

National Space Biomedical Research Institute Publications

Cardiovascular Alterations Team

Articles

Aljuri, N., and R. J. Cohen. Theoretical considerations in the dynamic closed-loop baroreflex and autoregulatory control of total peripheral resistance. *Am J Physiol Heart Circ Physiol* 287(5):H2252-73, 2004.

Aljuri, N., R. Marini, and R. J. Cohen. Test of dynamic closed-loop baroreflex and autoregulatory control of total peripheral resistance in intact and conscious sheep. *Am J Physiol Heart Circ Physiol* 287(5):H2274-86, 2004.

Armoundas, A. A., S. H. Hohnloser, T. Ikeda, and R. J. Cohen. Can microvolt T-wave alternans testing reduce unnecessary defibrillator implantation? *Nat Clin Pract Cardiovasc Med* 2(10):522-8. 2005.

Armoundas, A. A., M. Osaka, T. Mela, D. S. Rosenbaum, J. N. Ruskin, H. Garan, and R. J. Cohen. T-wave alternans and dispersion of the QT interval as risk stratification markers in patients susceptible to sustained ventricular arrhythmias. *Am J Cardiol* 82(9):1127-1129, 1998.

Armoundas, A. A., D. S. Rosenbaum, J. N. Ruskin, H. Garan, and R. J. Cohen. Prognostic significance of electrical alternans versus signal averaged electrocardiography in predicting the outcome of electrophysiological testing and arrhythmia-free survival. *Heart* 80(3):251-256, 1998.

Armoundas, A. A., N. Toshihiko, and R. J. Cohen. Images in cardiovascular medicine. T-wave alternans preceding torsade de pointes ventricular tachycardia. *Circulation* 101(21):2550, 2000.

Askari, A. T., S. Unzek, Z. B. Popovic, C. K. Goldman, F. Forudi, M. Kiedrowski, A. Rovner, S. G. Ellis, J. D. Thomas, P. E. DiCorleto, E. J. Topol, and M. S. Penn. Effect of stromal-cell-derived factor 1 on stem-cell homing and tissue regeneration in ischaemic cardiomyopathy. *Lancet* 362(9385):697-703, 2003.

Bauer F, Jones M, Shiota T, Firstenberg MS, Qin JX, Tsujino H, Kim YJ, Sitges M, Cardon LA, Zetts AD, Thomas JD. Left ventricular outflow tract mean systolic acceleration as a surrogate for the slope of the left ventricular end-systolic pressure-volume relationship. *J Am Coll Cardiol.* 2002 Oct 2;40(7):1320-7.

Bayorh, M. A., L. Ambe, M. Walton, A. Ganafa, M. Thierry-Palmer, N. Emmett, and D. Eatman. Hindlimb unloading is associated with increased nitric oxide and decreased norepinephrine levels. *J Gravit Physiol* 12(2):23-32, 2005.

Bayorh, M. A., D. Eatman, M. Walton, R. R. Socci, and N. Emmett. Post-suspension hypotension is attenuated in Sprague-Dawley rats by prostacyclin synthase inhibition. *Prostaglandins Leukot Essent Fatty Acids* 66(5-6):511-517, 2002.

Berkowitz DE. Myocyte nitroso-redox imbalance in sepsis: NO simple answer. *Circ Res*. 2007 Jan 5;100(1):1-4.

Berkowitz, D. E., R. White, D. Li, K. M. Minhas, A. Cernetich, S. Kim, S. Burke, A. A. Shoukas, D. Nyhan, H. C. Champion, and J. M. Hare. Arginase reciprocally regulates nitric oxide synthase activity and contributes to endothelial dysfunction in aging blood vessels. *Circulation* 108(16):2000-2006, 2003.

Brooks-Asplund, E. M., A. A. Shoukas, S. Y. Kim, S. A. Burke, and D. E. Berkowitz. Estrogen has opposing effects on vascular reactivity in obese, insulin-resistant male Zucker rats. *J Appl Physiol* 92(5):2035-2044, 2002.

Buakhamsri A, Popovic ZB, Lin J, Lim P, Greenberg NL, Borowski AG, Wilson Tang WH, Klein AL, Lever HM, Desai MY, Thomas JD. Impact of left ventricular volume/mass ratio on diastolic function. *Eur Heart J*. 2009 Mar 20.

Carter, J. R., W. H. Cooke, and C. A. Ray. Forearm neurovascular responses during mental stress and vestibular activation. *Am J Physiol Heart Circ Physiol* 288(2):H904-7, 2005.

Carter, J. R., N. T. Kupiers, and C. A. Ray. Neurovascular responses to mental stress. *J Physiol* 564(Pt 1):321-7, 2005.

Carter JR, Ray CA. Effect of dimenhydrinate on autonomic activity in humans. *Clin Auton Res*. 2007 Jun;17(3):186-92.

Carter, J. R., C. A. Ray, and W. H. Cooke. Vestibulosympathetic reflex during mental stress. *J Appl Physiol* 93(4):1260-1264, 2002.

Carter, J. R., C. A. Ray, E. M. Downs, and W. H. Cooke. Strength training reduces arterial blood pressure but not sympathetic neural activity in young normotensive subjects. *J Appl Physiol* 94(6):2212-2216, 2003.

Carter, J. R., C. L. Sauder, and C. A. Ray. Effect of morphine on sympathetic nerve activity in humans. *J Appl Physiol* 93(5):1764-1769, 2002.

Cassone, V. M., and F. K. Stephan. Central and peripheral regulation of feeding and nutrition by the mammalian circadian clock: implications for nutrition during manned space flight. *Nutrition* 18(10):814-819, 2002.

