Chih-Wen Ni, Ph.D.

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Research Description

Vascular development, remodeling, and angiogenesis in Zebrafish

I am interested in the effects of mechanical force on cardiovascular diseases (CVD). Specifically, shear stress generated from blood flow plays an important role in the physiological or pathological function of endothelial cells. Disturbed blood flow resulting in low and oscillatory shear stress leads to atherosclerosis and affects the progression of angiogenesis (new vessel formation). The ultimate goal is to understand critical mechanisms, which cause CVD and subsequently identify essential genes that will serve as major targets for drug discovery. Currently, I am utilizing Zebrafish as an animal model to screen vascular deficits associated with specific genes, and try to provide insights into the vascular development, remodeling and angiogenesis controlled by mechanical forces in zebrafish. In addition, I am also interested in the development of an automated high-throughput system, which utilized zebrafish embryos as a platform for drug screening in respect to angiogenesis.

Education

Ph.D. 2010 Bioengineering, Wallace H. Coulter Department of Biomedical Engineering, Georgia Institute of Technology and Emory University.
Dissertation: *Discovery of Mechanosensitive miRNA and mRNA in mouse carotid endothelium and in culture endothelial cells*
Advisor: Hanjoong Jo, Ph.D.

M.S. 2000 Department of Chemical Engineering, National Taiwan University, Taiwan.
Advisor: Hsyue-Jen Hsieh, Ph.D.
Co-Advisor: Danny Ling Wang, Ph.D.

B.S. 1998 Department of Chemical Engineering, National Taiwan University, Taiwan.

Awards and Membership

- Regular member, American Heart Association, since 2011
- Student member, American Heart Association, 2010
- Regular member, American Physiology Society, since 2011
- Student member, American Physiology Society, 2005-2010
- Honorary member, The Phi Tau Phi Scholastic Honor Society of The Republic of China, 1998
- Presidential Award, issued by National Taiwan University, 1994-1998
- International travel awards, supported by the Institute of Biomedical Sciences, Academia, Sinica, 2004
- Travel Award, The 79th Annual Scientific Meeting of the Japan Circulation Society, 2015
- Travel Award, The 80th Annual Scientific Meeting of the Japan Circulation Society, 2016

Positions/Employment

01/2017 – present *Assistant Professor*
Bioengineering unit, School of Engineering
UC Merced

10/2013 – 12/2016 *Assistant Professor*
Department of Biomedical Engineering
Khalifa University
Abu Dhabi, UAE

09/2010 – 09/2013 *Postdoctoral Associate*
Program in Gene Function and Expression, University of Massachusetts Medical School (Mentor: Nathan D. Lawson, Ph.D.)

08/2005 – 08/2010 *Ph.D. Student, Graduate Research Assistant*
Wallace H. Coulter Department of Biomedical Engineering, Georgia Institute of Technology (Advisor: Hanjoong Jo, Ph.D.)

09/2001 – 06/2005 *Adjunct Instructor*
Center of General Studies, Kang-Ning Junior College of Medical Care and Management, Taipei, Taiwan

10/2000 – 06/2005 *Research Specialist*
Cardiovascular Division, Institute of Biomedical Sciences, Academia Sinica, Taiwan (Mentor: Danny L. Wang, Ph,D.)

09/1998 - 06/2000 *M.S. Student, Graduate Research Assistant*

Department of Chemical Engineering, National Taiwan University, Taipei, Taiwan (Advisor: Hsyue-Jen Hsieh, Ph.D.)

Teaching Experiences

1. **Genetic Engineering**, *undergraduate level* 2017 Spring
   Instructor
2. **Calculus**, *undergraduate level* 2001-2005
   Instructor
3. **Biomedical Transport Phenomena**, *undergraduate level* 2013 to 2016
   Instructor
4. **Physiological Systems and Modeling I**, *undergraduate level* 2014 to 2016
   Instructor
5. **Biomedical Engineering Fundamentals**, *undergraduate level* 2014 to 2016
   Instructor
6. **Molecular and Cell Physiology II and lab**, *undergraduate level* 2014 to 2016
   Instructor
7. **Molecular and Cellular Engineering**, *graduate level* 2016 Spring
   Instructor- *the module of Genetic Engineering*

Peer-Reviewed Publications

Journal Papers:

1. Shmukler, BE., Huston, NC., Thon, JN., **Ni, CW**., Kourkoulis, G., Lawson, ND., Paw, BH., Alper SL., Homozygous knockout of the piezo1 gene in the zebrafish is not associated with anemia. ***Haematologica***, haematol.132449 (2015)

