

Curriculum Vitae

Eugene Chang M.D., Ph.D.

General Information

Place of Birth Tainan, Taiwan

Citizenship United States of America

Contact Division of Cardiovascular Medicine
Harrington Heart and Vascular Institute
University Hospitals Cleveland Medical Center
Case Western Reserve University
11100 Euclid Avenue, Mailstop LKS 5038
Cleveland, OH 44106
eugene.chang@case.edu

Education

2007 A.B. University of Chicago (Biological Sciences)

2009 M.S. University of Rochester School of Medicine and Dentistry (Pathology)

2011 Ph.D. University of Rochester School of Medicine and Dentistry (Pathology)

2015 M.D. University of Iowa College of Medicine

Postdoctoral Training

2011 Postdoctoral Fellow, University of Rochester School of Medicine and Dentistry, Rochester, NY

2015-16 Intern, Medicine, Case Western/University Hospitals, Cleveland, OH

2016-17 Resident, Medicine, Case Western/University Hospitals, Cleveland, OH

2017- Clinical Fellow, Cardiovascular Medicine, Case Western/University Hospitals, Cleveland, OH

Professional Honors & Recognition

2005-07 University of Chicago Dean's List

2009 University of Rochester Pathology Research Day Poster Competition (1st place)

2009 University of Rochester Pathology Travel Award

2009 North American Vascular Biology Organization Vasculata Poster Competition Award

2009 North American Vascular Biology Organization Vasculata Scholarship

2010-11 Howard Hughes Medical Institute Med-into-Grad Training Fellowship in Cardiovascular Science

2010 The American Society for Cell Biology Travel Award

2010 American Heart Association Council of Basic Cardiovascular Science Travel Grant

2010 University of Rochester Medical Faculty Council Travel Award

2011 U.S. Medical Supplies Medical Professions of Tomorrow Scholarship

2015- Harrington Physician-Scientist Fellowship

Invited Speaking Engagements, Presentations, Symposia, and Workshops:

1. **Chang E**, Woo CH, Abe J. PIAS1-mediated Transrepression of NF- κ B in Inflammation. University of Rochester Pathology Research Day. Rochester, NY, USA. May 16, 2008. **Award recipient.**
2. **Chang E**, Woo CH, Abe J. Role of PIAS1 in Endothelial Inflammation. Upstate NY Cardiovascular Research Symposium, Dec 5 2010, Rochester, NY.
3. **Chang E**, Woo CH, Heo KS, Abe J. Role of MK2 in Endothelial Inflammation and Apoptosis. University of Rochester Pathology Research Day. Rochester, NY, USA. May 15, 2009.
4. **Chang E**, Woo CH, Abe J. Role of MK2 in PIAS1-mediated Transrepression of NF- κ B. North American Vascular Biology Organization - Vasculata 2009 Meeting. Cleveland, OH, USA. July 28-31, 2009. **Award recipient.**
5. Woo CH, Shishido T, **Chang E**, Takahashi H, Lu Y, McClain C, Abe J. Novel role of Protein Inhibitor of Activated Stat1 (PIAS1) as a Substrate of P90rsk in Diabetic (DM) Cardiomyopathy via Small Ubiquitin-

related Modification of ERK5 Kinase (ERK5-sumoylation). American Heart Association Scientific Sessions 2009. Orlando, FL, USA. November 14-18, 2009.

