

Jun. 20, 2008

CURRICULUM VITAE

Name: Wei Dong Gao
Position: Assistant Professor
Anesthesiology and Critical Care Medicine
Johns Hopkins University School of Medicine
Baltimore, MD 21205
Tel: 410-955-7519
Fax: 410-955-0994
e-mail: wgao3@jhmi.edu

1. Education and Training

3.1978 - 7.1982: Medicine, Harbin Medical University, China.
Bachelor of Medicine (MD)
9.1984 - 4.1987: Graduate School, Harbin Medical University, China.
5.1987 - 12.1991: Ph.D. (Cardiovascular Physiology), Department of Medical Sciences,
Graduate Studies, University of Calgary, Canada
17.12.1991: Ph.D. thesis defence "Cardiac Muscle Mechanics during Ischemia"
16.6.1992: Ph.D.-Diploma, University of Calgary
1.1992 - 9.1992: Research Fellow, Department of Medicine and Medical Physiology,
University of Calgary, Canada
9.1992 - 8.1995: Post-doctoral Research Fellow, Division of Cardiology, Department of
Medicine, Johns Hopkins University School of Medicine, USA
7.1997 - 6.1998: Resident, Internal Medicine, University Hospital, Cincinnati, OH.
7.1998 - 6.2001: Resident, Anaesthesiology, University Hospital, Cincinnati, OH.
9. 2001- 6.2002: Fellow, Cardiac Anaesthesia, Dept. of Anaesthesiology and Critical Care
Medicine, Johns Hopkins University School of Medicine, Baltimore, MD

2. Positions

7.1982 - 4.1987: Teaching assistant and lecturer(faculty), Department of
Medicine and Pathophysiology, Harbin Medical University, China
5.1987 - 12.1991: Research assistant, Department of Medicine and Medical Physiology,
University of Calgary, Canada
9.1995 - 6.1997: Research Associate, Section of Molecular and Cellular Cardiology,
Department of Medicine, Johns Hopkins University School of Medicine,
Baltimore, MD, USA
7.2002 - present: Assistant Professor, Dept. of Anaesthesiology and Critical Care Medicine,
Johns Hopkins University School of Medicine, Baltimore, MD, USA

3. Awards

7.1982: Triple-Excellency Student Award, Harbin Medical University, The
People's Republic of China
5.1987 - 5.1989: William H. Davis Scholarship for Medical Research, Graduate

- 9.1992 - 8.1994: Studies, University of Calgary, Canada
International Research Fellowship, American Heart Association. USA
- 7.2002 – 6.2004: Physician-Scientist Award, Johns Hopkins University School of Medicine, Baltimore, MD, USA

4. Teaching

- 8.1982 - 4.1987: Laboratory tutor of medical students, Department of Pathophysiology, Harbin Medical University, China
Lecturer, Course: Pathophysiology (Shock, Heart failure).
- 4.1987 - 6. 1992 Teaching assistant, Cardiovascular Research Group, University of Calgary, Alberta, Canada.
- 2.2002 CA1-CA2 Resident lecture: “Anesthesia Monitoring”, Johns Hopkins Hospital.
- 7.2002 CA1 Orientation (2 weeks), Johns Hopkins Hospital.
- 7.2003 CA1 Orientation (2 weeks), Johns Hopkins Hospital.
- 9.2002 – 3.2004 Resident lectures: “Systolic function of the heart”, “Myocardial stunning and anesthesia implications”, “Anesthesia management for patients with scleroderma having lung transplant”
- 4.2004 All Resident lecture: “Non conventional manifestations of cardiac ischemia and reperfusion”
- 7.2004 CA1 Orientation (2 weeks), Johns Hopkins Hospital.
- 9.2004 Resident lecture: “Myocardial Energetics”
- 7.2005 CA1 Orientation (2 weeks), Johns Hopkins Hospital.
- 1-6.2006 Resident lectures: “Cardio-pulmonary bypass”, “Monitoring in Cardiac Anesthesia”
- 7.2006 CA1 Orientation (2 weeks), Johns Hopkins Hospital.
- 1-6.2007 Resident lectures: “Scleroderma and anesthesia implications”
- 7.2007 CA1 Orientation (2 weeks), Johns Hopkins Hospital.
12. 2007 Resident lectures: “Conventional and non-conventional manifestations of cardiac ischemia”