Delp, M. D., P. N. Collieran, M. K. Wilkerson, M. R. McCurdy, and J. Muller-Delp. Structural and functional remodeling of skeletal muscle microvasculature is induced by simulated microgravity. *Am J Physiol Heart Circ Physiol* 278(6):H1866-H1873, 2000.

Deserranno D, Kassemi M, Thomas JD. Incorporation of myofilament activation mechanics into a lumped model of the human heart. *Ann Biomed Eng.* 2007 Mar;35(3):321-36.

de Tombe, P. P. Cardiac myofilaments: mechanics and regulation. *J Biomech* 36(5):721-730, 2003.

Ding, B., R. L. Price, E. C. Goldsmith, T. K. Borg, X. Yan, P. S. Douglas, E. O. Weinberg, J. Bartunek, T. Thielen, V. V. Didenko, and B. H. Lorell. Left ventricular hypertrophy in ascending aortic stenosis mice. *Circulation* 101(24):2854-2861, 2000.

Dorfman TA, Levine BD, Tillery T, Peshock RM, Hastings JL, Schneider SM, Macias BR, Biolo G, Hargens AR. Cardiac atrophy in women following bed rest. *J Appl Physiol* 103:8-16, 2007.

Dorfman TA, Rosen BD, Perhonen MA, Tillery T, McColl R, Peshock RM, Levine BD. Diastolic suction is impaired by bed rest: MRI tagging studies of diastolic untwisting. *J Appl Physiol.* 2008 Apr;104(4):1037-44.

Dunbar, S. L., D. E. Berkowitz, E. M. Brooks-Asplund, and A. A. Shoukas. The effects of hindlimb unweighting on the capacitance of rat small mesenteric veins. *J Appl Physiol* 89(5):2073-2077, 2000.

Dunbar, S. L., L. Tamhidi, D. E. Berkowitz, and A. A. Shoukas. Hindlimb unweighting affects rat vascular capacitance function. *Am J Physiol Heart Circ Physiol* 281(3):H1170-H1177, 2001.

Dyckman DJ, Monahan KD, Ray CA. Effect of baroreflex loading on the responsiveness of the vestibulosympathetic reflex in humans. *J Appl Physiol.* 2007 Sep;103(3):1001-6.

Eatman, D., R. A. Listhrop, A. S. Beasley, R. R. Socci, I. Abukhalaf, and M. A. Bayorh. Influences of prostanoids and nitric oxide on post-suspension hypotension in female Sprague-Dawley rats. *Prostaglandins Leukot Essent Fatty Acids* 68(3):197-205, 2003.

Eatman, D., M. Walton, R. R. Socci, N. Emmett, and M. A. Bayorh. NOS II inhibition attenuates post-suspension hypotension in Sprague-Dawley rats. *Clin Exp Hypertens* 25(1):11-24, 2003.

Elstad, M., K. Toska, K. H. Chon, E. A. Raeder, and R. J. Cohen. Respiratory sinus arrhythmia: opposite effects on systolic and mean arterial pressure in supine humans. *J Physiol* 536(Pt 1):251-259, 2001.

Eto, Y., H. Yamada, J-H. Shin, D. A. Agler, H. Tsujino, J-X. Qin, G. Saracino, N. L. Greenert, J. D. Thomas and T. Shiota. Automated mitral annular tracking: a novel method for evaluating mitral annular motion using two-dimensional echocardiography. *J Am Soc Echocardiogr* 18(4):306-12, 2005.

Feldman, A. B., Y. B. Chernyak, and R. J. Cohen. Spiral waves as stable in discrete element models of two-dimensional homogeneous excitable media. *Int J Bifurcat Chaos* 8(6):1153-1161, 1998.

Firstenberg MS, Greenberg NL, Garcia MJ, Thomas JD. Relationship between ventricular contractility and early diastolic intraventricular pressure gradients: A diastolic link to systolic function. *J Am Soc Echocardiogr*. 2008 May;21(5):501-6.

Ganafa, A. A., M. Walton, D. Eatman, I. K. Abukhalaf, and M. A. Bayorh. Amlodipine attenuates oxidative stress-induced hypertension. *Am J Hypertens* 17(9):743-748, 2004.

Gashev, A. A., M. J. Davis, and D. C. Zawieja. Inhibition of the active lymph pump by flow in rat mesenteric lymphatics and thoracic duct. *J Physiol* 540(Pt 3):1023-1037, 2002.

Gashev, A. A., M. D. Delp, and D. C. Zawieja. Inhibition of the active lymph pump by simulated microgravity in rats. *Am J Physiol Heart Circ Physiol* 290(6):H2295-308, 2006.

Grenon, S. M., S. Hurwitz, N. Sheynberg, X. Xiao, B. Judson, C. D. Ramsdell, C. Kim, R. J. Cohen, and G. H. Williams. Sleep restriction does not affect orthostatic tolerance in the simulated microgravity environment. *J Appl Physiol* 97(5):1660-6, 2004.

Grenon, S. M., S. Hurwitz, N. Sheynberg, X. Xiao, C. D. Ramsdell, C. L. Mai, C. Kim, R. J. Cohen, and G. H. Williams. Role of individual predisposition in orthostatic intolerance before and after simulated microgravity. *J Appl Physiol* 96(5):1714-22, 2004.

Grenon, S. M., S. Hurwitz, X. Xiao, N. Sheynberg, C. D. Ramsdell, C. Kim, R. J. Cohen, and G. H. Williams. Readaptation from simulated microgravity as a stimulus for improved orthostatic tolerance: Role of renal, endocrine, and cardiovascular systems. *J Invest Med* 53(2):82-91, 2005.

