References

[1] Abbasian, M., Shams, M., Valizadeh, Z., Moshfegh, A., Javadzadegan, A., Cheng, S., 2020a. Effects of different non-Newtonian models on unsteady blood flow hemodynamics in patient-specific arterial models with in-vivo validation. Computer Methods and Programs in Biomedicine 186, 105185. https://doi.org/10.1016/j.cmpb.2019.105185

[2] Abbasian, M., Shams, M., Valizadeh, Z., Moshfegh, A., Javadzadegan, A., Cheng, S., 2020b. Effects of different non-Newtonian models on unsteady blood flow hemodynamics in patient-specific arterial models with in-vivo validation. Computer Methods and Programs in Biomedicine 186, 105185. https://doi.org/10.1016/j.cmpb.2019.105185

[3] Abdelsalam, S.I., Mekheimer, K.S., Zaher, A.Z., 2022. Dynamism of a hybrid Casson nanofluid with laser radiation and chemical reaction through sinusoidal channels. Waves in Random and Complex Media. https://doi.org/10.1080/17455030.2022.2058714

[4] Abdelsalam, S.I., Zaher, A.Z., 2022. On behavioral response of ciliated cervical canal on the development of electroosmotic forces in spermatic fluid. Mathematical Modelling of Natural Phenomena 17. https://doi.org/10.1051/mmnp/2022030

[5] Abroug, F., Ouanes-Besbes, L., Nciri, N., Sellami, N., Addad, F., Hamda, K. Ben, Amor, A. Ben, Najjar, M.F., Knani, J., 2006. Association of left-heart dysfunction with severe exacerbation of chronic obstructive pulmonary disease: Diagnostic performance of cardiac biomarkers. American Journal of Respiratory and Critical Care Medicine 174, 990–996. https://doi.org/10.1164/rccm.200603-380OC

[6] Aggarwal, S., Qamar, A., Sharma, V., Sharma, A., 2011. Abdominal aortic aneurysm: A comprehensive review. Experimental and Clinical Cardiology 16, 11–15.

[7] Ahmed, S.A., Giddens, D.P., 1983. Flow disturbance measurements through a constricted tube at moderate Reynolds numbers. Journal of Biomechanics 16, 955–963. https://doi.org/10.1016/0021-9290(83)90096-9

[8] Ahsaas, S., Tiwari, S., 2016. Numerical Simulation of Blood Flow through Asymmetric and Symmetric Occlusion in Carotid Artery 1–8.

[9] Akbarzadeh, P., 2016. Pulsatile magneto-hydrodynamic blood flows through porous blood vessels using a third grade non-Newtonian fluids model. Computer Methods and Programs in Biomedicine 126, 3–19. https://doi.org/10.1016/j.cmpb.2015.12.016

[10] Alimohammadi, M., Pichardo-Almarza, C., Agu, O., Díaz-Zuccarini, V., 2017. A multiscale modelling approach to understand atherosclerosis formation: A patient-specific case study in the aortic bifurcation. Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine 231, 378–390. https://doi.org/10.1177/0954411917697356

[11] Alishahi, M., Alishahi, M.M., Emdad, H., 2011. Sharif University of Technology Numerical simulation of blood flow in a flexible stenosed abdominal real aorta. Scientia Iranica 18, 1297–1305. https://doi.org/10.1016/j.scient.2011.11.021

[12] Allardice, J.T., Allwright, G.J., Wafula, J.M.C., Wyatt, A.P., 1988. High prevalence of abdominal aortic aneurysm in men with peripheral vascular disease: Screening by ultrasonography. British Journal of Surgery 75, 240–242. https://doi.org/10.1002/bjs.1800750318

[13] Alsharif, A.M., Abdellateef, A.I., Elmaboud, Y.A., Abdelsalam, S.I., 2022. Performance enhancement of a DC-operated micropump with electroosmosis in a hybrid nanofluid: fractional Cattaneo heat flux problem. Applied Mathematics and Mechanics (English Edition) 43, 931–944. https://doi.org/10.1007/s10483-022-2854-6

[14] Anagnostakos, J., Lal, B.K., 2021. Abdominal aortic aneurysms. Progress in Cardiovascular Diseases 65, 34–43. https://doi.org/https://doi.org/10.1016/j.pcad.2021.03.009

[15] Anand, M., Rajagopal, K.R., 2004. A shear-thinning viscoelastic fluid model for describing the flow of blood. International Journal of Cardiovascular Medicine and Science 4, 59–68.