5. Membership in Scientific Societies

- 1994-1995: Member, Biophysical Society, USA
- 1997-1998: Member, American College of Physicians
- 1997- 2004: Member, American Medical Association. Member of American Society of Anaesthesiology.
- 1997- present: Member of American Society of Anesthesiology
- 2002- present: Member of Maryland Society of Anesthesiologist,
Member, Maryland State Medical Society

6. Research Support

Completed in past 5 years

NIH/NHLBI 5 R01 HL44065-15 02/24/02-2/31/04

Cellular Mechanisms of Cardiac Contractile Dysfunction

Role: P.I.

The major goal of this project is to investigate the basic derangements of excitation-contraction coupling in stunned myocardium and failing myocardium.

Clinician Scientist Award 07/01/02-30/06/04

Johns Hopkin University School of Medicine

Mechanism of Force Augmentation by Allopurinol in Cardiac Muscle

Role: P.I.

The main goal involves investigating the mechanisms of force augmentation by allopurinol (an xanthine oxidase inhibitor) in cardiac muscle at cross bridge level. This project also seeks to characterize the interaction between pathways of NO synthesis and free oxygen radical generation by xanthine oxidase (XO) in physiological and pathophysiological states in cardiac muscle.

Current

NIH/NHLBI 2 NIH RO1 HL-65455 P.I. J Hare 08/15/2005-08/14/2010

Oxidative Stress in Heart Failure: Mechanisms and Manifestations

Role: Consultant

The major goal of this project is to explore the role of xanthine oxidase upregulation in the heart failure pathophysiology

NIH/NHLBI P01 HL 081427 P.I. O'Rourke 07/01/2005-06/30/2010

Mitochondrial Function in Ischemic Cardiac Disease

Role: Co-investigator, Project 1 Core D.

This PPG investigates, using molecular, computation, and proteomic methods, how mitochondrial function is remodeled during ischemia and reperfusion.

NIH/NHLBI R01 HL085487 P.I. B. McConnell 4/01/2007 -03/31/2012

Targeted Disruption of β -Adrenergic Signaling to Increase Cardiac Contractility

Role: Co-P.I.

This project investigate the AKAP regulation of PKA targeting in cardiac E-C coupling and its implication in heart failure.

AHA-GIA- 0855439E 07/01/2008-06/30/2010

Mechanism of Force Augmentation via Myofilament Protein Thiol Modification by Nitroxyl

Role: P.I.

This project investigates the molecular mechanism of force generation as a result of protein thiol modification by nitroxyl.

Pending

NIH R01, (Murphy, PI)

“Molecular Physiology of Myocardial Troponin I Variants”

Study utilizing transgenic and biochemical approaches to dissect physiology of TnI variants.

Role: Co-investigator

NIH R21

“Mechanism of enhancement of cardiac contractility by nitroxyl”

Studying the molecular mechanisms of increased cardiac contraction by nitroxyl (HNO) and test its application in an animal model of heart failure.

Role: P.I.

7. Journal Peer Reviewer

1993:	Cardiovascular Research
1994:	Journal of Molecular and Cellular Cardiology, Circulation Research
1995-2002:	Cardiovascular Research, Circulation Research, Circulation, Anaesthesiology
2003-2005:	Anaesthesiology, Cardiovascular Research, AJP (Heart & Circulation)
2006-present:	Circulation Research, Circulation, Cardiovascular Research, J Physiology, J App Physiology. Reg Peptide. J Eur Pharmaco. Anaesthesia & Analgesia

