetics	1 lecture and 1 demonstration
2014	Spring	Biology 352	Muscle physiology and biological kinetics	1 lecture and 1 demonstration

Vanderbilt University

2012	Fall	Biomedical engineering 253	Mathematical modeling of sarcomeres	1 lecture
2014	Spring	Biomedical engineering 253	Mathematical modeling of sarcomeres	1 lecture
2015	Fall	Biomedical engineering 253	Mathematical modeling of sarcomeres	1 lecture

Teaching awards

2006, 2010, 2014	Holsinger Award for Excellence in Teaching Department of Physiology, University of Kentucky
2007	Abraham Flexner Master Educator Award Outstanding Teaching Contribution or Mentorship College of Medicine, University of Kentucky
2014	Abraham Flexner Master Educator Award Educational innovation and Curriculum Development College of Medicine, University of Kentucky

TRAINEES

High school students

2007 – 2008	Rahul Sharma	Paul Dunbar High School, Mathematics and Science Training Center	
2010	Mary Combs	Henry Clay High School	Went to study physics at Rhodes College, Memphis, TN
2013 - 2014	Joseph Schneider	Paul Dunbar High School, Mathematics and Science Training Center	Received US Presidential Scholarship (only 2 from Kentucky). Went to study physics at Cal Tech.
2015 - present	Chase Vickery	Paul Dunbar High School, Mathematics and Science Training Center	

Undergraduate students

2006	Andrew Fryman	Bio 395 Research in Biology	
2006 - 2007	Eric M. Reid	UK Bucks for Brains Summer Student and BIO395 Research in Biology	Went to Medical School
2007 - 2008	Philip A. Montague		Went to Medical School
2008 - 2009	Jennifer Peterson	UK Bucks for Brains Summer Student and BIO395 Research in Biology	Went to Teach for America
2010	Calen M. Smith	BIO395 Research in Biology	No data
2010 - 2011	William K. Snapp	BIO395 Research in Biology	Went to Medical School
2011	Alexandria Jarrells	Chellgren Fellow	Went to MPH program
2011	Justin Penny	Chellgren Fellow	Went to DO School
2012 - 2013	Kristofer Nava	BIO395 Research in Biology	Went to Medical School
2012 - 2014	Byron Hempel	Chellgren Fellow, Summer Research Fellowship, and CHE395	Went to PhD program in Chemical Engineering
2012 – 2013	Kurtis Mann	HHMI Undergraduate Research Student	Went to PhD in Mathematics
2013	Heidi Gorbrandt	HHMI Undergraduate Research Student	No data
2014 - 2015	Travis Park	Undergraduate	Went to Medical School
2015 - present	Tori Buckley	BIO395	American Physiological Society Summer Research Fellowship
2015 - present	Joslyn Issacs	BIO395	American Physiological STRIDE Fellowship
2015 - present	Ross Own	BIO395	

2015 - 2016t	Faith Evans	Chellgren Fellow and BIO395	Pursuing career as an Emergency Medical Technician
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Interns

2014	Koen van der Poll	Delft University of Technology, Netherlands	
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Postbaccalaureate students

2015	Akruti Patel	Research experience	
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Medical students

2009	Ayodele Osasona	Summer research rotation	Residency in General Surgery at UTMB
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2012 - 2013	Tyler Holley	CTSA professional student	
2013	Eric M. Reid	Fourth year research rotation	

Residency in Emergency
Medicine at the University of
Kentucky

2013-2014	Tara Shrout	CTSA professional student	
2014	Alex Williams	Fourth year research rotation	
	Nate Smith	Fourth year research rotation	
2015	Samaher Alsaad	Alfaisal University (Saudi Arabia) University of Kentucky Research Program	

Graduate students

Primary advisor for PhD students

2009 - 2014	Premi Shekar, now Premi Haynes	PhD awarded March 2014	Post-doc with Daniel Miller at the University of Washington
2013 - present	Cheavar Blair		

Committee member for PhD students

2007 - 2014	Mark Howarth	Center for Biomedical Engineering PhD awarded 2014	Working in industry
2009 - 2012	Gretchen Wolff	Physiology PhD awarded 2012	Postdoc at University of Miami
2008 - 2012	Mellani Lefta	Physiology PhD awarded 2012, in MD/PhD program	Returned to medical school
2011 - 2014t	A. Catalina Valez-Ortega	Physiology PhD awarded 2015	Postdoc at University of Kentucky
2015	Lance Riley	Physiology	Left institution
2016 - present	Yuan Wen	MD / PhD, Physiology	