Grenon, S. M., N. Sheynberg, S. Hurwitz, G. Xiao, C. D. Ramsdel, M. D. Ehrman, C. L. Mai, S. R. Krissjansson, G. H. Sundby, R. J. Cohen, and G. H. Williams. Renal, endocrine and cardiovascular responses to bed rest in male subjects on a constant diet. *J Invest Med* 52:117-28, 2004.

Grenon, S. M., X. Xiao, S. Hurwitz, C. D. Ramsdell, N. Sheynberg, C. Kim, G. H. Williams, and R. J. Cohen. Simulated microgravity induces microvolt T-wave alternans. *Ann Noninvasive Electrocardiol* 10(3):363-70, 2005.

Grenon SM, Xiao X, Hurwitz S, Sheynberg N, Kim C, Seely EW, Cohen RJ, Williams GH. Why is orthostatic tolerance lower in women than in men? Renal and cardiovascular responses to simulated microgravity and the role of midodrine. *J Invest Med*. 2006 May;54(4):180-90.

Hanafy, K. A., J. S. Krumenacker, and F. Murad. NO, nitrotyrosine, and cyclic GMP in signal transduction. *Med Sci Monit* 7(4):801-819, 2001.

Heldt, T., J. L. Chang, J. J. Chen, G. C. Verghese, and R. G. Mark. Cycle-averaged dynamics of a periodically driven, closed-loop circulation model. *Control Eng Pract* 13(9):1163-71, 2005.

Heldt T, Chernyak YB. Analytical solution to simplified cardiovascular model. *Comput Cardiol*. 2006 Sept;33:785-9.

Heldt T, Mark RG. Scaling cardiovascular parameters for population simulations. *Comput Cardiol*. 2004 Aug;31:133-136.

Heldt, T., and R. G. Mark. Understanding post-spaceflight orthostatic intolerance: A simulation Study. *Comput Cardiol* 32:631-634, 2005.

Heldt, T., E. B. Shim, R. D. Kamm, and R. G. Mark. Computational modeling of cardiovascular response to orthostatic stress. *J Appl Physiol* 92(3):1239-1254, 2002.

Heldt, T., E. B. Shim, R. D. Kamm, and R. G. Mark. Computational models of cardiovascular function for analysis of post-flight orthostatic intolerance. *Comput Cardiol* 26:213-216, 1999.

Hohnloser, S. H., T. Ikeda, D. M. Bloomfield, O. H. Dabbous, and R. J. Cohen. T-wave alternans negative coronary patients with low ejection and benefit from defibrillator implantation. *Lancet* 362(9378):125-126, 2003.

Hohnloser, S. H., T. Klingenheben, D. Bloomfield, O. Dabbous, and R. J. Cohen. Usefulness of microvolt T-wave alternans for prediction of ventricular tachyarrhythmic events in patients with dilated cardiomyopathy: results from a prospective observational study. *J Am Coll Cardiol* 41(12):2220-2224, 2003.

Hohnloser, S. H., T. Klingenheben, L. Yi-Gang, M. Zabel, J. Peetermans, and R. J. Cohen. T-wave alternans as a predictor of recurrent ventricular tachyarrhythmias in ICD recipients: prospective comparison with conventional risk markers. *J Cardiovasc Electrophysiol* 9(12):1258-1268, 1998.

Hurwitz, S., R. J. Cohen, and G. H. Williams. Diurnal variation of aldosterone and plasma rennin activity: timing relation to melatonin and cortisol and consistency after prolonged bed rest. *J Appl Physiol* 96:1406-1414, 2004.

Ito, K., M. Nakayama, F. Hasan, X. Yan, M. D. Schneider, and B. H. Lorell. Contractile reserve and calcium regulation are depressed in myocytes from chronically unloaded hearts. *Circulation* 107(8):1176-1182, 2003.

Ito, K., X. Yan, M. Tajima, Z. Su, W. H. Barry, and B. H. Lorell. Contractile reserve and intracellular calcium regulation in mouse myocytes from normal and hypertrophied failing hearts. *Circulation Research* 87(7):588-595, 2000.

Jhaveri, R., S. Kim, A. R. White, S. Burke, D. E. Berkowitz, and D. Nyhan. Enhanced vasodilatory responses to milrinone in catecholamine-precontracted small pulmonary arteries. *Anesth Analg* 98(6):1618-22, 2004.

Johnatty, S. E., J. R. B. Dyck, L. H. Michael, E. N. Olson, and M. Abdellatif. Identification of genes regulated during mechanical load-induced cardiac hypertrophy. *J Mol Cell Cardiol* 32(5):805-815, 2000.

Jung, A. S., R. Harrison, K. H. Lee, J. Genut, D. M. Nyhan, E. A. Brooks-Asplund, A. A. Shoukas, J. M. Hare, and D. E. Berkowitz. Simulated microgravity produces attenuated baroreflex-mediated pressor, chronotropic, and inotropic responses in mice. *Am J Physiol Heart Circ Physiol* 289(2):H600-7, 2005.

Kaufman ES, Bloomfield DM, Steinman RC, Namerow PB, Costantini O, Cohen RJ, Bigger Jr JT. "Indeterminate" microvolt T-wave alternans tests predict high risk of death or sustained ventricular arrhythmias in patients with left ventricular dysfunction. *J Am Coll Cardiol*. 2006 Oct 3;48(7):1399-404.

Khaled S, Gupta KB, Wu X, Yu T, Chang P, Kucik DF. Iron ion irradiation alters adhesiveness of vascular endothelium. *Gravit Space Bio Bulletin*. 2008 June; 21(2):25-26.

Konhilas, J. P., T. C. Irving, and P. P. de Tombe. Frank-Starling law of the heart and the cellular mechanisms of length-dependent activation. *Pflugers Arch - Eur J Physiol* 445(3):305-310, 2002.

