

CURRICULUM VITAE (selected)

VITALIY L. RAYZ

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EDUCATION

BS 1997 Mechanical Engineering, University of Wisconsin, Milwaukee, WI
PhD 2005 Mechanical Engineering, University of California, Berkeley, CA

PROFESSIONAL EXPERIENCE

Research Laboratory Engineer, Waukesha Bearings, Pewaukee, Wisconsin, 1997 – 2000
Postdoctoral Fellow, Radiology, VA Medical Center, San Francisco, California, 2005 – 2008
Assistant Research Scientist, Radiology Department, Univ. California San Francisco, 2008 – 2014
Assistant Professor (100%), Mechanical Engineering Department, UW – Milwaukee, 2014 – 2015
Assistant Professor, Neurosurgery Department, Medical College of Wisconsin, 2014 – 2016
Adjunct Assistant Research Professor (courtesy), Neurosurgery, Univ. of Arkansas, 2015 – present
Assistant Professor (75%), Mechanical Engineering Department, UW – Milwaukee, 2015 – 2016
Assistant Professor (25%), Biomedical Engineering Department, UW – Milwaukee, 2015 – 2016
Assistant Professor, Weldon School of Biomedical Engineering, 2017 – present
Assistant Professor, Mechanical Engineering (courtesy), 2017 – present

HONORS AND AWARDS

Deans Honor List, College of Engineering and Applied Science, UW – Milwaukee, 1997
Letters of appreciation from the President of the Medical College of Wisconsin and the Dean of the School of Medicine, 2015
Best paper award, 16th IEEE International Conference on Cognitive Informatics & Cognitive Computing at University of Oxford, 2017.

SCIENTIFIC AND PROFESSIONAL SOCIETIES

Member, Tau Beta Pi Engineering Honor Society, 1997
Member, Pi Tau Sigma Mechanical Engineering Society, 1997
Member, American Society of Mechanical Engineers, 1999
Member, American Physical Society, 2001
Member, International Society for Magnetic Resonance in Medicine, 2007
Member, Society for Magnetic Resonance Angiography, 2015
Member, Biomedical Engineering Society, 2016

RESEARCH GRANTS AND CONTRACT RECEIVED

Completed

Source: NIH, K25NS059891

V.L. Rayz (PI)

Title: Computational Modeling of hemodynamics in cerebral aneurysms.

Period: 01/15/08 – 01/14/13

Budget: \$595,954, Effort: 100%

Source: GE Catalyst Grant Program.

R.D'Souza (PI), V.L. Rayz (Co-PI)

Title: Co-Registration of Medical Scans from Different Imaging Modalities for Longitudinal Studies

Period: 08/31/2015 – 08/31/2016

Budget: \$55,324

Current

Source: NIH, NHLBI, R01HL115267

V.L. Rayz (PI); MCW: R. Sacho, UCSF: D. Saloner, C. Hess, L. Ge, and M.T. Lawton.

Title: Image-Based Numerical Predictions of Hemodynamics following Vascular Intervention.

Period: 09/03/2013 – 05/31/2018

Budget: \$1,561,765 total

Source: NIH, NHLBI, R01 HL114118

UCSF: D. Saloner (PI), L. Ge, M. Hope, Purdue: **V.L. Rayz**

Title: MRI of Structure and Function in Assessing Hemodynamic Impact on AAA Evolution.

Period: 04/07/2014 – 03/31/2018

Budget: \$1,793,958 total, Rayz: 1 cal month

Source: NIH, NCI, R01CA194533

UCSF: S. Hetts (PI), M. Saeed, M. Wilson, A. Martin, Y.W. Jun, T. Hope, H. VanBrocklin, S. Roy;
Purdue: **V.L. Rayz**, Caltech: J. Greer, R. Grubbs; UC Berkeley: N. Balsara; Chemofilter Ink: A. Patel, A. Chin.

Title: Endovascular Chemofiltration: Optimizing Removal of Chemotherapeutics and Nanoparticles from the Blood to Reduce Toxicity and Improve Image-Guided Drug Therapy.

Period: 06/01/2015 – 05/31/2020

Budget: \$2,595,272 total, Rayz: 1.7 cal month

Source: Clinical & Translational Science Institute of Southeast Wisconsin

MCW: J. LaDisa (PI), B. Hoffmann, K. Regner, A. Ching; Purdue: **V.L. Rayz**.