8a. Original Publications

1. Ma Liying, **Gao Wei Dong**, Wang Xiaoming, Liang Dianquan, Zhang Guoyi, and Li Hui. The role of lipid peroxidation and high energy phosphate in ischemia/reperfusion damage: effect of Danshen on the protection of the ischemic and reperfused myocardium. *Chinese Journal of Pathophysiology*.(in Chinese) 5:212-217, 1989.
2. Leijendekker, W. J., **W.D. Gao**, and H. E. D. J. ter Keurs. Unstimulated force during hypoxia of rat cardiac muscle: stiffness and calcium dependency. *Am J Physiol* 258:H861-869, 1990.
3. ter Keurs, H. E. D. J., **W.D. Gao**, H. Bosker, A. Drake-Holland and M. I. M. Noble. Characterization of the decay of frequency Induced potentiation and post-extrasystolic potentiation. *Cardiovas Res.* 24:903-910, 1990.
4. Banijamali, H.S., **W.D. Gao**, B. Mactutosh, and H.E.D.J. ter Keurs. Force-interval relations of twitches and cold contractures in rat cardiac trabeculae. effect of ryanodine. *Circ Res.* 69:937-949, 1991.
5. ter Keurs, H.E.D.J., P. H. Backx, H. Banijamali, B. MacIntosh, **W. D. Gao**. Calcium release and force development in rat myocardium. In *Excitation-Contraction Coupling in Skeletal, Cardiac and Smooth Muscle*. Eds. GB Frank, C Bianchi and HEDJ ter Keurs. *Adv Exp Med Biol.* 311:199-212, 1992.
6. Backx, P.H., **W.D. Gao**, M.D. Azan-Backx, and E Marban. Regulation of Intracellular Calcium in Cardiac Muscle. in *Interactive Phenomena in the Cardiac System*. eds. S Sideman and R Beyer, *Adv Exp Med Biol.* 346:3-10. (Plenum Pub. Corp, New York) 1993.

7. Backx, P.H., **W.D. Gao**, M.D. Azan-Backx, and E Marban. Mechanism of force inhibition by 2,3-Butanedione Monoxiime in Rat Cardiac Muscle: Role of Intracellular Calcium and Cross-bridge Kinetics. *J Physiol.* 476:487-500, 1994).
8. **Gao, W.D.**, P.H. Backx, M.D. Azan-Backx, and E Marban. Myofilament Ca^{2+} sensitivity in intact versus skinned rat ventricular muscle. *Circ Res.* 74:408-415, 1994.
9. Backx, P.H., **W.D. Gao**, M.D. Azan-Backx, and E Marban. The relationship between contractile force and intracellular $[Ca^{2+}]_i$ in intact rat cardiac trabeculae. *J Gen Physiol.* 105:1-19, 1995.
10. Atar, D., P.H. Backx, M. Appel, **W.D. Gao**, and E. Marban. Excitation-transcription coupling mediated by zinc influx through voltage-dependent calcium channels. *J Bio Chem*, 270(6):2473-2477, 1995.
11. Atar, D., **W.D. Gao**, E. Marban. Alterations of excitation-contraction coupling in stunned myocardium and in failing myocardium. *J Mol Cell Cardiol*, 27:783-791, 1995.
12. **Gao, W.D.**, D. Atar, P.H. Backx, and E. Marban. Relationship between intracellular calcium and contractile force in stunned myocardium: Direct evidence for decreases myofilament Ca^{2+} responsiveness and altered diastolic function in intact ventricular muscle. *Circ Res.* 76:1036-1048, 1995
13. Marban, E. and **W.D. Gao**. Stunned myocardium: a disease of the myofilaments? *Basic Res Cardiol.* 90:269-272, 1995.
14. **Gao, W.D.**, Y. Liu, R Mellgren and E. Marban. Intrinsic myofilaments alterations underlying the decreased contractility of stunned myocardium: A consequence of calcium-dependent proteolysis? *Circ Res.* 78:455-465, 1996.
15. Liu, Y., **W.D. Gao**, B. O'Rourke, and E. Marban. Synergistic potentiation of ATP-sensitive potassium currents by protein kinase C and adenosine: Implications for ischemic preconditioning. *Circ Res.* 78:443-454, 1996.
16. **Gao, W.D.**, Y. Liu and E. Marban. Selective effects of oxygen free radicals on excitation-contraction coupling in ventricular muscle: Implications for the mechanism of stunned myocardium. *Circulation* 94:2597-2604, 1996.
17. Liu, Y., **W.D. Gao**, B. O'Rourke, and E Marban. Cell-type specificity of preconditioning in an in vitro model. *Basic Res Cardiol.* 91:450-457, 1996.
18. Tang, L., **W.D. Gao**, and P.B. Taylor. Force-frequency response in isoproterenol-induced hypertrophied rat heart. *Eur J Pharma.* 318:349-356, 1996.
19. **Gao, W.D.**, D. Atar, Y. Liu, N.G Perez, A.M. Murphy, and E. Marban. Role of Troponin I proteolysis in the pathogenesis of myocardial stunning. *Circ Res.* 80:393-399, 1997.
20. Liu, Y., **W.D. Gao**, B. O'Rourke, and E. Marban. Protein kinase C and adenosine synergistically activate ATP-sensitive potassium currents: Implications for ischemic