Rotation mentor

2004	Amy McAnamey	Integrated biomedical sciences
2006	Megan Bardgett	Integrated biomedical sciences
	Lorenzo Frederico	Integrated biomedical sciences
	Joseph Whelan	Integrated biomedical sciences
2007	Valerie Reeves	Integrated biomedical sciences
2008	Wenjun Zhu	Integrated biomedical sciences
	Premi Shekar	Integrated biomedical sciences
2011	Robert Helsey	Integrated biomedical sciences
2012	Cheavar Blair	Integrated biomedical sciences
2014	Lance Riley	Integrated biomedical sciences
	Tyler Burton	Integrated biomedical sciences
2016	Hoda Saghaeiannejad-Esfahani	Integrated biomedical sciences

Outside examiner

2008	Leah Allen	Pharmaceutical sciences
2012	Candice Thomas	Nutritional sciences
2014	Jonathan Sims	Pharmacology
2015	Lisa Maggio	Nursing
2016	Joshua Brown	Pharmacy

Postdoctoral scholars

2007 - 2011	Mihail Mitov	Passive stiffness components in myocardium Funded by AHA Postdoctoral Fellowship and NIH R01 to KSC	Went to Staff scientist position at the University of Kentucky
2010 - 2012	Stuart Campbell	Single myocyte mechanics Funded by AHA Postdoctoral Fellowship and NIH R01 to KSC	Tenure-track Assistant Professor at Yale University
2012 - 2015	Charles Chung	Myocardial relaxation Funded by NIH R01 and CTSA Pilot Award to KSC and AHA SDG to CC	Tenure-track Assistant Professor at Wayne State University

Faculty Mentoring

2012 - 2014	Steve Leung, MD	Division of Cardiology University of Kentucky	CTSA KL2 Fellow
2013 - 2015	Moriel Vandsburger, PhD	Department of Physiology University of Kentucky	CTSA KL2 Fellow
2015 - present	Peter Kekenus-Huskey, PhD	Department of Chemistry University of Kentucky	

Mentoring Awards

2014	Mentor recognition award	Center for Clinical and Translational Sciences University of Kentucky	
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GRANT REVIEWING

US Federal Agencies

NIH

2012 - 2014 ZHL1 CSR-P (01)1 – Mentored Career Transition Scientist
2013 NIH NHLBI PPG Invited reviewer
2014 – 2019 MENTORED TRANSITION TO INDEPENDENCE – Regular member
2016 BDMA (Biodata Management and Analysis) – Ad hoc member

NSF

2007 Ad hoc reviewer (Foundation policy prevents identifying panel)
2012, 2014 Review panel member (Foundation policy prevents identifying panel)

US Non-Federal

American Heart Association

2007 - 2009 Member, National Peer Review Committee: Cardiac biology and regulation
2011 – 2014 Member, National Peer Review Committee: Cardiac biology and regulation
2011 – 2012 Co-Chair, National Peer Review Committee: Cardiac biology and regulation
2013 – 2014 Chair, National Peer Review Committee: Cardiac biology and regulation
2015 Member, National Peer Review Committee: Established Investigator Awards

International

2008 Ad hoc reviewer for Swiss National Science Foundation: Biology and Medicine
2010 Ad hoc reviewer for Prinses Beatrix Fonds (Netherlands)

Universities

2008, 2011 Ad hoc reviewer for the University of Kentucky Vice-President for Research
2010 Ad hoc reviewer for University of Michigan Geriatrics Center
2012 - present Grant review panel for the University of Kentucky Center for Clinical and Translational Sciences

EDITORIAL BOARDS

2010 - present Frontiers in Muscle physiology
2014 - present VAD - the Ventricular Assist Device Journal

MANUSCRIPT REVIEWING

As of 2015, approximately 1 article every 3 weeks for journals including:

Acta Physiologica Scandinavica
Aging Cell
Archives of Biochemistry and Biophysics
American Journal of Physiology: Cellular Physiology
American Journal of Physiology: Endocrinology and Metabolism
American Journal of Physiology: Heart and Circulatory Physiology
Biophysical Journal
Circulation Research (Triage and Full Reviews)
European Journal of Applied Physiology
Experimental Physiology
International Journal of Cardiology
Journal of Applied Physiology
Journal of Biomechanics
Journal of General Physiology
Journal of Molecular and Cellular Cardiology
Journal of Pharmacology and Experimental Therapeutics
Journal of Physiology
Journal of Theoretical Biology
Journal of Visualized Experiments
Mathematical Biosciences
Pflügers Archiv
PLoS One

POST-PUBLICATION PEER REVIEW

2010 - present Faculty of 1000

OTHER SERVICE

University of Kentucky

Institution

2009	Faculty mentor, Common reading experience
2011 - present	Undergraduate research advisory group
2011 - 2012	Center for Computational Sciences, Futures committee
2011 - 2013	Center for Clinical and Translational Science, Translational Technologies and Resources
2013- present	Director, Center for Clinical and Translational Science, Biobanking
2013 - present	Director, Center for Clinical and Translational Science, Chair of Executive Steering and Operations Committees for Global Biobanking Protocol
2014 – 2015	University Senate
2014 – 2015	University of Kentucky, Academic Planning and Priorities Committee