Krumenacker, J. S., K. A. Hanafy, and F. Murad. Regulation of nitric oxide and soluble guanylyl cyclase. *Brain Res Bull* 2004 Feb 15;62(6):505-15, 2004.

Krumenacker, J. S., S. M. Hyder, and F. Murad. Estradiol rapidly inhibits soluble guanylyl cyclase in rat uterus. *Proc Natl Acad Sci* 98(2):717-722, 2001.

Krumenacker, J. S., A. Kots, and F. Murad. Effects of the c-Jun kinase inhibitor anthra[1,9-cd] pyrazole-6(2H)-one (SP600125) on soluble guanylyl cyclase α 1 gene regulation and cGMP synthesis. *Am J Physiol Cell Physiol* 289(4):C778-84, 2005.

Krumenacker, J. S., and F. Murad. NO-cGMP signaling in development and stem cells. *Mol Genet Metab* 87(4):311-4, 2006.

Kuipers, N. T., C. L. Sauder, and C. A. Ray. Aging attenuates the vestibulorespiratory reflex in humans. *J Physiol* 548(Pt 3):955-961, 2003.

Kwan, J., T. Shiota, D. A. Agler, Z. B. Popovic, J. X. Qin, M. A. Gillinov, W. J. Stewart, D. M. Cosgrove, P. M. McCarthy, and J. D. Thomas. Geometric differences of the mitral apparatus between ischemic and dilated cardiomyopathy with significant mitral regurgitation: real-time three-dimensional echocardiography study. *Circulation* 107(8):1135-1140, 2003.

Lee, Y-C, E. Martin, and F. Murad. Human recombinant soluble guanylyl cyclase: expression, purification, and regulation. *Proc Natl Acad Sci* 97(20):10763-10768, 2000.

- Lim P, Buakhamsri A, Popovic ZB, Greenberg NL, Patel D, Thomas JD, Grimm RA. Longitudinal strain delay index by speckle tracking imaging. A new marker of response to cardiac resynchronization therapy. *Circulation*. 2008 Sep 9;118(11):1130-7.
- Lim HK, Lim HK, Ryoo S, Benjo A, Shuleri K, Miriel V, Baraban E, Camara A, Soucy K, Nyhan D, Shoukas A, Berkowitz DE. Mitochondrial arginase II constrains endothelial NOS-3 activity. *Am J Physiol Heart Circ Physiol*. 2007 Dec;293(6):H3317-24.
- Martin, E., Y-C Lee, and F. Murad. YC-1 activation of human soluble guanylyl cyclase has both heme-dependent and heme-independent components. *Proc Natl Acad Sci* 98(23):12938-12942, 2001.
- Martin, E., I. Sharina, A. Kots, and F. Murad. A constitutively activated mutant of human soluble guanylyl cyclase (sGC): implication for the mechanism of sGC activation. *Proc Natl Acad Sci* 100(16):9208-9213, 2003.
- Matsumura Y, Fukuda S, Tran H, Greenberg NL, Agler DA, Wada N, Toyono M, Thomas JD, Shiota T. Geometry of the proximal isovelocity surface area in mitral regurgitation by 3-dimensional color Doppler echocardiography: Difference between functional mitral regurgitation and prolapse regurgitation. *Am Heart J*. 2008 Feb;155(2):231-8.
- Matsumura Y, Saracino G, Sugioka K, Tran H, Greenberg NL, Wada N, Toyono M, Fukuda S, Hozumi T, Thomas JD, Yoshikawa J, Yoshiyama M, Shiota T. Determination of regurgitant orifice area with the use of a new three-dimensional flow convergence geometric assumption in functional mitral regurgitation. *J Am Soc Echocardiogr*. 2008 Nov;21(11):1251-6.
- Michailova, A., J. Saucerman, M. E. Belik, and A. D. McCulloch. Modeling regulation of cardiac K_{ATP} and L-type Ca^{2+} currents by ATP, ADP, and Mg^{2+} . *Biophys J* 88(3):2234-49, 2005.
- Miller, T. A., L. A. Lesniewski, J. M. Muller-Delp, A. K. Majors, D. Scalise, and M. D. Delp. Hindlimb unloading induces a collagen isoform shift in the soleus muscle of the rat. *Am J Physiol Regul Integr Comp Physiol* 281(5):R1710-R1717, 2001.
- Momen, A., U. A. Leuenberger, C. A. Ray, S. Cha, B. Handly, and L. I. Sinoway. Renal vascular responses to static handgrip: role of muscle mechanoreflex. *Am J Physiol Heart Circ Physiol* 285(3):H1247-H1253, 2003.
- Monahan KD, Leuenberger UA, Ray CA. Aldosterone impairs baroreflex sensitivity in healthy adults. *Am J Physiol Heart Circ Physiol*. 2007 Jan;292(1):H190-7.
- Monahan, K. D., U. A. Leuenberger, and C. A. Ray. Effect of repetitive hypoxic apneas on baroreflex function in humans. *J Physiol* 574(Pt 2):605-613, 2006.
- Monahan, K. D., and C. A. Ray. Cyclooxygenase inhibition and baroreflex sensitivity in humans. *Am J Physiol Heart Circ Physiol* 288(2):H737-43, 2005.

Monahan, K. D., and C. A. Ray. Gender affects calf venous compliance at rest and during baroreceptor unloading in humans. *Am J Physiol Heart Circ Physiol* 286:H895-H901, 2004.

Monahan, K. D., and C. A. Ray. Interactive effect of hypoxia and otolith organ engagement on cardiovascular regulation in humans. *J Appl Physiol* 93(2):576-580, 2002.