preconditioning. (Book Chapter, 1997,).

21. Liu, Y., **W.D. Gao**, B. O'Rourke, and E Marban. Priming effect of adenosine on K_{ATP} currents in intact ventricular myocytes: implications for preconditioning. *Am J Physiol.* 273: H1637-H1643.
22. **Gao, W.D.**, N.G.Perez, E. Marban. Calcium Cycling and Contractile Activation in Intact Mouse Cardiac Muscle. *J Physiol.* 507:175-184, 1998.
23. Wier, W.G., H.E.D.J. ter Keurs, E. Marban, **W.D. Gao**, C.W. Balke. Calcium 'sparks' and waves in intact ventricular muscle resolved by confocal imaging. *Circ Res.* 81:462-469, 1997
24. Perez, N.G., **W.D. Gao** and E.Marban. Novel myofilament calcium-sensitizing property of xanthine oxidase inhibitors. *Circ Res.* 83:423-430, 1998.
25. **Gao, W.D.**, N.G. Perez, C. Seidman, J, Seidman and E. Marban. Altered cardiac excitation-contraction coupling in cardiac muscle from mutant mice with familial hypertrophic cardiomyopathy. *J Clin Invest.* 103:661-666, 1999.
26. **Gao, WD.**, E. Marban. Myocardial stunning and preconditioning: clinical implications. In *Perioperative Care of Cardiopulmonary Comprised Patients*. Eds L Flesher and DS Prough, 13(2):pp172-180, 2001.
27. Stull, L.B., M.K. Leppo, L. Szweda, **W.D. Gao** and E. Marban. Chronic Treatment with Allopurinol Boosts Survival and Cardiac Contractility in Murine Postischemic Cardiomyopathy. *Circ Res.* 95:1005-1011, 2004.
28. **Gao, W.D.**, T. Dai, and D. Nyhan. Increased cross-bridge cycling rate in stunned myocardium. *Am J Physiol.* 290:H886-H893, 2006.
29. Bilchick, K., J. G. Duncan, R, Ravi, E. Takimoto, H. C. Champion, **W.D. Gao**, L.S. Stull, D.A. Kass, A.M. Murphy. Heart failure-associated alterations in troponin I phosphorylation impair left ventricular relaxation response to afterload, force-frequency response and systolic function. *Am J Pysiol.* 292:H318-325, 2007.
30. Dai, T., G. Ramirez-Correa, **W. D. Gao**. Apelin increases contractility in failing cardiac muscle. *Br J Pharma.* 553:222-228, 2006.
31. Tocchetti, Carlo G., W. Wang, J. P. Froehlich, S. Huke, M.A. Aon, G. M. Wilson, G. Di Benedetto, B. O' Rourke, **W. D.Gao**, D. A. Wink, J. P. Toscano, M. Zaccolo, D. M. Bers, H. H. Valdivia, H. Cheng, D. A. Kass and N. Paolocci. Nitroxyl (HNO) directly enhances cardiac sarcoplasmic reticulum Ca^{2+} cycling to improve heart function. *Circ Res.* 100:96-104, 2006.
32. Dai, T., Y. Tian, C. G. Tocchetti, T. Katori, D. Kass, N. Paolocci, **W. D. Gao**. Nitroxyl Anion (HNO/NO^-) Increases Myofilament Ca^{2+} Responsiveness in Rat Cardiac Muscle. *J Physiol.* 580(3): 951-960, 2007
33. **Gao, W.D.** and A. M. Murphy. Local Control in Thin Filament Activation of Cardiac Muscle. *J Physiol* 580(Pt. 2):358, 2007