6. Heo KS, Le NT, Lee H, Woo CH, Nigro P, **Chang E**, McClain C, Fujiwara K, Abe J. Novel role of p90RSK-mediated Sentrin/SUMO-specific proteases 2 (SEN2) phosphorylation on disturbed flow (d-flow) and H₂O₂-induced apoptosis in endothelial cells (EC). American Heart Association Scientific Sessions 2009. Orlando, FL, USA. November 14-18, 2009.
7. Heo KS, Le NT, Lee H, Woo CH, Nigro P, **Chang E**, McClain C, Fujiwara K, Abe J. Novel role of p90RSK-mediated Sentrin/SUMO-specific proteases 2 (SEN2) phosphorylation on disturbed flow (d-flow) and H₂O₂-induced apoptosis in endothelial cells (EC). Keystone Symposia - Advances in Molecular Mechanisms of Atherosclerosis. Banff, Alberta, Canada. February 12-17, 2010.
8. **Chang E**, Heo KS, Woo CH, Fujiwara K, Abe J. Role of MK2 in Endothelial Migration. University of Rochester Pathology Research Day. Rochester, NY, USA. May 14, 2010.
9. **Chang E**, Heo K, Woo CH, Fujiwara K, Abe J. TNF-alpha-mediated MAPK-activated Protein Kinase 2-SUMOylation Inhibits MK2 Kinase Activation, HSP27 Phosphorylation, and Subsequent Endothelial Migration: Involvement of MK2-Mediated Stress Fiber Formation and Actin Remodeling. American Heart Association Scientific Sessions 2010. Chicago, IL, USA. November 13-17, 2010. **Award recipient.**
10. Heo KS, Lee H, Le NT, Woo CH, **Chang E**, McClain C, Morrell C, Fujiwara K, Abe J. Novel Role of p90RSK-mediated Threonine 368 Phosphorylation of Sentrin/SUMO-Specific Proteases 2 on Disturbed Flow-induced Endothelial Dysfunction via Regulating p53-SUMOylation and Subsequent p53 Protein Stability. American Heart Association Scientific Sessions 2010. Chicago, IL, USA. November 13-17, 2010.
11. Heo KS, Lee H, Nigro P, Le NT, **Chang E**, McClain C, Berk BC, Fujiwara K, Woo CH, Abe J. Disturbed flow-mediated Reactive Oxygen Species Production and Subsequent Protein Kinase C Activation Plays a Key Role in Endothelial Apoptosis via PIASy (SUMO E3 ligase)-mediated p53-SUMOylation and p53 Protein Stability. American Heart Association Scientific Sessions 2010. Chicago, IL, USA. November 13-17, 2010.
12. **Chang E**, Heo KS, Woo CH, Fujiwara K, Abe J. Role of MK2 in Endothelial Migration. Upstate NY Cardiovascular Research Symposium, Dec 3 2010, Rochester, NY
13. **Chang E**, Thomas T, Fujiwara K, Abe J. MK2-SUMOylation Regulates Stress Fiber Formation and Laminar Shear Stress Mediated Actin Remodeling in Endothelial Cells. The American Society for Cell Biology 50th Annual Meeting. Philadelphia, PA, USA. December 11-15, 2010. **Award recipient.**
14. **Chang E**, Heo K, Le NT, Takei Y, Woo CH, Fujiwara K, Abe J. TNF-alpha Induces MAPK-activated protein kinase-2 -mediated Phosphorylation of Protein Inhibitor of Activated STAT-1 to Inhibit Endothelial NF-kappaB Transactivation. Arteriosclerosis, Thrombosis and Vascular Biology 2011 Scientific Sessions, Chicago, IL, USA. April 28-30, 2011. **Award recipient.**
15. Heo K, **Chang E**, Le NT, Cushman H, Yeh E, Fujiwara K, Abe J. The Sumo Protease Senp2 Regulates Endothelial Dysfunction And Subsequent Atherosclerosis Formation. American Heart Association Scientific Sessions 2012. Los Angeles, CA, USA. November 3-7, 2012.
16. Heo K, Le NT, Cushman H, Giancursio C, **Chang E**, Woo CH, Taunton J, Yeh E, Fujiwara F, Abe J. Disturbed Flow-induced P90RSK Activation Elicits Endothelial Dysfunction And Atherosclerosis Formation Via Inhibiting De-sumoylation Enzyme SENP2. American Heart Association Scientific Sessions 2013. Dallas, TX, USA. November 16-20, 2013.

Professional Service

Professional Service for Professional Organizations:

- 2010- Member, American Heart Association
- 2010- Member, The American Society for Cell Biology
- 2015- Member, The American College of Physicians
- 2017- Member, American College of Cardiology

Bibliography:

Peer-Reviewed Original Research

1. Zhang Y, Ni J, Messing EM, **Chang E**, Yang CR, Yeh S. Vitamin E succinate inhibits the function of androgen receptor and the expression of prostate-specific antigen in prostate cancer cells. Proc Natl Acad Sci USA. 2002 May 28; 99(11): 7408-13.