Title: Image-based modeling and RNA sequencing to predict maturation of arteriovenous fistulas created for hemodialysis.

Period: 01/01/2017 – 12/31/2017

Budget: \$50,000

PUBLICATIONS

Refereed journal papers

1. **V.L. Rayz**, S.A. Berger, and D. Saloner, “Transitional flows in arterial fluid dynamics”, Computer Methods in Applied Mechanics and Engineering, 196: 3043-3048, 2007
2. **V.L. Rayz**, M.T. Lawton, A. Martin, W.L. Young, and D. Saloner, “Numerical Simulation of Pre- and Post-surgical Flow in a Giant Basilar Aneurysm”, J.Biomech.Eng.,130(2):021004, 2008
3. **V.L. Rayz**, L. Bousset, G. Acevedo-Bolton, A.J. Martin, W.L. Young, M.T. Lawton, R. Higashida, and D. Saloner, “Numerical simulations of flow in cerebral aneurysms: comparison of CFD results and in vivo MRI measurements”, J.Biomech.Eng.,130(5):051011, 2008
4. L. Bousset, M. Wintermark, A. Martin, B. Dispensa, R. VanTijen, J. Leach, **V. Rayz**, G. Acevedo-Bolton, M. Lawton, R. Higashida, W. Young, and D. Saloner, “Monitoring Serial Change in the Lumen and Outer Wall of Vertebro-Basilar Aneurysms”, Am. J. Neuroradiol. 29(2):259-64, 2008

5. L. Bousset, **V.L. Rayz**, C. McCulloch, A. Martin, G. Acevedo-Bolton, M.T. Lawton, R. Higashida, W.S. Smith, W.L. Young, and D. Saloner, “Aneurysm growth occurs at region of low wall shear stress: Patient-specific correlation of hemodynamics and growth in a longitudinal study”, *Stroke*, 39:2997-3002, 2008
6. **V.L. Rayz**, L. Bousset, M.T. Lawton, G. Acevedo-Bolton, L. Ge, W.L. Young, R.T. Higashida, and D. Saloner, “Numerical modeling of the flow in intracranial aneurysms: prediction of regions prone to thrombus formation”, *Annals of Biomedical Engineering*, 36:1793-804, 2008
7. L. Bousset, **V.L. Rayz**, A. Martin, G. Acevedo-Bolton, M. Lawton, R. Higashida, W.S. Smith, W.L. Young, and D. Saloner, “Phase-Contrast MRI measurements in intra-cranial aneurysms in- vivo of flow patterns, velocity fields and wall shear stress: A comparison with CFD”, *Magnetic Resonance in Medicine*, 61:409-417, 2009
8. J.R. Leach, **V.L. Rayz**, M.R.K. Mofrad, and D. Saloner, “An efficient two-stage approach for image-based FSI analysis of atherosclerotic arteries”, *Biomechanics and Modeling in Mechanobiology*, 9(2):213-23, 2010
9. J.R. Leach, **V.L. Rayz**, B. Soares, M. Wintermark, M.R.K. Mofrad and D. Saloner, “Carotid Atheroma Rupture Observed In Vivo and FSI-Predicted Stress Distribution Based on Pre-rupture Imaging”, *Annals of Biomedical Engineering*, 38(8): 2748–2765, 2010
10. **V.L. Rayz**, L. Bousset, L. Ge, J.R. Leach, A.J. Martin, M.T. Lawton, C. McCulloch, and D. Saloner, “Flow Residence Time and Regions of Intraluminal Thrombus Deposition in Intracranial Aneurysms”, *Annals of Biomedical Engineering*, 38(10): 3058–3069, 2010
11. L. Bousset, **V.L. Rayz**, A. Martin, M. Lawton, R. Higashida, W.S. Smith, W.L. Young, and D. Saloner, “Temporal Stability of Dysmorphic Fusiform Aneurysms of the Intracranial Internal Carotid Artery”, *Journal of Vascular and Interventional Radiology*, 22(7): 1007-1011, 2011
12. M.E. Sughrue, D. Saloner, **V.L. Rayz**, and M.T. Lawton, “Giant Intracranial Aneurysms: Evolution of Management in a Contemporary Surgical Series”, *Neurosurgery*, 69(6): 1261–1271, 2011
13. R. Boutchko, **V.L. Rayz**, N.T. Vandehey, J.P. O’Neil, T.F. Budinger, P.S. Nico, J.L. Druhan, D. Saloner, G.T. Gullberg, W.W. Moses, “Imaging and modeling of flow in porous media using clinical nuclear emission tomography systems and computational fluid dynamics”, *Journal of Applied Geophysics*, 76:74-81, 2012
14. M. Sigovan, **V.L. Rayz**, W. Gasper, H.F. Alley, C.D. Owens, and D. Saloner, “Vascular Remodeling in Autogenous Arterio-Venous Fistulas by MRI and CFD”, *Annals of Biomedical Engineering*, 41(4): 657-668, 2013
15. **V.L. Rayz**, A. Abla, L. Bousset, J.R. Leach, G. Acevedo-Bolton, D. Saloner and M.T. Lawton, “Computational Modeling of Flow-Altering Surgeries in Basilar Aneurysms”, *Annals of Biomedical Engineering*, 43(5):1210-1222, 2015
16. N. Maani^G, **V.L. Rayz** and M. Nosonovsky, “Biomimetic approaches for green tribology: from the lotus effect to blood flow control”, *Surf. Topogr.: Metrol. Prop.* 3 034001, 2015
17. M.T. Lawton, A.A. Abla, W.C. Rutledge, A. Benet, Z. Zador, **V.L. Rayz**, D. Saloner, and V. Halbach, "Bypass Surgery for the Treatment of Dolichoectatic Basilar Trunk Aneurysms: A Work in Progress", *Neurosurgery*, 79(1):83-99, 2016
18. B.P. Walcott, C. Reinshagen, C.J. Stapleton, O. Choudhri, **V.L. Rayz**, D. Saloner, and M.T. Lawton. “Predictive modeling and in vivo assessment of cerebral blood flow in the management of complex cerebral aneurysms,” *J Cereb Blood Flow Metab*, 36(6): 998-1003, 2016
19. R. Ramachandran, N. Maani^G, **V.L. Rayz**, and M. Nosonovsky. “Vibrations and spatial patterns in biomimetic surfaces: using the shark-skin effect to control blood clotting,” *Philosophical Transactions of the Royal Society A*, DOI: 10.1098/rsta.2016.0133, 2016

