David S. Molony, Ph.D.

Postdoctoral Fellow, Division of Cardiology, School of Medicine
Emory University, Atlanta, GA, 30322
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EDUCATION

Doctor of Philosophy *Oct 2005-Jan 2010*
Department of Mechanical & Aeronautical Engineering
University of Limerick, Ireland
Dissertation title: *'Fluid-structure Interaction in Patient-specific Abdominal Aortic Aneurysms Treated with an Endovascular Stent-graft'*

Bachelor of Engineering *Sep 2001-May 2005*
Department of Mechanical & Aeronautical Engineering
University of Limerick, Ireland

RESEARCH EXPERIENCE

Post-doctoral Fellow *July 2015-present*
Division of Cardiology, School of Medicine
Emory University

- Creator, developer and maintainer of DeepIVUS – A GUI-based deep learning platform for Intravascular Ultrasound (IVUS) image segmentation and classification. Employed data augmentation using GANs. Model achieved very good agreement (CCC=0.9) with expert analysts.
- Fine-tuned NLP language model (GPT-2) for autocompleting cardiovascular text and deployed using GKE. http://cardioassistai.com
- Implemented algorithm for automatic ECG gating of IVUS images. Gating of images reduced clinician manual interaction time by 90%

Post-doctoral Fellow *Jan 2011-June 2015*
Wallace H. Coulter Department of Biomedical Engineering
Georgia Institute of Technology

- Implemented dynamic programming algorithm for lumen segmentation
- Associated primary modes of deformation in 3D models of rabbit aorta using statistical shape analysis (PCA).

TEACHING EXPERIENCE

Course Instructor
BMED 3300 - Biotransport *May 2014-Jul 2014*
Wallace H. Coulter Department of Biomedical Engineering
Georgia Institute of Technology

Facilitator
BMED 1300 - Problems in BME I *Aug 2013-May 2014*
Wallace H. Coulter Department of Biomedical Engineering
Georgia Institute of Technology

Undergraduate Teaching Assistant *Sep 2006-May 2008*
Department of Mechanical & Aeronautical Engineering
University of Limerick, Ireland

AWARDS & HONORS

- American Heart Association Postdoctoral Fellowship — *Aug 2013-Jul 2015*
- Petit Scholar Mentor — *Jan-Dec 2014*
- Gandy Diaz Teaching Fellowship — *Aug 2013-May 2014*
- Engineers Ireland Biomedical Research Medal Runner-up — *Jan 2010*

SCIENTIFIC & PROFESSIONAL ACTIVITIES

Journal Reviewer for *Annals of Biomedical Engineering, Cardiovascular Engineering & Technology, Computers in Biology and Medicine, International Journal of Computer Assisted Radiology and Surgery, Journal of Biomechanics, Journal of Biomechanical Engineering – transactions of the ASME, Journal of Medical Devices – transactions of the ASME, , Journal of the American College of Cardiology – Cardiovascular Interventions, Journal of Endovascular Therapy, Medical & Biological Engineering & Computing, Medical Engineering & Physics, Proceedings of IMECHE Part H – Journal of Engineering in Medicine, PLOS Computational Biology* — *Jan 2009-present*

Selection Committee for Petit Scholar program, Georgia Tech — *August 2014*

Laser safety officer, University of Limerick — *Jan 2008-Jan 2010*

Member of Biomedical Engineering Society (BMES) — *April 2012-present*

INVITED SEMINARS/SYMPOSIA

- Georgia Institute of Technology, Atlanta, USA — *May 2009*
- Georgia Institute of Technology, Atlanta, USA — *May 2013*
- Optics in Cardiology, Rotterdam, Netherlands — *April 2017*

JOURNAL PUBLICATIONS

Impact: A Web of Science search for Molony DS in January 2020 retrieved a total of 260 citations (7.9 citations per paper). My h-index was 10. The journal impact factors for my last 10 publications are as follows:

Journal	Impact Factor
Journal of American College of Cardiology	16.834
Journal of American College of Cardiology: Cardiovascular Interventions	9.881
IEEE Transactions on Medical Imaging	6.131
Annals of Biomedical Engineering	3.405
Journal of Royal Society Interface	3.355
Journal of Biomechanics	2.431
International Journal of Cardiovascular Imaging	2.036
Journal of Biomechanical Engineering	1.916