Monahan, K. D., and C. A. Ray. Limb neurovascular control during altered otolithic input in humans. *J Physiol* 538(Pt 1):303-308, 2002.

Monahan, K. D., and C. A. Ray. Vestibul sympathetic reflex during orthostatic challenge in aging humans. *Am J Physiol Regul Integr Comp Physiol* 283(5):R1027-R1032, 2002.

Monahan, K. D., M. K. Sharpe, D. Drury, A. C. Ertl, and C. A. Ray. Influence of vestibular activation on respiration in humans. *Am J Physiol Regul Integr Comp Physiol* 282(3):R689-R694, 2002.

Monahan, K. D., T. E. Wilson and C. A. Ray. Omega-3 fatty acid supplementation augments sympathetic nerve activity responses to physiological stressors in humans. *Hypertension* 44:732-38, 2004.

Mukkamala, R., and R. J. Cohen. A forward model-based validation of cardiovascular system identification. *Am J Physiol Heart Circ Physiol* 281(6):H2714-H2730, 2001.

Mukkamala, R., R. J. Cohen, and R. G. Mark. A computational model-based validation of guyton's analysis of cardiac output and venous return curves. *Comput Cardiol* 29:561-564, 2002.

Mukkamala, R., A. T. Reisner, H. M. Hojman, R. G. Mark, and R. J. Cohen. Continuous cardiac output monitoring by peripheral blood pressure waveform analysis. *IEEE Trans Biomed Eng* 53(3):459-67, 2006.

Mukkamala, R., K. Toska, and R. J. Cohen. Noninvasive identification of the total peripheral resistance baroreflex. *Am J Physiol Heart Circ Physiol* 284(3):H947-H959, 2003.

Muthuchamy, M., A. Gashev, N. Boswell, N. Dawson, and D. Zawieja. Molecular and functional analyses of the contractile apparatus in lymphatic muscle. *FASEB J* 17(8):920-922, 2003.

Notomi, Y., P. Lysyansky, R. M. Setser, T. Shiota, Z. B. Popovic, M. G. Martin-Miklovic, J. A. Weaver, S. J. Oryszak, N. L. Greenberg, R. D. White, and J. D. Thomas. Measurement of ventricular torsion by two-dimensional ultrasound speckle tracking imaging. *J Am Coll Cardiol* 45(12):2034-2041, 2005.

Notomi, Y., M. G. Martin-Miklovic, S. J. Oryszak, T. Shiota, D. Deserranno, Z. B. Popovic, M. J. Garcia, N. L. Greenberg, and J. D. Thomas. Enhanced ventricular

untwisting during exercise: A mechanistic manifestation of elastic recoil described by doppler tissue imaging. *Circulation* 113(21):2524-33, 2006.

Notomi Y, Popovic ZB, Yamada H, Wallick DW, Martin MG, Oryszak SJ, Shiota T, Greenberg NL, Thomas JD. Ventricular untwisting: A temporal link between left ventricular relaxation and suction. *Am J Physiol Heart Circ Physiol*. 2008 Jan;294(1):H505-13.

Notomi, Y., R. M. Setser, T. Shiota, M. G. Martin-Miklovic, J. A. Weaver, Z. B. Popovic, H. Yamada, N. L. Greenberg, R. D. White, and J. D. Thomas. Assessment of left ventricular torsional deformation by Doppler tissue imaging: Validation study with tagged magnetic resonance imaging. *Circulation* 111(9):1141-7, 2005.

Notomi, Y., G. Srinath, T. Shiota, M. G. Martin-Miklovic, L. Beachler, K. Howell, S. J. Oryszak, D. G. Deserranno, A. D. Freed, N. L. Greenberg, A. Younoszai, and J. D. Thomas. Maturational and adaptive modulation of left ventricular torsional biomechanics: Doppler tissue imaging observation from infancy to adulthood. *Circulation* 113(21):2534-41, 2006.

Nyhan, D., S. Kim, S. Dunbar, D. Li, A. Shoukas, and D. Berkowitz. Impaired pulmonary artery contractile responses in a rat model of microgravity: role of nitric oxide. *J Appl Physiol* 92(1):33-40, 2002.

Papadopoulos, A., and M. D. Delp. Effects of hindlimb unweighting on the mechanical and structure properties of the rat abdominal aorta. *J Appl Physiol* 94(2):439-445, 2003.

Popovic ZB, Benejam C, Bian J, Mal N, Drinko J, Lee K, Forudi F, Reeg R, Greenberg NL, Thomas JD, Penn MS. Speckle-tracking echocardiography correctly identifies segmental left ventricular dysfunction induced by scarring in a rat model of myocardial infarction. *Am J Physiol Heart Circ Physiol*. 2007 Jun;292(6):H2809-16.

Popovic ZB, Grimm RA, Ahmad A, Agler D, Favia M, Dan G, Lim P, Casas F, Greenberg NL, Thomas JD. Longitudinal rotation: An unrecognized motion pattern in patients with dilated cardiomyopathy. *Heart*. 2008 Mar;94(3):e11.

Popovic, Z. B., U. N. Khot, G. M. Novaro, F. Casas, N. L. Greenberg, M. J. Garcia, G. S. Francis, and J. D. Thomas. Effects of sodium nitroprusside in aortic stenosis associated with severe heart failure: pressure-volume loop analysis using a numerical model. *Am J Physiol Heart Circ Physiol* 288(1):H416-23, 2005.

Popovic, Z. B., K. E. Richards, N. L. Greenberg, A. Rovner, J. Drinko, Y. Cheng, M. S. Penn, K. Fukamachi, N. Mal, B. D. Levine, M. J. Garcia, and J. D. Thomas. Scaling of diastolic intraventricular pressure gradients is related to filling time duration. *Am J Physiol Heart Circ Physiol* 291(2):H762-9, 2006.