[16] Antonova, N., 2012. On some mathematical models in hemorheology. Biotechnology and Biotechnological Equipment 26, 3286–3291. https://doi.org/10.5504/bbeq.2012.0069

[17] Arteritis - Wikipedia [WWW Document], n.d. URL https://en.wikipedia.org/wiki/Arteritis (accessed 7.2.23).

[18] Arun Mahalingam, Udhav Gawandalkar, Girish Kini, Abdulrajak Buradi, Tadashi Araki, Nobutaka Ikeda, Andrew Nicolaides, John R Laird, Luca Saba, J.S.S., 2016. Numerical analysis of the effect of turbulence transition on the hemodynamics parameters in human coronary arteries.

Cardiovascular Diagnosis and Therapy 9, 3–5.

[19] Attenberger, U.I., Morelli, J.N., Schoenberg, S.O., Michaely, H.J., 2011. Assessment of the kidneys: magnetic resonance angiography, perfusion and diffusion. Journal of Cardiovascular Magnetic Resonance 13, 70. https://doi.org/10.1186/1532-429X-13-70

[20] Aulivola, B., 2008. Abdominal Aortic Aneurysm. Common Surgical Diseases 97–100. https://doi.org/10.1007/978-0-387-75246-4_24

[21] Bai, Z., Zhu, L., 2019a. Simulation of blood flow past a distal arteriovenous-graft anastomosis at low Reynolds numbers. Physics of Fluids 31. https://doi.org/10.1063/1.5099635

[22] Bai, Z., Zhu, L., 2019b. 3D simulation of a viscous flow past a compliant model of arteriovenous-graft annastomosis. Computers and Fluids 181, 403–415. https://doi.org/10.1016/j.compfluid.2019.02.006

[23] Barbato, F., Allocca, R., Bosso, G., Numis, F.G., 2022. Anatomy of Cerebral Arteries with Clinical Aspects in Patients with Ischemic Stroke. Anatomia 1, 152–169. https://doi.org/10.3390/anatomia1020016

[24] Baskurt, O.K., Meiselman, H.J., 2003. Blood Rheology and Hemodynamics. Seminars in Thrombosis and Hemostasis 29, 435–450. https://doi.org/10.1055/s-2003-44551

[25] Behbahani, P.M., 2013. Numerical Analysis of Blood Flow in Human Arteries and Medical Devices.

[26] Bejan, A., Rocha, L.A.O., Lorente, S., 2000. Thermodynamic optimization of geometry: T- and Y-shaped constructs of fluid streams. International Journal of Thermal Sciences 39, 949–960. https://doi.org/10.1016/S1290-0729(00)01176-5

[27] Beris, A.N., Horner, J.S., Jariwala, S., Armstrong, M.J., Wagner, N.J., 2021. Recent advances in blood rheology: A review. Soft Matter 17, 10591–10613. https://doi.org/10.1039/d1sm01212f

[28] Bessonov, N., Sequeira, A., Simakov, S., Vassilevskii, Y., Volpert, V., 2016. Methods of Blood Flow Modelling. Mathematical Modelling of Natural Phenomena 11, 1–25. https://doi.org/10.1051/mmnp/201611101

[29] Biro, G.P., 1982. Comparison of acute cardiovascular effects and oxygen-supply following haemodilution with dextran, stroma-free haemoglobin solution and fluorocarbon suspension.

Cardiovascular Research 16, 194–204. https://doi.org/10.1093/cvr/16.4.194

[30] Blausen 0257 CoronaryArtery Plaque - Coronary artery disease - Wikipedia [WWW Document], n.d. URL https://en.wikipedia.org/wiki/Coronary_artery_disease#/media/File:Blausen_0257_CoronaryArtery_Plaque.png (accessed 7.2.23).