1. **Molony, D.S.**, Callanan, A., Morris, L.G., Doyle, B.J., Walsh, M.T., McGloughlin, T.M., 2008 "Geometrical Enhancements for Abdominal Aortic Stent-grafts" *J Endovasc Ther*, Vol 15(5), pp. 518-529

2. **Molony, D.S.**, Callanan, A., Kavanagh, E.G., Walsh, M.T., McGloughlin, T.M., 2009, "Fluid-structure interaction of a patient-specific abdominal aortic aneurysm treated with a endovascular stent-graft" *Biomed Eng Online*, Vol. 8, pp. 1-12

3. **Molony, D.S.**, Kavanagh, E.G., Madhavan, P., Walsh, M.T., McGloughlin, T.M., 2010, "A Computational Study of the Magnitude and Direction of Migration Forces in Patient-specific Abdominal Aortic Stent-grafts" *Eur J Vasc Endo Surg*, Vol. 40(3), pp. 332-339

4. Corbett, T.J., **Molony, D.S.**, Callanan, A., McGloughlin, T.M., 2011, "The effect of vessel material properties and pulsatile wall motion on the fixation of a proximal stent of an endovascular graft" *Med Eng & Physics*, Vol. 33(1), pp. 106-111

5. **Molony, D.S.**, Broderick, S., Callanan, A., McGloughlin, T.M., Walsh, M.T., 2011, "Fluid-structure interaction in Healthy, Diseased and Endovascularly Treated Abdominal Aortic Aneurysms" *Stud Mechanobiol Tissue Eng Biomater*, Vol 7, pp. 163-179

6. Gogas, B.D., King, S.B., Timmins, L.H., Passerini, T., Piccinelli, M., Veneziani, A., Kim, S., **Molony, D.S.**, Giddens, D.P., Serruys, P.W., Samady, H., 2013, "Biomechanical assessment of fully bioresorbable devices" *JACC:Card Interv*, Vol. 6(7), pp.760-761

7. Timmins, L.H., Gupta, D., Corban, M.T., **Molony, D.S.,** Oshinski, J.N., Samady, H., Giddens, D.P., 2014, "Co-localization of disturbed flow patterns and occlusive cardiac allograft vasculopathy lesion formation in heart transplant patients" *Cardiovasc Eng & Tech*, Vol 6(1), pp. 25-35

8. **Molony, D.S.,** Timmins, L.H., Rasoul-Arzumly, E., Samady, H., Giddens, D.P., 2014, "Investigation of the influence of side-branches on wall shear stress in coronary ultrasound arteries reconstructed from intravascular ultrasound" *Comp Bio Med*, pp. 41-52

9. Timmins, L.H., **Molony, D.S.,** Eshtehardi, P., McDaniel, M.C., Oshinski, J.N., Samady, H., Giddens, D.P., 2015, "Focal association between wall shear stress and coronary artery disease progression" *Ann Bio Eng*, Vol 43(1), pp. 94-106

10. **Molony, D.S.,** Timmins, L.H., Hung, O.H., Rasoul-Arzrumly, E., Samady, H., Giddens, P.G., 2015, "An assessment of intra-patient variability on observed relationships between wall shear stress and plaque progression in coronary arteries", *Biomed Eng Online*, Vol 14, S2

11. Hung, O.Y., **Molony, D.S.,** Corban, M.T., Rasoul-Arzrumly, E., Maynard, C., Eshtehardi, P., Dhawan, S., Timmins, L.H., Piccinelli, M., Ahn, S., Gogas, B.D., McDaniel, M.C., Quyyumi, A.A., Giddens, D.P., Samady, H., "Comprehensive assessment of coronary plaque progression with advanced intravascular imaging, physiological measures, and wall shear stress: A pilot double-blinded randomized controlled clinical trial of nebivolol versus atenolol in nonobstructive coronary artery disease", *J Am Heart Assoc*, Vol 5, pp. e002764