Popovic, Z. B., J. P. Sun, H. Yamada, J. Drinko, K. Mauer, N. L. Greenberg, Y. Cheng, C. S. Moravec, M. S. Penn, T. N. Mazgalev, and J. D. Thomas. Differences in left ventricular long-axis function from mice to humans follow allometric scaling to ventricular size. *J Physiol* 568(1):255-265, 2005.

Prisby, R. D., K. Wilkerson, E. M. Sokoya, R. M. Bryan, E. Wilson, and M.D. Delp. Endothelium-dependent vasodilation of cerebral arteries is altered with simulated microgravity through nitric oxide synthase and EDHF mechanisms. *J Appl Physiol* 101(1):348-53, 2006.

Puglisi, J. L., and D. M. Bers. LabHEART: an interactive computer model of rabbit ventricular myocyte ion channels and Ca transport. *Am J Physiol Cell Physiol* 281:C2049-C2060. 2001.

Qin, J. X., T. Shiota, C. R. Asher, N. G. Smedira, J. H. Shin, D. A. Agler, P. J. Nash, N. L. Greenberg, H. M. Lever, B. W. Lytle, and J. D. Thomas. Usefulness of real-time three-dimensional echocardiography for evaluation of myectomy in patients with hypertrophic cardiomyopathy. *Am J Cardiol* 94(7):964-6, 2004.

Qin, J. X., M. Jones, A. Travaglini, J-M. Song, J. Li, R. D. White, H. Tsujino, N. L. Greenberg, A. D. Zetts, J. A. Panza, J. D. Thomas, and T. Shiota. The accuracy of left ventricular mass determined by real-time three-dimensional echocardiography in chronic animal and clinical studies: A comparison with postmortem examination and magnetic resonance imaging. *J Am Soc Echocardiogr* 18(10):1037-43, 2005.

Qin, J. X., T. Shiota, H. M. Lever, C. R. Asher, Z. B. Popovic, N. L. Greenberg, D. A. Agler, J. K. Drinko, N. G. Smedira, E. M. Tuzcu, B. W. Lytle, and J. D. Thomas. Conduction system abnormalities in patients with obstructive hypertrophic cardiomyopathy following septal reduction interventions. *Am J Cardiol* 93(2):171-175, 2004.

Qin, J. X., T. Shiota, P. M. McCarthy, C. R. Asher, M. Hail, D. A. Agler, Z. B. Popovic, N. L. Greenberg, N. G. Smedira, R. C. Starling, J. B. Young, and J. D. Thomas. Importance of mitral valve repair associated with left ventricular reconstruction for patients with ischemic cardiomyopathy: a real-time three-dimensional echocardiographic study. *Circulation* 108(10 Suppl 1):II241-246, 2003.

Ramsdell, C. D., T. J. Mullen, G. H. Sundby, S. Rostoft, N. Sheynberg, N. Aljuri, M. Maa, R. Mukkamala, D. Sherman, K. Toska, J. Yelle, D. Bloomfield, G. H. Williams, and R. J. Cohen. Midodrine prevents orthostatic intolerance associated with simulated spaceflight. *J Appl Physiol* 90(6):2245-2248, 2001.

Ray, C. A. Melatonin attenuates the sympathetic nerve responses to orthostatic stress in humans. *J Physiol* 551(Pt 3):1043-1048, 2003.

Ray CA, Carter JR. Central modulation of exercise-induced muscle pain in humans. *J Physiol*. 2007 Nov 15;585(Pt 1):287-94.

Ray, C. A., and K. D. Monahan. Aging, opioid-receptor agonists and antagonists, and the vestibulosympathetic reflex in humans. *J App Physiol* 96:1761-1766, 2004.

Ray, C. A., and K. D. Monahan. The vestibulosympathetic reflex in humans: neural interactions between cardiovascular reflexes. *Clin Exp Pharmacol Physiol* 29(1-2):98-102, 2002.

Ray, C. A., M. Vasques, T. A. Miller, M. K. Wilkerson, and M. D. Delp. Effect of short-term microgravity and long-term hindlimb unloading on rat cardiac mass and function. *J Appl Physiol* 91(3):1207-1213, 2001.

Ray, C. A. and T. E. Wilson. Comparison of skin sympathetic nerve responses to isometric arm and leg exercises. *J App Physiol* 97:160-64, 2004.

Rice, J. J., and P. P. de Tombe. Approaches to modeling crossbridges and calcium-dependent activation in cardiac muscle. *Progress in Biophysics & Molecular Biology* 85:179-195, 2004.

Rice, J. J., G. Stolovitzky, Y. Tu, and P. P. de Tombe. Ising model of cardiac thin filament activation with nearest-neighbor cooperative interactions. *Biophys J* 84(2.1):897-909, 2003.

Rovner, A., N. L. Greenberg, J. D. Thomas, and M. J. Garcia. Relationship of diastolic intraventricular pressure gradients and aerobic capacity in patients with heart failure. *Am J Physiol Heart Circ Physiol* 289(5):H2081-8, 2005.

Rovner, A., R. Smith, N. L. Greenberg, E. M. Tuzcu, N. Smedira, H. M. Lever, J. D. Thomas, and M. J. Garcia. Improvement in diastolic intraventricular pressure gradients in patients with HOCM after ethanol septal reduction. *Am J Physiol Heart Circ Physiol* 285(6):H2492-H2499, 2003.