20. A. Vali^{PD}, A. Abla, M.T. Lawton, D. Saloner and **V.L. Rayz**, “CFD modeling of contrast transport in basilar aneurysm following flow-altering surgeries”, *Journal of Biomechanics*, special issue on Biofluid Mechanics, 50:195–201, 2017
21. A. Bakhshinejad^G, A. Baghaie^{PD}, A. Vali^{PD}, D. Saloner, **V.L. Rayz** and R.M. D’Souza, “Merging computational fluid dynamics and 4D Flow MRI using proper orthogonal decomposition and ridge regression”, *Journal of Biomechanics*, 58(14): 162-173, 2017

Books and chapters in books

1. S.A. Berger and **V.L. Rayz**, “Flow in the stenotic carotid bifurcation”, In: *Numerical Simulations of Incompressible Flows*, (M. Hafez, Ed.), World Scientific Publishing Co. Pte. Ltd., 463-473, 2003
2. **V.L. Rayz** and S.A. Berger, “Computational Modeling of Vascular Hemodynamics”, In: *Computational Modeling in Biomechanics*, Part 2, 171-206, 2010

Contributed conference/symposium presentations

1. Rayz, V.L.*. and Berger S.A., “Flow in the stenotic carotid bifurcation”, 54th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, San Diego, California, November 2001.
2. Rayz, V.L.*. and Berger S.A., “The nature of the disturbed flow in severely stenotic blood vessels at moderate Reynolds numbers”, 55th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Dallas, Texas, November 2002.
3. Berger S.A. and Rayz, V.L.*, “Flow in the stenotic carotid bifurcation”, Proceedings of the American Society of Mechanical Engineers (ASME) International Mechanical Engineering Congress and Exposition (IMECE2002), New Orleans, Louisiana, November 2002.
4. Rayz, V.L.*, Williamson, S.D., and Berger S.A., “Unsteady flow in stenotic blood vessels”, 56th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, East Rutherford, New Jersey, November 2003.
5. Rayz, V.L.*, Williamson, S.D., Berger S.A. and Saloner D., “Blood flow in stenotic carotid bifurcation”, 57th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Seattle, Washington, November 2004.
6. D. Saloner*, G. Acevedo-Bolton, V. Rayz, M. Wintermark, A. Martin, B. Dispensa, W.L. Young, M. Lawton, J. Rapp, and L.-D. Jou, “Imaging and CFD in the analysis of vascular disease progression”, Proceedings of the International Society for Optics and Photonics (SPIE), 6143, 144-153, 2006.
7. Saloner, D.*, Rayz, V.L., Leach, J.R., Dispensa, B.P., Bousset, L., Acevedo-Bolton, G., Higashida, R.T., Lawton, M.T., and Young, W.L., “CE-MRA and MR velocimetry in the determination of hemodynamic forces in longitudinal studies of intracranial aneurysm growth”, International Society for Magnetic Resonance in Medicine – European Society of Magnetic Resonance in Medicine and Biology (ISMRM-ESMRMB) Joint Annual Meeting, Berlin, Germany, May 2007.
8. Rayz, V.L.*, Martin, A.J., Acevedo-Bolton, G., Higashida, R.T., Lawton, M.T., Young, W.L., and Saloner, D., “In vivo MR velocimetry in intracranial aneurysms: Computational fluid dynamics specification and validation”, International Society for Magnetic Resonance in Medicine – European Society of Magnetic Resonance in Medicine and Biology (ISMRM-ESMRMB) Joint Annual Meeting, Berlin, Germany, May 2007.
9. Rayz, V.L.*, Leach, J.R., Acevedo-Bolton, G., Dispensa, B.P., Bousset, L., Higashida, R.T., Wintermark, M., Lawton, M.T., Martin, A.J., Young, W.L., and Saloner, D., “CE-MRA and numerical modeling of the flow in intracranial aneurysms: prediction of regions prone to thrombus formation”, International Society for Magnetic Resonance in Medicine – European Society of

Magnetic Resonance in Medicine and Biology (ISMRM-ESMRMB) Joint Annual Meeting, Berlin, Germany, May 2007.