12. Timmins, L.H., Suo, J., Eshtehardi, P., **Molony, D.S.,** McDaniel, M.C., Oshinski, J.O., Giddens, D.P., Samady, H., 2016, "Comparison of angiographic and IVUS derived geometric reconstructions for evaluation of the association of hemodynamics with coronary artery disease progression", *Int J Cardiovasc Img*, Vol 32, 1327

13. Timmins, L.H., **Molony, D.S**., Eshtehardi, P., Rasoul-Arzrumly E., Lam, A., Hung, O.Y., McDaniel, M.C., Oshinski, J.N., Giddens, D.P., Samady, H., 2016, "Quantification of the focal progression of coronary atherosclerosis through automated co-registration of virtual histology-intravascular ultrasound imaging data", *Int J Cardiovasc Img,* Vol 33(1), pp. 13-24

14. **Molony D.S.,** Timmins, L.H., Rasoul-Arzrumly, E., Giddens, D.P., Samady, H., 2016, "Evaluation of a framework for the co-registration of intravascular ultrasound and optical coherence tomography coronary artery pullbacks", *J Biomech*, Vol 49(16), p. 4048-4056

15. Timmins, L.H., **Molony, D.S.,** Eshtehardi, P., McDaniel, M.C., Oshinski, J.N., Giddens, D.P., Samady, H., 2016, "Oscillatory wall shear stress is a dominant flow characteristic affecting lesion progression patterns in patients with coronary artery disease", *J R Soc Interface*, Vol 14(127), 20160972

16. Samady, H., **Molony, D.S.** 2017, "The ongoing quest to predict plaque rupture", *J Am Coll Cardiol Img,* Vol 10(12), pp. 1484-1486

17. Guo, X., Giddens, D.P., **Molony, D.S.,** Yang, C., Samady, H., Zheng, J., Mintz, G.S., Maehara, A., Wang, L., Pei, X., Li, Z., Tang, D. 2017, "Combining IVUS and OCT for more accurate coronary cap thickness quantification and stress/strain calculations: A patient-specific 3D FSI approach", *J Biomech Eng,* Vol, 140(4) 041055

18. **Molony, D.S.,** Zhou, L., Park, J., Fleischer, C., Sun, H., Hu, X., Oshinski, J., Samady, H., Rezvan, A., Giddens, D.P. "Bulk flow and near wall hemodynamics of the rabbit aortic arch: A 4D PC-MRI study*", J Biomech Eng* (Online)

19. Elliott, M.R., Kim, D., **Molony, D.S.**, Morris, L., Samady, H., Joshi, S., Timmins, L.H. "Establishment of an automated algorithm utilizing optical coherence tomography and micro-computed tomography imaging to reconstruct the 3D deformed stent geometry ", *IEEE Trans Med Imaging*, (Online)

20. Kumar, A., Thompson, E.W., Lefieux, A., **Molony, D.S.**, Davis, E.L., Chand N., Fournier, S., Lee, H., Suh, J., Sato, K., Ko, Y., Molloy, D., Chandran, K., Hosseini, H., Gupta, S., Milkas, A., Gogas, B., Chang, H., Min, J.K., Fearon, W., Veneziani, A., Giddens, D.P., King III, S.B., De Bruyne, B., Samady, H. 2018. "High coronary wall shear stress in patients with stable CAD predicts subsequent myocardial infarction", *J Am Coll Cardiol,* Vol 72(16), pp. 1926-1935

21. Kumar A., Hung O.Y., Piccinelli, M., Eshtehardi P., Corban, M.T., Sternheim, D., Yang B., Lefieux, A., **Molony, D.S.**, Thompson, E.W., Zeng, W., Bouchi, Y., Gupta, S., Hosseini, H., Raad, M., Ko, Y., Liu, C., McDaniel, M.C., Gogas, B.D., Douglas, J.S., Quyyumi, A.A., Giddens, D.P., Veneziani, A., Samady, H. 2018, "Low coronary wall shear stress is associated with severe endothelial dysfunction in patients with non-obstructive coronary artery disease", *J Am Coll Cardiol Card Inter*, Vol 11(20), pp. 2072-2080

22. Kok, A.M., **Molony, D.S**., Timmins, L.H., Ko, Y., Boersma, E., Eshtehardi, P., Wentzel, J.J., Samady, H. 2017. "The influence of multidirectional shear stress on plaque progression and destabilization in human coronary arteries". *Eurointervention, Vol 15(8), pp. 692-699*