2. Butko, E., Distel, M., Pouget, C., Weijts, B., Kobayashi, I., Ng, K., Mosimann, C., Poulain, FE., McPherson, A., **Ni, CW**., Stachura, DL., Del, Cid N., Espín-Palazón, R., Lawson, ND., Dorsky, R., Clements, WK., Traver, D. "Gata2b is a restricted early regulator of hemogenic endothelium in the zebrafish embryo" ***Development***. 2015 142(6):1050-61 (2015)

3. *Kok, F.O., *Shin, M. ****Ni, CW.***, Gupta, A., Grosse, AS., van Impel, A.,Kirchmaier, BC., Peterson-Maduro, J., Kourkoulis, G., Male, I., DeSantis, D.F., Sheppard-Tindell, S.,Ebarasi, L., Betsholtz, C.,Schulte-Merker, S., Wolfe, S. A.,and Lawson, N. D. "Reverse genetic screening reveals poor correlation between morpholino-induced and mutant phenotypes in zebrafish." ***Dev Cell***. 2;32(1):97-108. (2015) (*equal-contribution)

4. Kumar, S., Kim, CW., Son, DJ., **Ni, CW.,** and Jo, H. "Flow-dependent regulation of genome-wide mRNA and microRNA expression in endothelial cells in vivo." ***Scientific Data*** 1, 140039 (2014)

5. **Ni, CW.,** Kumar, S., Ankeny, CJ., and Jo, H., "Development of immortalized mouse aortic endothelial cell lines." ***Vasc. Cell.*** 1:6(1):7 (2014)

6. Son, DJ., Kumar, S., Takabe, W., Kim CW., **Ni, CW**., Alberts-Grill, N., Jang, IH., Kim, S., Kim, W., Kang SW., Baker, AH., Seo JW, Ferrara, KW., Jo, H. "The atypical mechanosensitive microRNA-712 derived from pre-ribosomal RNA induces endothelial inflammation and atherosclerosis." ***Nat. Commun***. 18;4:3000. doi: 10.1038/ncomms4000 (2013)

7. Fazeli, G., Stopper, H., Schinzel, R., **Ni, CW.**, Jo, H., Schupp, N. "Angiotensin II induces DNA damage via AT1 receptor and NADPH oxidase isoform Nox4 "***Mutagenesis***. 27(6):673-81 (2012)

8. **Ni, CW**., Qiu, H., Jo, H. „MicroRNA-663 upregulated by oscillatory shear stress plays a role in inflammatory response of endothelial cells." ***Am. J. Physiol. Heart Circ. Physiol.*** 300(5):H1762-9 (2011)

9. Rezvan A., **Ni, CW**., Alberts-Grill N., Jo, H. "Animal, in vitro, and ex vivo models of flow-dependent atherosclerosis: Role of oxidative stress." ***Antioxid. Redox. Signal.*** 1;15(5):1433-48. (2011) (*review article*)

10. **Ni, CW**., Qiu, H., Rezvan A., Kwon, K., Nam, D, Son, D, Visvader, JE., Jo, H. "Discovery of novel mechanosensitive genes *in vivo* using mouse carotid artery endothelium exposed to disturbed flow." ***Blood.*** 116(15):e66-e73.(2010) Editorial commentary: Hamik, A., Jain, MK., "Shear stress: devil's in the details." ***Blood.*** 116(15):2625-6. (2010)

11. Kim, J., Ahn, S., Ko, YK., Boo, Y., Chi, SG., **Ni, CW**., Go, YM., Jo, H., Park, H. "X-linked inhibitor of apoptosis protein controls integrin {alpha}5-mediated cell adhesion and migration." ***Am. J. Physiol. Heart Circ. Physiol.*** 299(2):H300-9 (2010)

12. *Nam, D., ***Ni, CW**., *Rezvan, A., Suo, J., Budzyn, K., Llanos, A., Harrison, D., Giddens, D., Jo, H. "A Model of Disturbed Flow-Induced Atherosclerosis in Mouse Carotid Artery by Partial Ligation and a Simple Method of RNA Isolation from Carotid Endothelium." ***J. Vis. Exp***. Jun 22;(40). pii: 1861. doi: 10.3791/1861 (2010) (*equal-contribution)

13. Rhee, WJ., **Ni, CW**., Zheng, Z., Chang, K., Jo, H., Bao G. "HuR regulates the expression of stress-sensitive genes and mediates inflammatory response in human umbilical vein endothelial cells." ***Proc. Natl. Acad. Sci. U S A*** *13;107(15):6858-63 (2010).*

14. Bond, AR., **Ni, CW**., Jo, H., Weinberg, PD. "Intimal cushions and endothelial nuclear elongation around mouse aortic branches and their spatial correspondence with patterns of lipid deposition." ***Am. J. Physiol. Heart Circ. Physiol.*** 298(2):H536-44 (2010)