[31] Blazek, J., 2015. Principles of Solution of the Governing Equations. Computational Fluid Dynamics: Principles and Applications 29–72. https://doi.org/10.1016/b978-0-08-099995-1.00003-8

[32] Bluestein, D., Niu, L., Schoephoerster, R.T., Dewanjee, M.K., 1996. Steady Flow in an Aneurysm Model: Correlation Between Fluid Dynamics and Blood Platelet Deposition. Journal of Biomechanical Engineering 118, 280–286. https://doi.org/10.1115/1.2796008

[33] Bogren, H.G., Klipstein, R.H., Firmin, D.N., Mohiaddin, R.H., Underwood, S.R., Simon O Rees, R., Longmore, D.B., 1989. Quantitation of antegrade and retrograde blood flow in the human aorta by magnetic resonance velocity mapping. American Heart Journal 117, 1214–1222. https://doi.org/10.1016/0002-8703(89)90399-2

[34] Bonert, M., Leask, R.L., Butany, J., Ethier, C.R., Myers, J.G., Johnston, K.W., Ojha, M., 2003. The relationship between wall shear stress distributions and intimal thickening in the human abdominal aorta. Biomedical engineering online 2, 18. https://doi.org/10.1186/1475-925X-2-18

[35] Borazjani, I., Westerdale, J., McMahon, E.M., Rajaraman, P.K., Heys, J.J., Belohlavek, M., 2013. Left ventricular flow analysis: Recent advances in numerical methods and applications in cardiac ultrasound. Computational and Mathematical Methods in Medicine 2013. https://doi.org/10.1155/2013/395081

[36] Boussel, L., Rayz, V., McCulloch, C., Martin, A., Acevedo-Bolton, G., Lawton, M., Higashida, R., Smith, W.S., Young, W.L., Saloner, D., 2008. Aneurysm Growth Occurs at Region of Low Wall Shear Stress. Stroke. https://doi.org/10.1161/strokeaha.108.521617

[37] Boutsianis, E., Guala, M., Olgac, U., Wildermuth, S., Hoyer, K., Ventikos, Y., Poulikakos, D., 2009a. CFD and PTV steady flow investigation in an anatomically accurate abdominal aortic aneurysm. Journal of Biomechanical Engineering 131. https://doi.org/10.1115/1.3002886

[38] Boutsianis, E., Guala, M., Olgac, U., Wildermuth, S., Hoyer, K., Ventikos, Y., Poulikakos, D.,

2009b. CFD and PTV steady flow investigation in an anatomically accurate abdominal aortic aneurysm. Journal of Biomechanical Engineering 131, 1–15. https://doi.org/10.1115/1.3002886

[39] Boutsianis, E., Guala, M., Olgac, U., Wildermuth, S., Hoyer, K., Ventikos, Y., Poulikakos, D., 2009c. CFD and PTV steady flow investigation in an anatomically accurate abdominal aortic aneurysm. Journal of biomechanical engineering 131, 011008. https://doi.org/10.1115/1.3002886

[40] Boyd, J., Buick, J.M., Green, S., 2007. Analysis of the Casson and Carreau-Yasuda non-Newtonian blood models in steady and oscillatory flows using the lattice Boltzmann method. Physics of Fluids 19. https://doi.org/10.1063/1.2772250

[41] Brady, A.R., Thompson, S.G., Fowkes, F.G.R., Greenhalgh, R.M., Powell, J.T., 2004. Abdominal aortic aneurysm expansion: Risk factors and time intervals for surveillance. Circulation 110, 16–21. https://doi.org/10.1161/01.CIR.0000133279.07468.9F

[42] Brewster, D.C., Cronenwett, J.L., Hallett, J.W., Johnston, K.W., Krupski, W.C., Matsumura, J.S., 2003. Guidelines for the treatment of abdominal aortic aneurysms: Report of a subcommittee of the Joint Council of the American Association for Vascular Surgery and Society for Vascular Surgery. Journal of Vascular Surgery 37, 1106–1117. https://doi.org/10.1067/mva.2003.363

[43] Budwig, R., Elger, D., Hooper, H., Slippy, J., 1993. Steady Flow in Abdominal Aortic Aneurysm Models. Journal of Biomechanical Engineering 115, 418–423. https://doi.org/10.1115/1.2895506

[44] Buradi, A., Mahalingam, A., 2020. Numerical Analysis of Wall Shear Stress Parameters of Newtonian Pulsatile Blood Flow Through Coronary Artery and Correlation to Atherosclerosis. Lecture Notes in Mechanical Engineering 107–118. https://doi.org/10.1007/978-981-15-0124-1_12