10. Rayz, V.L.*, Bousset, L., Leach, J.R., Acevedo-Bolton, G., Higashida, R.T., Lawton, M.T., Martin, A.J., Young, W.L., and Saloner, D., "Assessment of intracranial aneurysm thrombosis with patient-specific computational models based on MRI data", International Society for Magnetic Resonance in Medicine (ISMRM) Joint Annual Meeting, Toronto, Canada, May 2008.
11. Leach, J.R.*, Rayz, V.L., and Mofrad, M.R.K., "Patient specific FEM analysis of the atherosclerotic carotid bifurcation", 8th World Congress on Computational Mechanics, Venice, Italy, June 2008.
12. Rayz, V.L.*, Bousset, L., and Saloner, D., "Numerical simulation of cerebral aneurysm flow: prediction of thrombus-prone regions", 8th World Congress on Computational Mechanics, Venice, Italy, June 2008.
13. Rayz, V.L.*, Bousset, L., Acevedo-Bolton, G., Leach, J.R., Higashida, R.T., Lawton, M.T., Martin, A.J., Young, W.L., and Saloner, D., "In-plane PC-MRI as a tool for verification of non-Newtonian CFD models of the flow in cerebral aneurysms", International Society for Magnetic Resonance in Medicine (ISMRM) Joint Annual Meeting, Honolulu, Hawaii, April 2009.
14. Leach, J.R.*, Rayz, V.L., Wintermark, M., Kaazempur-Mofrad, M.R., and Saloner, D. "Patient specific FEM analysis of the atherosclerotic carotid bifurcation", American Society of Mechanical Engineers (ASME) Summer Bioengineering Conference, Squaw Creek, California, June 2009.
15. Ge, L.*, Rayz, V.L., Leach, J.R., and Saloner, D., "CFD simulations of the flow in cerebral aneurysms: computing and visualizing particle residence time", 10th US National Congress on Computational Mechanics, Columbus, Ohio, July 2009.
16. Rayz, V.L.*, Bousset, L., Ge, L., Leach, J.R., Martin, A.J., Lawton, M.T., and Saloner, D. "Flow residence time predicts the location of intra-aneurysmal thrombus: Numerical modeling based on MRA and MRV data", International Society for Magnetic Resonance in Medicine (ISMRM) Joint Annual Meeting, Stockholm, Sweden, May 2010.
17. Rayz, V.L., Acevedo-Bolton, G., Bousset, L. and Saloner, D., "Modeling cerebral aneurysm flow with initial conditions obtained from MR velocimetry", 63th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Long Beach, California, November 2010.
18. Rayz, V.L.*, Bousset, L., Acevedo-Bolton, G., Martin, A.J., and Saloner, D., "PC-MRI velocimetry as improved initial approximation in iterative CFD modeling", International Society for Magnetic Resonance in Medicine (ISMRM) Joint Annual Meeting, Montreal, Canada, May 2011.
19. Rayz, V.L.*, Lawton, M.T., Bousset, L., Martin, A.J., and Saloner, D., "Simulation of surgical interventions based on MRA/MRI", 23rd Annual International Conference on Magnetic Resonance Angiography, Banff, Canada, September 2011.
20. Rayz, V.L.*, Sigovan, M., Dyverfeldt, P., and Saloner, D., "4D MRI as the best way to prescribe patient-specific proximal and distal boundaries for numerical modeling", International Society for Magnetic Resonance in Medicine (ISMRM) Joint Annual Meeting, Melbourne, Australia, May 2012.
21. Rayz, V.L.*, Acevedo-Bolton, G., Leach, J.R., Dyverfeldt, P., Halbach, V., and Saloner D., "MRI-based computational modeling of flow through a flow-diverting stent", International Society for Magnetic Resonance in Medicine (ISMRM) Joint Annual Meeting, Melbourne, Australia, May 2012.
22. Rayz, V.L.*, Dyverfeldt, P. and Saloner D., "4D MRV-based CFD models supplement MRA data", 24th Annual International Conference on Magnetic Resonance Angiography, Utrecht, Netherlands, September 2012.
23. Rayz, V.L.*, Acevedo-Bolton, G., Martin, A.J., Halbach, V. and Saloner D., "MRI-based computations of flow following endovascular interventions", International Society for Magnetic Resonance in Medicine (ISMRM) Joint Annual Meeting, Salt Lake City, Utah, April 2013.