Ryoo S, Gupta G, Benjo A, Lim HK, Camara A, Sikka G, Lim HK, Sohi J, Santhanam L, Soucy K, Taday E, Baraban E, Ilies M, Gerstenblith G, Nyhan D, Shoukas A, Christianson DW, Alp NJ, Champion HC, Huso D, Berkowitz DE. Endothelial arginase II. A novel target for the treatment of atherosclerosis. *Circ Res.* 2008 Apr 25;102(8):923-32.

Ryoo S, Lemmon CA, Soucy KG, Gupta G, White AR, Nyhan D, Shoukas A, Romer LH, Berkowitz DE. Oxidized low-density lipoprotein-dependent endothelial arginase II activation contributes to impaired nitric oxide signaling. *Circ. Res.* 2006 Oct. 27;99(9):951-60.

Saeed, M., C. Lieu, G. Raber, and R. G. Mark. MIMIC II: a massive temporal ICU patient database to support research in intelligent patient monitoring. *Comput Cardiol* 29:641-644, 2002.

Samar, Z., T. Heldt, G. C. Verghese, and R. G. Mark. Model-based cardiovascular parameter estimation in the intensive care unit. *Comput Cardiol* 32: 635-638, 2005.

Santhanam L, Lim HK, Lim HK, Miriel V, Brown T, Patel M, Balanson S, Ryoo S, Anderson M, Irani K, Khanday F, Di Costanzo L, Nyhan D, Hare JM, Christianson D, Rivers R, Shoukas A, Berkowitz DE. iNOS-dependent S-nitrosylation and activation of

arginase contributes to age related endothelial dysfunction. *Circ Res.* 2007 Sep 28;101(7):692-702.

Saucerman, J. J., L. L. Brunton, A. P. Michailova, and A. D. McCulloch. Modeling β -adrenergic control of cardiac myocyte contractility in silico. *J Biol Chem* 278(48):47997-48003, 2003.

Saucerman, J. J., S. N. Healy, M. E. Belik, J. L. Puglisi, and A. D. McCulloch. Proarrhythmic consequences of a KCNQ1 AKAP-binding domain mutation: Computational models of whole cells and heterogeneous tissue. *Circ Res* 95(12):1216-24, 2004.

Saucerman, J. J., and A. D. McCulloch. Mechanistic systems models of cell signaling networks: a case study of myocyte adrenergic regulation. *Prog Biophys Mol Biol* 85(2-3):261-78, 2004.

Sauder CL, Conboy EE, Chin-Sang SA, Ray CA. Otolithic activation on visceral circulation in humans: effect of aging. *Am J Physiol Renal Physiol.* 2008 Oct;295(4):F1166-9.

Sauder CL, Leonard TO, Ray CA. Greater sensitivity of the vestibulosympathetic reflex in the upright posture in humans. *J Appl Physiol.* 2008 Jul;105(1):65-9.

Seminara AR, Ruvolo PP, Murad F. LPS/IFN γ -induced RAW 264.7 apoptosis is regulated by both nitric oxide-dependent and -independent pathways involving JNK and the Bcl-2 family. *Cell Cycle.* 2007 Jul 15;6(14):1772-8.

Shapiro, R., B. Winters, M. Hales, A. Barnett, D. A. Schwinn, N. Flavahan, and D. Berkowitz. Endogenous circulating sympatholytic factor in orthostatic intolerance. *Hypertension* 36(4):553-560, 2000.

Shibata S, Hastings JL, Prasad A, Fu Q, Okazaki K, Palmer MD, Zhang R, Levine BD. The "dynamic" Starling mechanism: Effects of ageing and physical fitness on ventricular-arterial coupling. *J Physiol.* 2008 Apr 1;586(7):1951-62.

Shibata S, Zhang R, Hastings J, Fu Q, Okazaki K, Iwasaki K, Levine BD. Cascade model of ventricular-arterial coupling and arterial-cardiac baroreflex function for cardiovascular variability in humans. *Am J Physiol Heart Circ Physiol.* 2006 Nov;291(5):H2142-2151.

Shim, E. B., H. Y. Chan, T. Heldt, R. D. Kamm, and R. G. Mark. Computational modeling of cardiovascular system after fontan procedure. *Lecture Notes in Computer Science* 2526:105-114, 2002.

Soucy KG, Lim HK, Benjo A, Santhanam L, Ryoo S, Shoukas AA, Vazquez ME, Berkowitz DE. Single exposure gamma-irradiation amplifies xanthine oxidase activity and induces endothelial dysfunction in rat aorta. *Radiat Environ Biophys.* 2007 Jun;46(2):179-86.

Soucy KG, Ryoo S, Benjo A, Lim HK, Gupta G, Sohi JS, Elser J, Aon MA, Nyhan D, Shoukas AA, Berkowitz DE. Impaired shear stress-induced nitric oxide production through decreased NOS phosphorylation contributes to age-related vascular stiffness. *J Appl Physiol*. 2006 Dec;101(6):1751-9.

Steppan, J., S. Ryoo, K. H. Schuleri, C. Gregg, R. K. Hasan, A. R. White, L. J. Bugaj, M. Khan, L. Santhanam, D. Nyhan, A. A. Shoukas, J. M. Hare, and D. E. Berkowitz. Arginase modulates myocardial contractility by a nitric oxide synthase 1-dependent mechanism. *Proc Natl Acad Sci U S A*. 2006 Mar 21;103(12):4759-64.

Sung, D., R. W. Mills, J. Schettler, S. M. Narayan, J. H. Omens, and A. D. McCulloch. Ventricular filling slows epicardial conduction and increases action potential duration in an optical mapping study of the isolated rabbit heart. *J Cardiovasc Electrophysiol* 14(7):739-749, 2003.