College of Medicine

2012 - 2014	MD/PhD Internal advisory/Admissions committee
2011 - 2013	Heart/Lung Section Curriculum Committee

Department of Physiology

2005 - 2007	Faculty Search Committee
2005 – present	Graduate Affairs Committee
2006 - 2010	Graduate student open house Meeting coordinator
2007, 2011	Holsinger Award Committee
2007 - 2014	Information Technology Coordinator
2008 - 2011	Brian J. Hardin Research Award Committee
2010	50 th Anniversary Celebration Committee
2010 - 2014	Founding Director of the Physiology Scholars Program
2010 - 2011	Developer, Physiology grant application database
2013 - 2014	New Chair search committee

Center for Muscle Biology

2008	Journal club coordinator
2008 - 2011	Webmaster, Center website
2009 - present	Executive committee member
2010 - 2014	Co-Director, Function Core

Regional

2005 - present Volunteer, American Heart Association, Central Kentucky Heartwalk
2006 - present Volunteer, American Heart Association, "You are the Cure" Advocate
2006 Volunteer Judge, Kentucky Science and Engineering Fair, Richmond, KY
2008 -2012 Volunteer Judge, Fayette County Science and Engineering Fair, Lexington, KY
2008 -2012 Volunteer Judge, Central Kentucky Science and Engineering Fair, Lexington, KY
2009 American Heart Association Lobbyist, Kentucky State Government

National

2006 - 2012 Biophysical Society Early Careers Committee
2008/10/12 Biophysical Society Annual Meeting Career Workshop Coordinator
2009 Biophysical Society Annual Meeting Early Careers Evening Coordinator
2012 Biophysical Society Career Panel Member

PROFESSIONAL MEMBERSHIPS

1993 - 1998 Physiological Society, United Kingdom
1998 - present Biophysical Society
2001 - present American Heart Association
2004 - present American Physiological Society
2008 - 2010 International Society for Heart Research
2012 - present Fellow of the American Heart Association

HONORS AND OTHER EXPERIENCE

1993 - 1998 Wellcome Trust Prize Studentship
1999 - 2005 Invited participant, Gordon Research Conference Contractile Proteins
2000 Best oral presentation, Midwest Physiological Society
2007 Symposium Chair, Experimental Biology, Washington, DC
2008 - 2010 International Society for Heart Research
2008 Invited participant, Gordon Research Conference Cardiac Regulatory Proteins
2010 Symposium Chair, 6th World Congress on Biomechanics, Singapore
2010 - present Faculty of 1000 Physiology – Muscle and connective tissue
2011 Director, Modeling workshop for trainees in muscle biology, University of Kentucky
2011 Co-Chair, Muscle: fiber and molecular mechanics and structure, Biophysical Society Annual Meeting, Baltimore, MD
2012 Co-Chair, Titin session, Experimental Biology, San Diego, CA
2013 Invited participant, Multi-scale physics of muscle workshop, University of Washington, Seattle
2014 Symposium speaker, Biophysical Society Annual meeting, San Francisco, CA
2014 Consultant, helped to create "The Ventricular Assist Device Journal", an open-source clinical journal hosted by the University of Kentucky Library UKNow system

INVITED TALKS

Intramural

University of Wisconsin-Madison

1997 Department of Physiology
2003 Cardiovascular Research Center

University of Kentucky

2003 Department of Physiology
2004 Center for Biomedical Engineering
2005 Gill Heart Institute
Muscle Forum
2006 Department of Physiology
Gill Heart Institute
Muscle Forum
2007 Muscle Forum (x2)
Center for Biomedical Engineering
2008 Gill Heart Institute, Cardiovascular Seminar Series
Muscle Forum (x2)
Clinical and Translational Science Fall Conference
Department of Physiology
2009 Muscle Forum
2010 Research collaborations between Engineering and Medicine
Muscle Forum
Nutritional Sciences Seminar Series
Department of Mathematics
2011 Cardiovascular Grand Rounds
Center for Muscle Biology Research Retreat
2012 Muscle Forum
2013 Department of Computer Science

Extramural

Before faculty appointment

- 1995 Practical demonstration, Physiological Society, United Kingdom
Oral communication, Physiological Society, United Kingdom
- 1996 Oral communication, Physiological Society, United Kingdom
- 1997 NIAMS, National Institutes of Health
- 2000 Department of Biochemistry, Molecular Biology, and Biophysics, University of Minnesota
- 2001 Midwest Physiological Society
- 2002 National Institute for Medical Research, London, United Kingdom