24. Rayz, V.L.*, Acevedo-Bolton, G., Lawton, M.T., Halbach, V., Leach, J.R. and Saloner D., “Numerical modeling of the flow in cerebral aneurysms can predict thrombus deposition region following vascular interventions”, Summer Bioengineering Conference, Sunriver, Oregon, June 2013.
25. Rayz, V.L.*, Leach, J.R., Acevedo-Bolton, G. and Saloner D., “Simulating contrast transport with CFD and 4D PC-MRI derived flow fields”, 25th Annual International Conference on Magnetic Resonance Angiography, Manhattan, New York, August 2013.
26. Rayz, V.L.*, Lawton, M.T., Abla, A., Halbach, V., Acevedo-Bolton, G., and Saloner, D., “Predictive modeling of the flow in cerebral aneurysms following surgical procedures”, 7th World Congress of Biomechanics, Boston, Massachusetts, July 2014.
27. Rayz, V.L.*, Bousset, L., Abla, A., Lawton, M.T., and Saloner D., “MRA & MRI – based computations of postoperative thrombosis in basilar aneurysms”, 26th Annual International Conference on Magnetic Resonance Angiography, Rome, Italy, September 2014.
28. Rayz, V.L.*, Lawton, M.T., Abla, A., Bousset, L., Leach, J.R., Acevedo, G., Halbach, V., and Saloner D., “Numerical predictions of hemodynamics following surgeries in cerebral aneurysms”, 67th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, San Francisco, California, November 2014.
29. Rayz, V.L.*, Zaidat, S., Acevedo-Bolton, G., Halbach, V., Saloner, D., and Lawton, M.T., “Computational modeling of postoperative flow and thrombosis in cerebral aneurysms”, Society of NeuroInterventional Surgery (SNIS) 12th Annual Meeting, San Francisco, California, July 2015.
30. Bousset, L., Sigovan, M., Leach J.R., Boisson, N., Saloner D., and Rayz, V.L.*, “PC-MRI based simulation of contrast-injection in cerebral aneurysms”, 27th Annual International Conference on Magnetic Resonance Angiography, Cincinnati, Ohio, September 2015.
31. Seshadri^{PD}, S., Lawton, M.T., Bousset, L., Saloner D., and Rayz, V.L.*, “Numerical simulations of post-surgical flow and thrombosis in basilar artery aneurysms”, 68th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Boston, Massachusetts, November 2015.
32. Rayz, V.L.*, Patel, A., Chin, A. and Hetts, S., “Computational modeling of Endovascular Chemofiltration device for removing toxins from blood”, 68th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Boston, Massachusetts, November 2015.
33. Rayz, V.L.*, Seshadri^{PD}, S., Bousset, L., Saloner, D. and Lawton, M.T., “Computational modeling of blood flow in cerebral aneurysms”, 8th International Bio-Fluids Symposium, Caltech, Pasadena, California, February 2016.
34. Rayz, V.L.*, “Predictive modeling of blood flow in cerebral aneurysms following surgeries”, Milwaukee Engineering Research Conference, Milwaukee, Wisconsin, May 2016.
35. A. Vali^{PD}*, M.T. Lawton, D. Saloner and V.L. Rayz, “Numerical modeling of post-surgical flow in basilar artery aneurysms”, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, Maryland, June 2016.
36. Rayz, V.L.*, Vali^{PD}, A., Bousset, L., Lawton, M.T. and Saloner, D., “Comparison of contrast agent transport obtained from CFD, 4D PC-MRI, and DSA in cerebral aneurysms”, European Congress on Computational Methods in Applied Sciences and Engineering, Crete Island, Greece, June 2016.
37. Rayz, V.L.*, Leach J.R., Saloner D., and Bousset, L., “Virtual contrast modeling based on PC-MRI flow measurements”, 12th World Congress on Computational Mechanics, Seoul, Korea, July 2016.
38. A. Vali^{PD}*, B. Dickerhoff^G, R. Sacho, R. Prost, S. Schnell, M. Markl and V.L. Rayz, “Flow quantification in cerebral aneurysms: CFD, 4D Flow MRI, and DSA”, 28th Society for Magnetic Resonance Angiography (SMRA) Annual International Conference, Chicago, Illinois, September 2016