Thomas JD, Popovic ZB. Assessment of left ventricular function by cardiac ultrasound. *J Am Coll Cardiol* 2006 Nov 21;48(10):2012-25.

Townsend, S. A., A. S. Jung, Y. S. Hoe, R. Y. Lefkowitz, S. A. Khan, C. A. Lemmon, R. W. Harrison, K. Lee, L. A. Barouch, S. Cotecchia, A. A. Shoukas, D. Nyhan, J. M. Hare, and D. E. Berkowitz. Critical role for the alpha-1B adrenergic receptor at the sympathetic neuroeffector junction. *Hypertension* 44(5):776-82, 2005.

Tsujino, H., M. Jones, J. X. Qin, M. Sitges, L. A. Cardon, A. L. Morehead, A. D. Zetts, F. Bauer, Y. J. Kim, X. Y. Hang, N. Greenberg, J. D. Thomas, and T. Shiota. Combination of pulsed-wave Doppler and real-time three-dimensional color Doppler echocardiography for quantifying the stroke volume in the left ventricular outflow tract. *Ultrasound Med Biol* 30(11):1441-6, 2004.

Tuday EC, Meck JV, Nyhan D, Shoukas AA, Berkowitz DE. Microgravity induced changes in aortic stiffness and its role in orthostatic intolerance. *J Appl Physiol*. 2007 Mar;102(3):853-8.

Tuday EC, Nyhan D, Shoukas AA, Berkowitz DE. Simulated microgravity induced aortic remodeling. *J Appl Physiol*. 2009 Mar 19.

Usyk, T. P., and A. D. McCulloch. Electromechanical model of cardiac resynchronization in the dilated failing heart with left bundle branch block. *J Electrocardiol* 36 Suppl:57-61, 2003.

Usyk, T. P., and A. D. McCulloch. Relationship between regional shortening and asynchronous electrical activation in a three-dimensional model of ventricular electromechanics. *J Cardiovasc Electrophysiol* 14(10):S196-S202, 2003.

White, A. R., S. Ryoo, D. Li, H. C. Champion, J. Steppan, D. Wang, D. Nyhan, A. A. Shoukas, J. M. Hare, and D. E. Berkowitz. Knockdown of arginase I restores NO signaling in the vasculature of old rats. *Hypertension* 47(2):245-51, 2006.

Wilkerson, M. K., P. N. Colleran, and M. D. Delp. Acute and chronic head-down tail suspension diminishes cerebral perfusion in rats. *Am J Physiol Heart Circ Physiol* 282(1):H328-H334, 2002.

Wilkerson, M. K., L. A. Lesniewski, E. M. Golding, R. M. Bryan, A. Amin, E. Wilson, and M. D. Delp. Simulated microgravity enhances cerebral artery vasoconstriction and vascular resistance through an endothelial nitric oxide mechanism. *Am J Physiol Heart Circ Physiol* 288(4):H1652-61, 2005.

Wilkerson, M. K., J. Muller-Delp, P. N. Colleran, and M. D. Delp. Effects of hindlimb unloading on rat cerebral, splenic, and mesenteric resistance artery morphology. *J Appl Physiol* 87(6):2115-2121, 1999.

Wilson, T. E., D. J. Dyckman, and C. A. Ray. Determinants of skin sympathetic nerve responses to isometric exercise. *J Appl Physiol* 100(3):1043-8, 2006.

Wilson, T. E., N. T. Kuipers, E. A. McHugh, and C. A. Ray. Vestibular activation does not influence skin sympathetic nerve responses during whole body heating. *J Appl Physiol* 97:540-44, 2004.

Wilson, T. E., K. D. Monahan, D. S. Short, and C. A. Ray. Effect of age on cutaneous vasoconstrictor responses to norepinephrine in humans. *Am J Physiol Regul Integr Comp Physiol* 287:R1230-R1234, 2004.

Wilson, T. E., and C. A. Ray. Effect of thermal stress on the vestibulosympathetic reflex in humans. *J Appl Physiol* 97:1367-1370, 2004.

Wilson TE, Sauder CL, Kearney ML, Kuipers NT, Leuenberger UA, Monahan KD, Ray CA. Skin-surface cooling elicits peripheral and visceral vasoconstriction in humans. *J Appl Physiol*. 2007 Oct;103(4):1257-62.

Winters, B., X. Mo, E. Brooks-Asplund, S. Y. Kim, A. Shoukas, D. Nyhan, and D. E. Berkowitz. Reduction of obesity, as induced by leptin, reverses endothelial dysfunction in obese (*Lep^{ob}*) mice. *J Appl Physiol* 89(6):2382-2390, 2000.

Xiao, X., S. M. Grenon, C. Kim, N. Sheynberg, S. Hurwitz, G. H. Williams, and R. J. Cohen. Bed rest effects on human calf hemodynamics and orthostatic intolerance: a model-based analysis. *Aviat Space Environ Med* 76(11):1037-45, 2005.

Xiao, X., R. Mukkamala, and R. J. Cohen. A weighted-principal component regression method for the identification of physiologic systems. *IEEE Trans Biomed Eng* 53(8):1521-30, 2006.

Xiao, X., R. Mukkamala, N. Sheynberg, S. M. Grenon, M. D. Ehrman, T. J. Mullen, C. D. Ramsdell, G. H. Williams, and R. J. Cohen. Effects of simulated microgravity on closed-loop cardiovascular regulation and orthostatic intolerance: analysis by means of system identification. *J Appl Physiol* 96(2):489-497, 2004.

Xiao, X., R. Mukkamala, N. Sheynberg, G. H. Williams, and R. J. Cohen. Effects of prolonged bedrest on the total peripheral resistance baroreflex. *Comput Cardiol* 29:53-56, 2002.