23. Costopoulos, C., Timmins, L.H., Huang, Y., Hung, O.Y., **Molony, D.S.**, Davis, E., Brown, A., Teng, Z., Gillard, J., Samady, H., Bennett, M. 2017, "Impact of combined plaque structural stress and wall shear stress on coronary plaque progression, regression and changes in composition", *Eur Heart J*, Vol 40(18), pp. 1411-1422

24. Guo, X., Giddens, D.P., **Molony, D.S.**, Yang, C., Samady, H., Zheng, Z., Matsumara, M., Mintz, G., Maehara, A., Wang, L., Tang, D. 2019, "A Multi-modality image-based FSI modeling approach for prediction of coronary artery disease progression using IVUS and OCT data with follow-up", *J Biomech Eng*, Vol 141(9), 091003

25. Wang, L., Tang, D., Maehara, A., **Molony, D.S.**, Zheng, J., Samady, H., Wu, Zheyang, Lu, W., Zhu, J., Genshan, M., Giddens, D.P., Stone, G.W., Mintz, G.S. 2019, "Multi-factor decision-making strategy for better coronary plaque burden increase prediction: a patient-specific 3D FSI study using IVUS follow-up data", *Bio Model Mech* Vol 18(5), pp. 1269-1280

26. Samady, H., **Molony, D.S.**, Coskun, A.U., Varshney, A.S., De Bruyne, B., Stone, P.H. 2019. "Risk stratification of coronary plaques using physiologic characteristics by CCTA: Focus on shear stress". *J Cardio Comp Tom*, (in press)

27. Zhang, C., Li, H., Guo, X., Molony, D.S., Guo, X., Samady, H., Giddens, D.P., Athanasiou, L., Nie, R., Cao, J., Tang, D. 2019. "Convolutional neural networks and support vector machines for automatic segmentation of intracoronary optical coherence tomography". *Mol Cell Biomech*, Vol 16(2), pp. 153-161

CONFERENCE PROCEEDINGS

1. **Molony, D.S.**, Devereux, P.D., Walsh, M.T., McGloughlin, T.M. "A computational study of mass transport at a graft/artery junction", Biomedical Engineering in Ireland, Galway, Ireland, 30 January, 2006.

2. **Molony, D.S.**, Doyle, B.J., Callanan, A., Morris, L.G., Walsh, M.T., McGloughlin, T.M. "A computational investigation of blood flow in realistic AAA stent-grafts", Biomedical Engineering in Ireland, Fermanagh, Ireland, 26 January 2007.

3. **Molony, D.S.**, Doyle, B.J., Callanan, A., Morris, L.G., Walsh, M., McGloughlin, T.M. "A computational investigation of blood flow in realistic AAA stent-grafts", ASME Summer Bioengineering Conference, Keystone, CO, June 2007.

4. **Molony, D.S.**, Callanan, A., Doyle, B.J., Walsh, M.T., McGloughlin, T.M. "Implications of Fluid Structure Interaction in abdominal aortic aneurysms", Biomedical Engineering in Ireland, Sligo, Ireland, 26 January, 2008.

5. **Molony, D.S.**, Callanan, A., Doyle, B.J., Morris, L.G., Walsh, M.T., McGloughlin, T.M. "Affect of abdominal aortic aneurysm stent-graft design on arterial haemodynamics", ASME Summer Biomengineering Conference, Marco Island, FL, June 2008.

6. **Molony, D.S.**, Callanan, A., Doyle, B.J., Walsh, M.T., McGloughlin, T.M. "Influence of modelling parameters on abdominal aortic aneurysms stent-grafts", European Society of Biomechanics, Lucerne, Switzerland, 6-9 July 2008.

7. **Molony, D.S.**, Walsh, M.T., McGloughlin, T.M. "Fluid-structure interaction of pre- and post-operative abdominal aortic aneurysms", Biomedical Engineering in Ireland, Limerick, Ireland, 30 January 2009.