8b. Abstracts:

1. Leijendekker, W.J., **W.D. Gao**, and H.E.D.J. ter Keurs. The role of calcium in the development of diastolic force during hypoxia in rat myocardium. in "Muscle Energetics", (eds) Richard Paul, Alan Liss Inc., New York, pp 604-605, 1988.
2. Leijendekker, W.J., **W.D. Gao** and H.E.D.J. ter Keurs. Energy deprivation related to contracture and spontaneous activity. *Circulation (suppl II)* 78:641, 1988.
3. **Gao, W.D.**, W.J. Leijendekker, and H.E.D.J. ter Keurs. Effect of glycolysis inhibition on rat myocardium during hypoxia. Proceedings of The Annual Meeting of Canadian Biological Federation, Calgary, AB, 1989.
4. Leijendekker, W.J., **W.D. Gao**, and H.E.D.J. ter Keurs. Spontaneous sarcomere activity during hypoxia and reoxygenation. Proceedings of The Annual Meeting of Canadian Biological Federation, Calgary, AB, 1989.
5. **Gao, W.D.**, W.J. Leijendekker, and H.E.D.J. ter Keurs. Protection of rat myocardium by free oxygen radical scavengers during hypoxia and reoxygenation. Proceedings of Annual Meeting of Western Pharmacological Society, Banff, AB, 33:277, 1990.
6. Banijamali, H.S., **W.D. Gao**, and H.E.D.J. ter Keurs. Induction of calcium from the sarcoplasmic of rat cardiac trabeculae by ryanodine. *Circulation (suppl III)* 82:215, 1990.
7. **Gao, W.D.**, and H.E.D.J. ter Keurs. Determinants of ATP depletion during metabolic inhibition of rat cardiac muscle. *Can J Cardiol.* 7(suppl A):103A, 1991.
8. Blans, M.J., **W.D. Gao**, and H.E.D.J. ter Keurs. Inotropic effects of ouabaine in rat cardiac trabeculae. *Can J Cardiol.* 7(suppl A):82A, 1991.
9. **Gao, W.D.**, and H.E.D.J. ter Keurs. Determinants of ATP depletion during metabolic inhibition of rat cardiac trabeculae. *Circ.* 84(suppl II): II-93, 1991.
10. **Gao, W.D.**, P.H. Backx, M.D. Azan-Backx, and E Marban. Calcium sensitivity of the myofilament is altered by skinning: direct comparison of intact versus skinned rat ventricular muscle. *Circulation (Suppl to vol. 88 No 4 pt 2)*:I-136, 1993.
11. **Gao, W.D.**, P.H. Backx, R. Mellgren, and E Marban. Calcium-activated proteolysis alters Ca^{2+} -sensitivity of the contractile proteins: implications for stunned myocardium. *Circulation (Suppl to vol. 88 No 4 pt 2)*:I-187, 1993.
12. Atar, D., **W.D. Gao** and E. Marban. Decreased myofilament Ca^{2+} responsiveness in stunned myocardium revealed by direct measurements of $[Ca^{2+}]_i$ and force. *J Mol Cell Cardiol.* 26:CXIII (A-470), 1994.
13. Atar, D., **W.D. Gao**, M.M. Appel. P.H. Backx, and E. Marban. Excitation-transcription coupling mediated by zinc influx through voltage-dependent calcium channels. *J Mol Cell Cardiol.* 26:XLIX (A-149), 1994.