39. Bakhshinejad^{G,*}, V.L. Rayz, and R.M. D'Souza, "Reconstructing blood velocity profiles from noisy 4D-PCMR data using ensemble Kalman filtering", Biomedical Engineering Society Annual Meeting, Minneapolis, Minnesota, October 2016.
40. Vali^{PD,*}, B. Dickerhoff^G, F. Faraji, D. Saloner and V.L. Rayz, "Using in-vivo 4D PC-MRI to obtain boundary conditions for CFD simulations of flow in cerebral aneurysms", Biomedical Engineering Society Annual Meeting, Minneapolis, Minnesota, October 2016.
41. M. Brindise^G, J. Zhang, B. Dickerhoff^G, C. Scalo, S. Schnell, M. Markl, D. Saloner, V.L. Rayz* and P.P. Vlachos, "PC-MRI, PIV, and CFD integrated framework for investigating velocity and pressure fields in patient specific cerebral aneurysm", International Society for Magnetic Resonance in Medicine (ISMRM) Workshop on Quantitative MR Flow: Innovation & Implementation for Clinical & Physiological Insights, San Francisco, California, October 2016.
42. A. Bakhshinejad^G, A. Baghaie^G, A. Vali^{PD}, D. Saloner, V.L. Rayz, and R.M. D'Souza*, "Reconstructing high fidelity hemodynamic flow fields by merging patient-specific computational fluid dynamics (CFD) and 4D phase contrast magnetic resonance data", International Society for Magnetic Resonance in Medicine (ISMRM) Workshop on Quantitative MR Flow: Innovation & Implementation for Clinical & Physiological Insights, San Francisco, California, October 2016.
43. V.L. Rayz*, A. Vali^{PD}, M. Sigovan, M.T. Lawton, D. Saloner and Loic Boussel, "Modeling contrast agent flow in cerebral aneurysms: comparison of CFD with medical imaging", 69th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Portland, Oregon, November 2016.
44. N. Maani^{G,*}, S. Beyhaghi^G, D. Yee, M. Nosonovsky, J. Greer, S. Hetts and V.L. Rayz, "Multiscale modeling of a Chemofilter device for filtering chemotherapy toxins from blood", 69th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Portland, Oregon, November 2016.
45. M. Brindise^{G,*}, B. Dickerhoff^G, D. Saloner, V.L. Rayz and P. Vlachos, "Volumetric PIV in patient-specific cerebral aneurysm", 69th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Portland, Oregon, November 2016.
46. N. Maani^{G,*}, D. Yee, M.J. Nosonovsky, J.R. Greer, S. Hetts and V.L. Rayz, "Computational Modeling in Design of Endovascular Chemofilter Device for Removing Toxins from Blood", IEEE Great Lakes Biomedical Conference, Milwaukee, WI, April 2017.
47. J.M. Rayz*, V.L. Rayz* and V. Raskin, "Cognitive Imaging: Using Knowledge Representation for Reliable Segmentation of MR Angiography Data", 16th IEEE International Conference on Cognitive Informatics & Cognitive Computing, University of Oxford, UK, July 2017.
48. J.M. Rayz*, D. Saloner and V.L. Rayz, "Ontological Approach to Detecting Imaging Artifacts in MRA images", 29th Society for Magnetic Resonance Angiography (SMRA) Annual International Conference, Stellenbosch, South Africa, October 2017
49. M. Brindise, C.Goergen, S. Schnell, M. Markl, P. Vlachos and V.L. Rayz*, "Comparison of 4D Flow MRI Measurements to PIV and CFD Modeling", 29th Society for Magnetic Resonance Angiography (SMRA) Annual International Conference, Stellenbosch, South Africa, October 2017
50. N. Maani^{G,*}, D. Yee, M. Nosonovsky, J. Greer, S. Hetts, and V.L. Rayz, "CFD modeling of catheter-based Chemolter device for filtering chemotherapy drugs from venous flow", 70th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Denver, Colorado, November 2017
51. M. Brindise^{G,*}, B. Dickerhoff^G, D. Saloner, V.L. Rayz and P.P. Vlachos,, "Investigation of Patient-Specific Cerebral Aneurysm using Volumetric PIV, CFD, and In Vitro PC-MRI", 70th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Denver, Colorado, November 2017