8. **Molony, D.S.**, Walsh, M.T., McGloughlin, T.M. "Analysis of Post-operative Abdominal Aortic Aneurysm Repair: A Multi Patient-specific Study", ASME Summer Biomengineering Conference, Lake Tahoe, CA, June 2009.

9. **Molony, D.S.**, Walsh, M.T., McGloughlin, T.M. "Fluid-structure interaction of Pre- and Post-operative Abdominal Aortic Aneurysms", World Congress of Medical Physics and Biomedical Engineering, Munich, Germany, September 2009

10. **Molony, D.S.**, Walsh, M.T., McGloughlin, T.M. "Fluid-structure Interaction Evaluation of EVAR in AAA Patients", 6th World Congress of Biomechanics, Singapore, August 2010

11. **Molony, D.S.**, Nencka, A., Li, Z., Zhao, M., Giddens, D.P. "Hemodynamics of the rat aortic arch", ASME Summer Bioengineering Conference, Farmington, PA, June 2012

12. **Molony, D.S.,** Arepalli, C., Yang, Y., Tang, S., Oshinski, J.O., Tang, X., Veeraswamy, R., Stillman, A., Giddens, D.P. "A New Methodology for Evaluating the Relationship Between Wall Shear Stress and Carotid Artery Plaque", BMES Annual Fall Meeting, Atlanta, GA, October 2012

13. **Molony, D.S.**, Timmins, L.H., Eshtehardi, P., Samady, H., Giddens, D. "CFD and VH-IVUS Biomechanical Analysis of Coronary Artery Disease with One Year Follow-up", ASME Summer Bioengineering Conference, Sunriver, OR, June 2013

14. Timmins, L.H, **Molony D.S.**, Eshtehardi, P., McDaniel, M.C., Oshinski, J.N., Samady, H, Giddens D.P. "Development of a framework to examine the focal association between wall shear stress and coronary artery disease progression in the clinical setting" ASME Summer Bioengineering Conference, Sunriver, OR, June 2013

15. **Molony, D.S.,** Timmins, L.H., Razoul-Arzumly, E., Hung, O., Samady, H., Giddens D.P., "Investigating the Influence of Coronary Side-branches on the Relationship between Wall Shear Stress and Plaque Progression", Shear Stress Symposium, Montreal, Canada, March 2014

16. Timmins, L.H., **Molony, D.S.**, Eshtehardi, P., McDaniel, M.C., Oshinski, J.N., Samady H., Giddens, D.P., "Clinical Data Uncertainties in CFD Modeling: The Association Between Coronary Artery Disease Progression and Absolute Versus Relative Wall Shear Stress", Shear Stress Symposium, Montreal, CA, March 2014

17. **Molony, D.S.,** Timmins, L.H., Razoul-Arzumly, E., Hung, O., Samady, H., Giddens, D.P., "A Prospective Study of the Relationship between Wall Shear Stress and Atherosclerotic Plaque Formation", World Congress of Biomechanics, Boston, MA, July 2014

18. Timmins, L.H., **Molony, D.S.**, Eshtehardi, P., McDaniel, M.C., Oshinski, J.N., Samady, H., Giddens, D.P., "Examination of Differences Between Regional and Local Analysis Methods When Assessing Human Coronary Artery Hemodynamics", World Congress of Biomechanics, Boston, MA, July 2014

19. Giddens, D.P., Samady, H., Timmins, L.H., **Molony, D.S.**, Suo, J., Gogas, B.D., Corban, M.T., McDaniel, M.C., Veneziani, A., Hung, O., Piccinelli, M., "Wall Shear Stress and Plaque Progression in Human Coronary Arteries: Esoteric Concept of Clinically Relevant?", World Congress of Biomechanics, Boston, MA, July 2014

20. **Molony, D.S.,** Timmins, L.H., Razoul-Arzumly, E., Hung, O., Samady, H., Giddens, D.P., "Does Coronary Side-branch Exclusion Alter Wall Shear Stress Predictions of Plaque Progression", Post World Congress Biomechanics Summit, Worcester, MA, July 2014