15. *Nam, D , ***Ni, CW**., Rezvan, A., Suo, J., Budzyn, K., Llanos, A., Harrison, D., Giddens, D., Jo, H. "Partial carotid ligation is a model of acutely induced disturbed flow, leading to rapid endothelial dysfunction and atherosclerosis." ***Am. J. Physiol. Heart Circ. Physiol.*** 297(4):H1535-43. (2009) (*equal-contribution)

16. Tressel, SL., Kim, H., **Ni, CW**., Chang, K., Velasquez-Castano, JC., Taylor, WR., Yoon, YS., Jo, H. "Angiopoietin-2 stimulates blood flow recovery after femoral artery occlusion by inducing inflammation and arteriogenesis." ***Arterioscler. Thromb. Vasc. Biol.*** 28(11):1989-95. (2008)

17. Tsai, YC., Hsieh, HJ., Liao, F., **Ni, CW**., Chao, YJ., Hsieh, CY., and Wang, DL."Laminar flow attenuates interferon-induced inflammatory responses in endothelial cells." ***Cardiovasc. Res.*** 1;74(3):497-505 (2007)

18. Wung, BS., **Ni, CW**., and Wang, DL. "ICAM-1 Induction by TNF-alpha and IL-6 is Mediated by Distinct Pathway via Rac in Endothelial Cells." ***J. Biomed. Sci.*** 12(1):91-101 (2005)

19. **Ni, CW.**, Hsieh, HJ., Chao, YJ., and Wang, DL. "Interleukin-6-Induced JAK2/STAT3 Signaling Pathway in Endothelial Cells is Suppressed by Hemodynamic Flow." ***Am. J. Physiol. Cell Physiol.*** 287, C771-C780. (2004)

20. **Ni, CW.**, Hsieh, HJ., Chao, YJ., and Wang, DL. "Shear Flow Attenuates Serum-induced STAT3 Activation in Endothelial Cells." ***J. Biol. Chem.*** 278, 19702-19708. (2003)

21. **Ni, CW.**, Wang, DL., Lien, SC., Cheng, JJ., Chao, YJ., and Hsieh, HJ. "Activation of PKC-epsilon and ERK1/2 participates in shear-induced endothelial MCP-1 expression that is repressed by nitric oxide." ***J. Cell. Physiol.*** 195, 428-434. (2003)

22. **Ni, CW.** and Hsieh, HJ. "A Comparison of Gene Transfection Methods for Mammalian Cells." ***J. Chin. Colloid & Interface Soc.*** 21, 121-130 (1998). Chinese

Conference Abstracts

1. **NI, CW.,** Kim, CW., Jang, I., Jo, H., and Lawson, ND. "Ramp2 is a Novel Flow-sensitive Gene both in vitro and in vivo" *Arterioscler Thromb Vasc Biol* 35: A234 (2015)
2. **Ni, CW.,** Smith, T., Lawson, ND., "Lacking Gata2 in Endothelial Cells Induces Apoptosis During Vascular Development" *Arterioscler Thromb Vasc Biol* 34: A174 (2014)