52. V.L. Rayz* and S. Schnell, “Flow in cerebral aneurysms: 4D Flow MRI measurements and CFD models”, 70th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Denver, Colorado, November 2017

Invited publications and conference/symposium presentations

1. “Image-based flow models may help plan treatment for brain aneurysms”, Plenary session, Great Lakes Biomedical Conference, Milwaukee, Wisconsin, May 15, 2015.
2. “Intracranial blood flow & aneurysms: In-vivo flow and analysis and CFD”, Invited presentation, Joint Society for Cardiovascular Magnetic Resonance (SCMR) and ”, International Society for Magnetic Resonance in Medicine (ISMRM) workshop on Cardiovascular Flow and Motion, Orlando, Florida, February 1, 2012.

Invited colloquium/seminar series presentations

1. “Hemodynamics in cerebral aneurysms: Patient-specific CFD modeling”, Fluid Dynamics Seminar, University of California – Berkeley, CA, October 26, 2009.
2. “Numerical modeling of blood flow resulting from surgical procedures in brain aneurysms”, Fluid Dynamics Seminar, University of California – Berkeley, CA, November 06, 2013.
3. “Computational modeling of blood flow in brain aneurysms”, Mechanical Engineering Seminar, University of Washington, May 5, 2014.
4. “Computational modeling of blood flow in brain aneurysms”, College of Engineering Seminar, University of Wisconsin - Milwaukee, April 28, 2014.
5. “Computational modeling of blood flow in cerebral aneurysms”, Neurosurgery Grand Rounds, Medical College of Wisconsin, June 6, 2014.
6. “Computational modeling of blood flow in brain aneurysms”, Bioengineering Department Seminar, University of Nevada Las Vegas, April 10, 2015.
7. “Computational modeling of blood flow in cerebral aneurysms”, Neurosurgery Grand Rounds, University of Arkansas for Medical Sciences, Little Rock, AR, June 06, 2015.
8. “Computational modeling of blood flow in brain aneurysms”, Joint BME Department Seminar Series: Marquette University — Medical College of Wisconsin — University of Wisconsin - Milwaukee, October 30, 2015.
9. “Numerical simulations of postoperative flow in brain aneurysms”, Applied & Computational Math Seminar, UW-Milwaukee Mathematical Sciences, November 11, 2015.
10. “Hemodynamics in intracranial aneurysms: CFD models based on medical imaging data”, Imperial College, London, UK, July 4, 2016.
11. “Hemodynamics in cerebral aneurysms: Computational models based on medical imaging data”, Biomedical Engineering seminar, Purdue University, October 17, 2016.
12. “Image-based computations of post-surgical flow in brain aneurysms”, Bioengineering Department Seminar, University of Illinois at Chicago, January 27, 2017.
13. BME 695 Cardiovascular Biomedical Engineering and Imaging, Guest lecture on modeling the flow in cerebral aneurysms, January 31, 2017
14. “Patient-specific modeling of flow-altering interventions in intracranial aneurysms”, Neurosurgery Grand Rounds, Medical College of Wisconsin, April 7, 2017.