2. Ohtsu H, Xiao Z, Ishida J, Nagai M, Wang HK, Itokawa H, Su CY, Shih C, Chiang T, **Chang E**, Lee Y, Tsai MY, Chang C, Lee KH. Antitumor agents 217. Curcumin analogues as novel androgen receptor antagonists with potential as anti-prostate cancer agents. *J Med Chem*. 2002 Nov 7;45(23):5037-42.
3. Shih C, **Chang E**, Zhang Y, Lai C, Su C, Chen Y, Chang H, Chiang T and Chang C. The use of a flow cytometry analysis in the study of different expression of androgen receptor in human prostate cancer LNCaP and PC-3 cells. *New Taipei Journal of Medicine* 2002;4:151-158.
4. Inui S, Lee YF, **Chang E**, Shyr CR, Chang C. Differential and bi-directional regulation between TR2/TR4 orphan nuclear receptors and a specific ligand mediated-peroxisome proliferator-activated receptor alpha in human HaCaT keratinocytes. *J Dermatol Sci*. 2003 Feb;31(1):65-71.
5. Ohtsu H, Itokawa H, Xiao Z, Su CY, Shih CC, Chiang T, **Chang E**, Lee Y, Chiu SY, Chang C, Lee KH. Antitumor agents 222. Synthesis and anti-androgen activity of new diarylheptanoids. *Bioorg Med Chem*. 2003 Nov 17;11(23):5083-90.
6. **Chang E***, Ni J*, Yin Y, Lin CC, Chang P, James NS, Chemler SR, Yeh S. Alpha-vitamin E derivative, RRR-alpha-tocopheryloxybutyric acid inhibits the proliferation of prostate cancer cells. *Asian J Androl*. 2007 Jan;9(1):31-9.
7. Woo CH, Le NT, Shishido T, **Chang E**, Lee H, Heo KS, Mickelsen D, Lu Y, McClain C, Spangenberg T, Yan C, Molina C, Yang J, Patterson C, Abe J. Novel role of CHIP ubiquitin ligase on inhibiting cardiomyocyte apoptosis via regulating ERK5-mediated degradation of inducible cAMP early repressor. *FASEB J*. 2010 Dec;24(12):4917-28. Epub 2010 Aug 19.
8. **Chang E**, Heo KS, Woo CH, Lee H, Le NT, Thomas TN, Fujiwara K, Abe J. MK2 SUMOylation regulates actin filament remodeling and subsequent migration in endothelial cells by inhibiting MK2 kinase and HSP27 phosphorylation. *Blood*. 2011 Feb 24;117(8):2527-37. Epub 2010 Dec 3.
9. Heo KS*, Lee H*, Nigro P, Thomas T, Le NT, **Chang E**, McClain C, Berk BC, Fujiwara K, Woo CH, Abe J. PKC ζ Mediates Disturbed Flow-Induced Endothelial Apoptosis via p53 SUMOylation. *J Cell Biol*. 2011 May 30;193(5):867-84.
10. Le NT*, Takei Y*, Shishido T*, Woo CH, **Chang E**, Heo KS, Lee H, Lu Y, Morrell C, Oikawa M, McClain C, Wang X, Tournier C, Molina CA, Taunton J, Yan C, Fujiwara K, Patterson C, Yang J, Abe JI. p90RSK targets the ERK5-CHIP ubiquitin E3 ligase activity in diabetic hearts and promotes cardiac apoptosis and dysfunction. *Circ Res*. 2012 Feb 17;110(4):536-50. Epub 2012 Jan 19.
11. Heo KS*, **Chang E***, Takei Y, Le NT, Woo CH, Sullivan MA, Morrell C, Fujiwara K, Abe J. Phosphorylation of Protein Inhibitor of Activated STAT1 (PIAS1) by MAPK-Activated Protein Kinase-2 Inhibits Endothelial Inflammation via Increasing Both PIAS1 Transrepression and SUMO E3 Ligase Activity. *Arterioscler Thromb Vasc Biol*. 2013 Feb;33(2):321-9. doi: 10.1161/ATVBAHA.112.300619. Epub 2012 Nov 29.
12. Le NT, Heo KS, Takei Y, Lee H, Woo CH, **Chang E**, McClain C, Hurley C, Wang X, Li F, Xu H, Morrell C, Sullivan MA, Cohen MS, Serafimova IM, Taunton J, Fujiwara K, Abe JI. A Crucial Role for p90RSK-Mediated Reduction of ERK5 Transcriptional Activity in Endothelial Dysfunction and Atherosclerosis. *Circulation*. 2013 Jan 29;127(4):486-99. doi: 10.1161/CIRCULATIONAHA.112.116988. Epub 2012 Dec 14.
13. Heo KS*, **Chang E***, Le NT, Cushman HJ, Yeh ET, Fujiwara K, Abe JI. De-SUMOylation enzyme of sentrin/SUMO-specific protease 2 regulates disturbed flow-induced SUMOylation of ERK5 and p53 that leads to endothelial dysfunction and atherosclerosis. *Circ Res*. 2013 Mar 15;112(6):911-23. doi: 10.1161/CIRCRESAHA.111.300179. Epub 2013 Feb 4.
14. Huang CK, Pang H, Wang L, Niu Y, Luo J, **Chang E**, Sparks JD, Lee SO, Chang C. New therapy via targeting androgen receptor in monocytes/macrophages to battle atherosclerosis. *Hypertension*. 2014 Jun;63(6):1345-53. doi: 10.1161/HYPERTENSIONAHA.113.02804. Epub 2014 Mar 31.
15. Heo KS, Le NT, Cushman HJ, Giancursio CJ, **Chang E**, Woo CH, Sullivan MA, Taunton J, Yeh ET, Fujiwara K, Abe JI. Disturbed flow-activated p90RSK kinase accelerates atherosclerosis by inhibiting SENP2 function. *J Clin Invest*. 2015 Feb 17. pii: 76453. doi: 10.1172/JCI76453.
16. Huang CK, Luo J, Lai KP, Wang R, Pang H, **Chang E**, Yan C, Sparks J, Lee SO, Cho J, Chang C. Androgen receptor promotes abdominal aortic aneurysm development via modulating inflammatory interleukin-1 α and transforming growth factor- β 1 expression. *Hypertension*. 2015 Oct;66(4):881-91. doi: 10.1161/HYPERTENSIONAHA.115.05654.
17. Huang CK, Lee SO, **Chang E**, Pang H, Chang C. Androgen receptor (AR) in cardiovascular diseases. *J Endocrinol*. 2016 Apr;229(1):R1-R16. doi: 10.1530/JOE-15-0518. Epub 2016 Jan 14. Review.
18. **Chang E**, Abe J. Kinase-SUMO networks in diabetes-mediated cardiovascular disease. *Metabolism*. 2016 May;65(5):623-33. doi: 10.1016/j.metabol.2016.01.007. Epub 2016 Jan 16. Review.