21. Hung, O., Piccenelli, M., **Molony, D.S.**, Arzrumly, E., Corban, M., Obagi, A., Timmins, L., Ahn, S., Yoo, S.Y., Maynard, C., Veneziani, A., King, S., Quyyumi, A., Giddens D.P., Samady, H. "Wall shear stress remains predictive of plaque progression in patients with coronary artery disease after adjusting for endothelial function" ACC Annual Scientific Sessions, San Diego, CA, March 2015

22. **Molony, D.S.,** Timmins, L.H., Rasoul-Arzrumly, E., Hung, O., Samady, H., Giddens, D.P., "Development of a Framework to Characterize Plaque Transformation: Combined Use of OCT and VH-IVUS", Summer Biomechanics, Bioengineering and Biotransport Conference, Snowbird, UT, June 2015

23. Timmins, L.H., **Molony, D.S**., Eshtehardi, P., McDaniel, M.C., Oshinski, J.N., Samady, H., Giddens, D.P., "Phenotypic Differences in Coronary Artery Disease Progression in the Clinical Setting and Dependence on a Focal Oscillatory Hemodynamic Environment", Summer Biomechanics, Bioengineering and Biotransport Conference, Snowbird, UT, June 2015.

24. **Molony, D.S**., Rezvan, A., Timmins, L.H., Fleischer, C., Park, J., Zhou, L., Hu, X., Giddens, D.P., "4D Phase Contrast MRI Derived Hemodynamics of the Rabbit Aortic Arch", CFD in Medicine and Biology II, Albufeira, Portugal, September 2015

25. **Molony, D.S.,** Timmins., L.H., Rasoul-Arzrumly, E., Gogas, B., Hung, O.H., Joshi, U., Bouchi, Y., Samady, H., Giddens, D.P., "Hemodynamic analysis of Coronary Artery Disease Progression Through Combined IVUS and OCT Imaging" Shear Stress Symposium, Atlanta, GA, April 2016

26. Timmins, L.H., **Molony, D.S**., Eshtehardi, P., Oshinski, J.N., Samady, H., Giddens, D.P., "CFD and Coronary Artery Disease: Towards Employing WSS to Guide Clinical Decisions", 8th International Bio-fluid Symposium, Pasadena, CA, February 2016

27. Eshtehardi, P., Hung, O.Y., Corban, M.T., Timmins, L.H., **Molony, D.S.**, Ahn, S.G., Gogas, B.D., Bouchi, Y., Zeng, W., Sebaali, F., Joshi, U., Suh, J., Giddens, D.P., Samady, H., "Elevated Hyperemic Microvascular Resistance is Associated with Lower Coronary Wall Shear Stress in Patients with Non-obstructive Coronary Artery Disease", ACC Annual Scientific Session (ACC.16), Chicago, IL, April 2016.

28. Timmins, L.H., **Molony, D.S.**, Eshtehardi, P., McDaniel, M.C., Oshinski, J.N., Samady, H., Giddens, D.P., "Evaluation of Analysis Frameworks to Examine the Association Between Hemodynamics and VH-IVUS Defined Coronary Artery Disease Progression" Shear Stress Symposium, Atlanta, GA, April 2016

29. **Molony, D.S.,** Timmins., L.H., Joshi, U., Bouchi, Y., Gogas, B., Samady, H., Giddens, D.P., "Wall shear stress and combined VH-IVUS and OCT analysis of Coronary Plaque Composition" Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, June 2016

30. Timmins, L.H., **Molony, D.S.**, Eshtehardi, P., McDaniel, M.C., Oshinski, J.N., Samady, H., Giddens, D.P., "Assessment of Analysis Methods to Evaluate the Association Between Wall Shear Stress and Coronary Artery Disease Progression in the Clinical Setting" Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, June 2016.