After faculty appointment

- 2004 Calcium-dependent myocardial stiffness: Implications for Diastolic function
Department of Anatomy and Cell Biology
Indiana University Purdue University Indianapolis
11 November, 2004
- 2007 Acto-myosin kinetics: Tension overshoots and residual forces
Department of Physiology
Loyola University, Chicago, IL
11 April, 2007
- Measurements and models of acto-myosin kinetics
Experimental Biology,
Washington, DC
30 April, 2007
- Myocardial stiffness in aging-associated diastolic heart failure
NIH/NIA New Investigator's Workshop
San Antonio, TX
31 May, 2007
- Myocardial stiffness: effect of simulated microgravity
Kentucky EPSCOR "Building Team Science" Conference
2 October, 2007

2008 Myocardial mechanics in animals of aging and obesity-associated cardiovascular disease
Department of Biomedical Sciences
Marshall University, Huntington, WV
6 June, 2008

Myofilament mechanics in animal models of diastolic dysfunction
University of Glasgow, United Kingdom
22 September, 2008

The short-range mechanical properties of myocardium
University of Birmingham, United Kingdom
24 September, 2008

2009 Computational models of acto-myosin interactions
2009 Workshop on multi-scale muscle mechanics
Marine Biological Laboratory, Woods Hole, MA
18-21 September, 2009

Emergent mechanical properties of skeletal and cardiac muscles
Department of Physiology
Loyola University, Chicago, IL
11 December, 2009

2010 Muscle fiber heterogeneity and heart function
Washington State University, Pullman, WA
8 June, 2010

Multi-scale models of muscle fibers
6th World Congress on Biomechanics
Singapore
1-6 August, 2010

Emergent mechanical properties of skeletal and cardiac muscle
Department of Molecular Physiology and Biophysics
University of Vermont
4 October, 2010

Emergent mechanical properties of skeletal and cardiac muscle
Department of Physiology and Cell Biology
The Ohio State University
8 December, 2010

- 2011 Emergent mechanical properties of skeletal and cardiac muscles
Department of Biology
Marquette University, Milwaukee, WI
18 February, 2011
- 2012 Mechanical modeling of Z-disk behavior in response to stretch
Experimental Biology, San Diego, CA
25 April, 2012
- Sarcomere level dysfunction in heart failure
Vanderbilt University
12 October, 2012
- 2013 Sarcomere level dysfunction in heart failure
University of Florida
21 February, 2013
- Activation dependent rates of force development simulated using a Huxley-type cross-bridge model with added cooperativity
Computer Methods in Biomechanics and Biomedical Engineering
Salt Lake City, UT
6 April, 2013
- Myofilament level dysfunction in heart failure
University of Iowa
27 August, 2013
- Short-range properties of striated muscles and cross-bridge modeling
Leiden University Medical Center
Leiden, The Netherlands
26 September, 2013
- Cellular level dysfunction in heart failure
Wayne State University
10 October, 2013
- 2014 Effects of transmural region and heart failure on the contractile properties of human myocardium
Symposium presentation, Biophysical Society Annual Meeting
17 February, 2014
- Transmural variation in the contractile properties of human myocardium
Cardiovascular Research Center
University of Wisconsin-Madison
10 April, 2014
- Sarcomere level dysfunction in heart failure
Penn State Medical Center, Hershey, PA
23 April, 2014
- Cellular level function in human heart failure
Imperial College, London
29 August, 2014

Myocardial strain rate modulates the speed of relaxation in dynamically loaded twitch contractions
Workshop on Mathematics and Biology
Wolfgang Pauli Institute
Vienna, Austria
22 September, 2014

Myofilament function in human heart failure
Stanford University
Palo Alto, CA
2 October, 2014

Sarcomere level function in human heart failure
University of Missouri
Columbia, MO
14 October, 2014

Molecular mechanisms of heart failure
University of Sydney
Sydney, Australia
November, 2014

Molecular mechanisms of heart failure
University of Auckland
Auckland, New Zealand
November, 2014

Instrumentation and measurement of cardiac cells
New Zealand IEEE Instrumentation and Measurement Society
Auckland, New Zealand
24 November, 2014

2015 Sarcomere level function in human myocardium
St. Louis University
St. Louis, MO
23 February, 2015

Mathematical modeling of sarcomeres
Vanderbilt University
Nashville, TN
5 October, 2015

Adventures in translational research
Georgetown College
Georgetown, KY
12 November, 2015

2016 Contractile properties of human myocardium
Washington State University
Pullman, WA
11 February, 2016

Contractile dysfunction in human heart failure
Eastern Kentucky University
Richmond, KY
29 April, 2016

Contractile properties of human myocardium
Yale University
New Haven, CT
1 June, 2016