19. **Chang E**, Nayak L, Jain MK. Krüppel-like factors in endothelial cell biology. *Curr Opin Hematol*. 2017 May;24(3):224-229. doi: 10.1097/MOH.0000000000000337.

**Denotes authors contributed equally to manuscript.*

Book Chapters

1. Itami S, Inui S, Uno H, Pan H, **Chang E**, Takayasu S, Ye F, Imamura K, Seki T, Ideta R, Aoki H, Adachi K, Price V, Kurata S, Collins L, Heinlein C, Chang C. Androgens in Dermatology: Hair Loss, Acne, and Other Diseases. Androgens and Androgen Receptor: Mechanisms, Functions and Clinical Application. Springer Publishing: USA, 2002: 411-476.
2. Yeh S, Ni J, **Chang E**, Yin Y, Chen M. Roles of Vitamin E in Prostate and Prostate Cancer. Prostate Cancer: Basic Mechanisms and Therapeutic Approaches. World Scientific Publishing: USA, 2005: 263-276.
3. Yeh S, Chen M, Ni J, Yin Y, **Chang E**, Zhang M, Wen X. Functions of Estrogen Receptor in Prostate and Prostate Cancer. Prostate Cancer: Basic Mechanisms and Therapeutic Approaches. World Scientific Publishing: USA, 2005: 293-313.