31. Gogas, B,D., Koganti, Vishnu., Bouchi, Y., **Molony, D.S.**, Zeng, W., Hung, O.Y., Sebaali, F., Davis, E., Lee, H., Thompson, E.W., Joshi, U., Maini, M., Singhal, E., Shin, E., Stankover, G., Otake, H., Akasaka, T., Escaned, J., Koo, B., Nam, C., Veneziani, A., Giddens, D.P., King, S.B., Samady, H. "Conformability and Wall Shear Stress Assessment Following Deployment of Resolute Integrity Zotarolimus-Eluting Stent and the XIENCE Xpedition Everolimus-Eluting Stent in Angulated Vessels: An Interim Analysis of the SHEAR-STENT Randomized Controlled Study", CRT, Washington DC, March 2018

32. **Molony, D.S.**, Zhou, L., Park, J., Sun, H., Fleischer, C., Oshinski, J., Hu, X., Samady, H., Rezvan, A., Giddens, D.P. "Analysis of the near wall and bulk flow aortic arch hemodynamics of New Zealand white rabbits" Shear Stress Symposium, Rotterdam, Netherlands, April 2017

33. **Molony, D.S.**, Zhou, L., Park, J., Fleischer, C., Oshinski, J., Hu, X., Samady, H., Rezvan, A., Giddens, D.P. "Comprehensive characterization of rabbit aortic arch hemodynamics from 4D PC-MRI derived CFD" Summer Biomechanics, Bioengineering and Biotransport Conference, Tucson, AZ, June 2017

34. Kok, A.M., **Molony, D.S.**, Timmins, L.H., Ko, Y., Eshtehardi, P., Wentzel, J.J., Samady, H. "Predictive Value of Transverse Wall Shear Stress on Plaque Progression in Human Coronary Arteries" Summer Biomechanics, Bioengineering and Biotransport Conference, Tucson, AZ, June 2017

35. Gogas, B., Thompson, E., **Molony, D.S.**, Spilias, N., Okada, K., Honda, Y., Veneziani, A., Giddens, D.P., Rapoza, R., Popma, J.J., Stone, G. "Impact of Underexpansion on IVUS-Derived Wall Shear Stress Patterns with Bioresorbable Scaffolds and Metallic DES: Insights from the ABSORB III Imaging Substudy", Transcatheter Cardiovascular Therapeutics (TCT), Denver, CO, September 2017

36. Elliott, M., Kim, D., **Molony, D.S.,** Morris, L., Joshi, S. Samady, H., Timmins, L.H. "Image Processing Framework Utilizing OCT and MicroCT to Characterize the 3D Deformed in Vivo Stent Geometry", BMES Annual Fall Meeting, Phoenix, AZ, October 2017

37. Kumar, A. Thompson, E., Davis, E., **Molony, D.S.**, Chand, N., Lee, H., Lefieux, A., Gogas, B., Suh, J., Ko, Y., "High Wall Shear Stress in the Proximal Segments of Hemodynamically Significant Coronary Lesions is Independently Predictive of Subsequent Myocardial Infarction: A Mechanistic Sub-study of the Fame II Trial", ACC Annual Scientific Session (ACC.18), Orlando, FL, March 2018

38. Sternheim, D., Thompson, E., Kumar, A., Hung, O.Y., Piccinelli, M., **Molony, D.S.**, Eshtehardi, P., Corban, M., Gupta, S., Chandran, K., Lefieux, A., Ko, Y., McDaniel, M.C., Gogas, B.D., Quyummi, A.A., Giddens, D.P., Veneziani, A., Samady, H. "Coronary Vessels with Larger Contiguous Regions of Low Wall Shear Stress Have More Endothelial Dysfunction", CRT, Washington DC, March 2018

39. Kumar, A., Hung, O.Y., Eshtehardi, P., Thompson, E., Sternheim, D., Gupta, S., Chandran, K., **Molony, D.S.**, Piccinelli, M., Lefieux, A., Corban, M.T., McDaniel, M.C., Quyummi, A.A., Gogas, B.D., Giddens, D.P., Veneziani, A., Samady, H. "Lower Wall Shear Stress and Clinical Risk Factors are Associated with Endothelial Dysfunction in Patients with Non-Obstructive Coronary Artery Disease", CRT, Washington DC, March 2018

40. Elliott, M., Kim, D., **Molony, D.S.**, Morris, L., Samady, H., Joshi, S., Timmins, L.H. "Establishment of an Automated Algorithm Utilizing OCT and MicroCT Imaging to Reconstruct the 3D Deformed In Vivo Stent Geometry", Shear Stress Symposium, Atlanta, GA, April 2018

41. **Molony, D.S.**, Hosseini, H., Samady, H. "Deep learning for IVUS segmentation" Shear Stress Symposium, Atlanta, GA, April 2018