TECHNOLOGY TRANSFER

Patents Submitted

S. Hetts, V.L. Rayz, B. Kilbride, B. Thorne, U.S. Provisional Application No. 62/204,374: “Filtration Devices and Methods Related Thereto”, pending

Industry interactions

Mimics Materialise software license for 20 students, for UWM ME 890, 2015

Appearances in Media Interviews and Other Coverage

“Patient-specific computational models can predict post-surgical blood flow in brain aneurysms” -- with M.T. Lawton, Brain Aneurysm Foundation Webinar, December 16, 2015. Target audience: patients affected by cerebral aneurysm disease and their caretakers.

TV – CBS 58, Interview with R. Sacho and B. Dickerhoff^G on generating computational and 3D-printed models of brain aneurysms in order to provide guidance in treatment, April 7, 2017.

ENGAGEMENT

Major Committee Assignments in the Department, School and/or University

Purdue University

- College of Engineering: First Year Engineering Curriculum Committee
- BME Undergraduate Curriculum Committee
- BME Graduate Admissions Committee
- Member of the BME Imaging Group
- Member of the BME Engineered Biomaterials and Biomechanics Group

University of Wisconsin – Milwaukee

- Mechanical Engineering Undergraduate Program Committee.
- GAANN (graduate assistance in areas of national need) Committee.
- Founding member, committee on the development of a new Biomedical Engineering program in collaboration with the Medical College of Wisconsin.
- UW – Milwaukee – Medical College of Wisconsin – Marquette University Hemodynamics and biofluid modeling group (co-lead), biweekly.
- Biomedical Engineering Industrial Advisory Council.

Service to Government or Professional Organizations

Participation and planning professional programs

- Session chair: American Physical Society Division of Fluid Dynamics 67th Annual Meeting, San Francisco, California, November 2014.
- Session chair: ISMRM Workshop on Quantitative MR Flow: Innovation & Implementation for Clinical & Physiological Insights, San Francisco, California, October 2016.
- Session chair, Brain and Lymphatic System: American Physical Society Division of Fluid Dynamics 70th Annual Meeting, Denver Colorado, November 2017.

- Member of the organizing committee: 2017 IEEE Great Lakes Biomedical Engineering Conference, Milwaukee, WI, April 2017
- Organized Midwest Seminar on Hemodynamics and Cardiovascular Disease. First seminar was held at the Medical College of Wisconsin, meetings in January and October 2015
- Co-organizer of BME Imaging Symposium for faculty and graduate students involved in medical imaging research, September 2017
- BME Seminar Series: Invited Dr. Mofrad, Bioengineering, UC-Berkeley, November 2017
- Cardiovascular Imaging Seminar: Invited Dr. Boussel, Head of Radiology at the University of Lyon, France, November 2017.

External Professional Service

- Associate guest editor for the journal “Medical Physics”
- Reviewer for the journal “Neurosurgery”.
- Reviewer for the journal “Annals of Biomedical Engineering”.
- Reviewer for the “Journal of Biomechanical Engineering”.
- Reviewer for the “Journal of Biomechanics”.
- Reviewer for the journal “Circulation”
- Reviewer for the journal “Medical Engineering and Physics”.
- Reviewer for the “American Journal of Neuroradiology”.
- Reviewer for the “European Journal of Mechanics – B/Fluids”.
- Reviewer for the journal “Biomechanics and Modeling in Mechanobiology”.
- Reviewer for the journal “European Radiology”.
- Reviewer for the journal “Cardiovascular Engineering and Technology”.
- Reviewer for the journal “Journal of Magnetic Resonance Imaging”.

Consulting Activities (Industry or Government Agencies)

Informal unpaid consulting for neurosurgeons at UC San Francisco, Medical College of Wisconsin and University of Arkansas for Medical Sciences on surgical options that would optimize postoperative flow.