3. Kanthi, Y.,, Hyman, M., Liao, H., Baek, A., Visovatti, S., Sutton, N., Takabe, W., **Ni, CW.,** Jo, H., Pinsky, D., "Concurrent Session I C: Molecular and Cellular Biology of the Vessel Wall" *Arterioscler Thromb Vasc Biol* 34: A13 (2014)
4. Kumar, S., Son, DJ ., Takabe, W., Kim, CW., **Ni, CW.,** Alberts-Grill, N., Kim, SO., Kim, WK., Seo, JW., Ferrara, K., Jo, H ., "Inhibition of Mechanosensitive MicroRNA, mir-712 Decreases Endothelial Dysfunction and Atherosclerosis" *Circulation* 128(22):A15696 (2013)
5. Takabe, W. **Ni, CW**., Son, D., Alberts-Grill N., Jo, H. Lim Domain Only 4 is a Shear-Sensitive Protein, Playing a Critical Role in Endothelial Inflammation and Atherosclerosis. *Arterioscler Thromb Vasc Biol.* 32(5):A363 (2012)
6. **Ni, CW**., Qiu, H., Rezvan A., Kwon, K., Nam, D., Son, D., Jo, H.
   Core 7. Vascular Disease: Biology and Clinical Science
   Session Title: Russell Ross Memorial Lectureship in Vascular Biology: Emerging Concepts in Vascular Disease
   Abstract 10348: Discovery of Novel Mechanosensitive mRNA and miRNA in Vivo Using Mouse Carotid Artery Endothelium Exposed to Disturbed Flow. *Circulation.* 122(21):A10348 (2010)
7. **Ni, CW**., Qiu, H., Rezvan A., Kwon, K., Nam, D, Jo, H. Discovery of Mechanosensitive Genes by Genomewide Microarray Analysis Using Endothelial RNA from Mouse Carotid Exposed to Disturbed Flow in Vivo. *Arterioscler Thromb Vasc Biol.* 30(11):E291-E291 (2010)
8. **Ni, CW**., Jo, H. Identification of Shear-Sensitive miRNAs in Endothelial Cells: Role of mir-663 in Monocyte Adhesion Response. *Arterioscler Thromb Vasc Biol.* 30(11):E224-E224 (2010)
9. Nam, D., **Ni, CW**., Rezvan, A., Jo, H. Partial Ligation of Carotid Artery Induces Flow Reduction and Reversal, Causing Rapid Atherosclerosis Development in a NADPH Oxidase-Dependent Manner. *Arterioscler Thromb Vasc Biol.* 29(7):E39-E40. (2009)
10. Tressel, S., **Ni, CW**., Jo, H. Angiopoietin-2 Stimulates Blood Flow Recovery After Femoral Artery Occlusion by Inducing Inflammation and Arteriogenesis *Arterioscler Thromb Vasc Biol.* 29(7):E93-E93. (2009)
11. Hyman, MC., **Ni, CW**., Visovatti, SH., Nam D., Neral MK., Jo H., Pinsky DJ., Regulation OF Entpdase1 (CD39) Expression by Fluid-phase Shear Forces. *Circulation.* 118(18):S409-S409 (2008)
12. Wang, DL., Hsieh, HJ., **Ni, CW.,** Shear stress attenuating IL-6-induced STAT3 activation is mediated by phosphatase SHP2 in endothelial cells, *FASEB JOURNAL* 19 (4): A720-A720 Part 1 Suppl. S MAR 4 (2005)
13. Wang, DL., **Ni, CW.**, Shear flow inhibits the serum-induced STAT3 Activation in endothelial cells. *FASEB JOURNAL* 17 (5): A1242-A1243 Part 2 Suppl. S MAR 17 (2003)
14. **Ni, CW.**, Wang, DL, IL-6-induced STAT3 activity is suppressing by shear flow via Src-homology tyrosine phosphatase-2 (SHP-2) in endothelial cells *FASEB JOURNAL* 17 (5): A1247-A1247 Part 2 Suppl. S MAR 17 (2003)
15. **Ni, CW.**, Lien, SC., Hsieh, HJ., and Wang, DL. Nitric oxide (NO) inhibiting shear stress-induced MCP-1 expression in endothelial cells (ECs) involves PKC epsilon and ERK1/2 pathway. *FASEB JOURNAL* 16 (4): A439-A439 Part 1 MAR 20 (2002)

Research Support

On Going Research Support

Khalifa Internal Research Funds Level 1 (PI. Chih-Wen Ni) 1/1/16 – 12/31/16
Khalifa University, Abu Dhabi UAE **AED 200,000 (~55,000 USD)**
Determining Vascular Functions of Novel Flow-Sensitive Genes Using Reverse Genetic Screening in Zebrafish.

Al Jalila Foundation Seed Grant (PI. Chih-Wen Ni) 1/1/15 – 12/31/16
Al Jalila Foundation, Dubai UAE **AED 300,000 (~82,500 USD)**
The Mechanism of vascular remodeling by blood flow in zebrafish

Complete Research Support

Khalifa Internal Research Funds Level 1 (PI. Chih-Wen Ni) 1/1/15 – 12/31/15
Khalifa University, Abu Dhabi UAE **AED 200,000 (~55,000 USD)**
The Role of Ramp2 in Vascular Development in Response to Blood Flow

Khalifa Internal Research Funds Level 1 (PI. Chih-Wen Ni) 1/1/14 – 12/31/14
Khalifa University, Abu Dhabi UAE **AED 200,000 (~55,000 USD)**
Development of a Zebrafish Animal Model of Type-2 Diabetes for Drug Discovery and Delivery

Services

Service to Journals

1. ***Applied Mathematical Modeling*** - Invited Reviewer 2014
2. ***Journal of Biomechanical Engineering*** - Invited Reviewer 2015

Service to Conferences

1. **UAE Graduate Students Research Conference 2015** 2015
   - Abstract Reviewer
   - Session Chair of "Clinical, Pre-Clinical & Health and Life Sciences
2. **AHA Scientific Sessions 2016** 2016
   -Abstract Reviewer for "Angiogenesis and Arteriogenesis" category

Service to University

1. University Curriculum committee - Committee member
   Khalifa University, Abu Dhabi UAE 2013 Fall

2. ABET committee - Committee member of BME
   Khalifa University, Abu Dhabi UAE 2014-2015

3. University Internship Committee - Committee member
- Academic Coordinator of BME

Khalifa University, Abu Dhabi UAE 2013-Present