42. **Molony, D.S.,** Zhou, L., Park, J., Fleischer, C., Sun, H., Hu, X., Oshinski, J., Samady, H., Rezvan, A., Giddens, D.P. "Statistical shape analysis assessment of the influence of aortic arch geometry on hemodynamics" World Congress of Biomechanics, Dublin, Ireland, July 2018

43. Kumar, A., **Molony, D.S.** Raad, M., Hosseini, H., Lee, W., Thompson, E., Lefieux, A., Hung, O., Machado, K., Kumar, S., Khawaja, S., Sternheim, D., Vasigh, M., Gupta, S., Gogas, B., Veneziani, A., Lee, J., Chen, S., Otake, H., Akasaka, T., Shin E., Koo, B., Stankovic, G., Milasinovic, D., Erglis, A., Chandran, K., Nam, C., Escaned, J., Erglis, A., Giddens, D.P. Samady, H. "Comparison of Conformability and Wall Shear Stress Between Resolute Integrity Zotarolimus-Eluting Stent and the Xience Xpedition Everolimus-Eluting Stent in Angulated Vessels: An interim Analysis of the SHEAR-STENT Randomized Contolled Study", Transcatheter Cardiovascular Therapeutics (TCT), San Diego, CA, September 2018

44. Kumar, A., Gogas, B., Thompson, E., Hosseini, H., **Molony, D.S.**, Sternheim, D., Raad, M., Gupta, S., Lefieux, A., Vasigh, M., Machado, K., Khawaja, S., Chandran, K., Kumar, S., Lee, W., Gandhi, R., Giddens, D.P., Veneziani, A., King, S., Samady, H. "The Absorb Bioresorbable Vascular Scaffolds Demonstrate Lower Wall Shear Stress Compared to Metallic, Xience V: Interim Analysis from the ABSORB III Imaging Study", Transcatheter Cardiovascular Therapeutics (TCT), San Diego, CA, September 2018

45. **Molony, D.S.,** Hosseini, H., Samady, H. "DeepIVUS: A machine learning framework for fully automatic IVUS segmentation" Transcatheter Cardiovascular Therapeutics (TCT), San Diego, CA, September 2018

46. Hair, J., **Molony, D.S.**, Timmins, L.H., Samady, H., Oshinski, J. "Effect of Coronary Flow Reserve on CFD-Derived Fractional Flow Reserve", BMES Annual Fall Meeting, Atlanta, GA, October 2018

47. **Molony, D.S**., Samady, H. 2019, "DeepIVUS: A machine learning platform for fully automatic IVUS segmentation and phenotypinog", Transcatheter Cardiovascular Therapeutics (TCT), San Diego, CA, September 2019

INTELLECTUAL PROPERTY

1. Samady, H., Veneziani, A., Giddens, D.P., **Molony, D.**, Lefieux, A., Viguerie, A.F. 2017. Methods and Systems for Determining Hemodynamic Information for One or More Arterial Segments. U.S. Patent Application No. 62569269. *Patent pending*

2. Samady, H., Veneziani, A., Giddens, D.P., **Molony, D.**, Lefieux, A., Kumar, A. 2018. Methods and Systems for Determining Coronary Hemodynamic Characteristic(s) That is Predictive of Myocardial Infarction. U.S. Patent Application No. 62640939. *Patent pending*

MENTORSHIP

Undergraduate Research Students

Thibault Joseph Twahirwa — *Jan 2014-Nov 2014*

CFD Engineers

Vishnu Koganti — *Aug 2015 – May 2016*
Emily Davis — *Jun 2016 – Mar 2017*
Elizabeth Thompson — *Jun 2016 – May 2018*
Grady Burnett — *Aug 2018 - present*

RESEARCH SUPPORT

PI: **Molony, D.S.** — *July 2014-Jun 2016*
Source: American Heart Association Postdoctoral Fellowship
Title: Investigation of the Role of High Wall Shear Stress in the Transition of Coronary Artery Plaque Morphology
Award: $98,412
Success Rate: 14.2%
Project: The aim of this study was to develop a method to register IVUS and OCT images and investigate the association of wall shear stress with plaque changes assessed by both imaging modalities.