14. **Gao, W.D.**, P.H. Backx, and E. Marban. Myofilament Ca^{2+} sensitivity in intact versus skinned rat ventricular muscle. *Biophysical J.* 66(2):A132, 1994.
15. Zhang, Y., **W.D. Gao**, and H.E.D.J. ter Keurs. Effect of R58865 on the rate of rigor development during metabolic inhibition in rat cardiac trabeculae. *Biophysical J.* 66(2):A316, 1994.
16. Atar, D., **W.D. Gao**, P.H. Backx, A.M. Murphy, and E. Marban. Immunoblot analysis of stunned myocardium reveals structural alterations of the myofilaments predicted by modelling of cross-bridge kinetics. *Circulation* 90:I-646, 1994
17. Atar, D., **W.D. Gao**, and E. Marban. Accelerated diastolic relaxation and increased Ca^{2+} -dependent diastolic tone in stunned myocardium. *Circulation* 90:I-646, 1994
18. **Gao, W.D.**, D. Atar, P.H. Backx, and E. Marban. Direct measurement of the Ca^{2+} responsiveness of the contractile proteins in intact stunned myocardium. *Circulation* 90:I-646, 1994
19. **Gao, W.D.**, D. Atar, Y. Liu, A.M. Murphy, and E. Marban. Degradation of troponin I in ischemic/reperfused myocardium: Molecular basis of myocardial stunning? *Biophysical J.* 68:A112, 1995.
20. **Gao, W.D.**, Y. Liu, and E. Marban. Mechanism of decreased myofilament Ca^{2+} responsiveness in stunned myocardium: Relative roles of soluble versus structural factors. *Circulation* 92:I-187, 1995.
21. Liu, Y, **W.D. Gao**, B. O'Rourke, E. Marban. Synergistic potential of ATP-sensitive potassium current by protein kinase C and adenosine: Implications for ischemic preconditioning. *Circulation* 92:I-251, 1995.
22. Liu, Y., **W.D. Gao**, B. O'Rourke, E. Marban. Protein kinase C and adenosine synergistically potentiate the opening of ATP-sensitive K^+ channels during metabolic inhibition: Implications for ischemic preconditioning. *Biophys J* 70:A261, 1996.
23. **Gao, W.D.**, Y. Liu, E. Marban. Selective effects of oxygen free radicals on excitation-contraction coupling in ventricular muscle. *Circulation* 94:I-185, 1996
24. Liu, Y, **W.D. Gao**, B. O'Rourke, E. Marban. Priming of ATP-sensitive potassium channels by adenosine in intact ventricular myocytes: implications for ischemic preconditioning. *Circulation* 94:I-425, 1996.
25. Liu, Y, **W.D. Gao**, B. O'Rourke, E. Marban. Cell-type specificity of preconditioning in an in vitro model. *Circulation* 94:I-549, 1996.
26. Wier, W.G., H.E.D.J. ter Keurs, E. Marban, **W.D. Gao**, C.W. Balke. Ca^{2+} sparks and Ca^{2+} waves in intact ventricular muscle resolved by confocal imaging. *Circulation* 94:I-158, 1996.
27. Stull, L.S., P.M.L. Janssen, **W.D. Gao**, E. Marban. Mechanism of enhancement of cardiac-calcium activated force by allopurinol. *Biophys. J.* (annual Meeting Abstract) 2002:71a.

28. **Gao, W.D.**, L. Stull, M. Leppo, E. Marban. Cross bridge cycling in stunned myocardium. (Scientific Sessions of AHA, 2003).
29. Dai, T., C.G. Tocchetti, T. Katori, N. Paolocci, **W. D. Gao**. Increased Ca^{2+} responsiveness by HNO/NO⁻ in Cardiac Muscle. (Scientific Sessions of AHA, 2005).
30. Dai, T., G. Tamirez-Correa, **W.D. Gao**. Apelin disproportionately increases contraction in failing cardiac muscle. (Scientific Sessions of AHA, 2005).
31. Tian, Y., X. Sha, B. King, G. Cormaci, C.G. Tocchetti, D.A. Kass, N. Paolocci, **W.G. Gao**. Pure HNO donors increase myofilament Ca^{2+} responsiveness in cardiac muscle. (ACC 2007).