[45] Burattini, R., Sipkema, P., van Huis, G.A., Westerhof, N., 1985. Identification of canine coronary resistance and intramyocardial compliance on the basis of the waterfall model. Annals of Biomedical Engineering. https://doi.org/10.1007/BF02407768

[46] Caballero, A.D., Laín, S., 2015. Numerical simulation of non-Newtonian blood flow dynamics in human thoracic aorta. Computer Methods in Biomechanics and Biomedical Engineering 18, 1200–1216. https://doi.org/10.1080/10255842.2014.887698

[47] Canchi, T., Kumar, S.D., Ng, E.Y.K., Narayanan, S., 2015. A Review of Computational

Methods to Predict the Risk of Rupture of Abdominal Aortic Aneurysms. BioMed Research International 2015. https://doi.org/10.1155/2015/861627

[48] Cao, H., Li, Y., Zhao, Y., Xiong, T., Liu, Z., Zheng, T., Chen, M., 2021. Hemodynamic Characteristics of Patients With Suspected Coronary Heart Disease at Their Initial Visit. Frontiers in Physiology 12, 1–9. https://doi.org/10.3389/fphys.2021.714438

[49] Capillary system CERT - Capillary - Wikipedia [WWW Document], n.d. URL https://en.wikipedia.org/wiki/Capillary#/media/File:Capillary_system_CERT.jpg (accessed 7.2.23).

[50] Cardiovascular diseases (CVDs) [WWW Document], n.d. URL https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds) (accessed 12.22.21).

[51] Cardiovascular system [WWW Document], n.d. URL https://wordwall.net/en-gb/community/cardiovascular-system-label-the-double-circulatory-system (accessed 7.2.23).

[52] Caro, C.G., Fitz-Gerald, J.M., Schroter, R.C., 1971. Atheroma and arterial wall shear. Observation, correlation and proposal of a shear dependent mass transfer mechanism for atherogenesis. Proceedings of the Royal Society of London. Series B. Biological sciences 177, 109–159. https://doi.org/10.1098/rspb.1971.0019

[53] Carvalho, V., Rodrigues, N., Ribeiro, R., Costa, P.F., Teixeira, J.C.F., Lima, R.A., Teixeira, S.F.C.F., 2021. Hemodynamic study in 3D printed stenotic coronary artery models: experimental validation and transient simulation. Computer Methods in Biomechanics and Biomedical Engineering 24, 623–636. https://doi.org/10.1080/10255842.2020.1842377

[54] Cebral, J.R., Castro, M.A., Burgess, J.E., Pergolizzi, R.S., Sheridan, M.J., Putman, C.M., 2005. Characterization of cerebral aneurysms for assessing risk of rupture by using patient-specific computational hemodynamics models. American Journal of Neuroradiology 26, 2550–2559. https://doi.org/10.1016/s0098-1672(08)70473-9

[55] Chaichana, T., Sun, Z., Jewkes, J., 2012. Computational Fluid Dynamics Analysis of the Effect of Plaques in the Left Coronary Artery 2012. https://doi.org/10.1155/2012/504367

[56] Charkoudian, N., 2010. Mechanisms and modifiers of reflex induced cutaneous vasodilation and vasoconstriction in humans. Journal of Applied Physiology 109, 1221–1228. https://doi.org/10.1152/japplphysiol.00298.2010

[57] Chen, J., Lu, X., 2004a. Numerical investigation of the non-Newtonian blood flow in a bifurcation model with a non-planar branch 37, 1899–1911. https://doi.org/10.1016/j.jbiomech.2004.02.030

[58] Chen, J., Lu, X.Y., 2004b. Numerical investigation of the non-Newtonian blood flow in a bifurcation model with a non-planar branch. Journal of Biomechanics 37, 1899–1911. https://doi.org/10.1016/j.jbiomech.2004.02.030

[59] Chen, J., Lu, X.Y., Wang, W., 2006. Non-Newtonian effects of blood flow on hemodynamics in distal vascular graft anastomoses. Journal of Biomechanics 39, 1983–1995. https://doi.org/10.1016/j.jbiomech.2005.06.012

[60] Chen, L.J., Tong, Z.R., Wang, Q., Zhang, Y.Q., Liu, J.L., 2018. Feasibility of Computational Fluid Dynamics for Evaluating the Intraventricular Hemodynamics in Single Right Ventricle Based on Echocardiographic Images. BioMed Research International 2018. https://doi.org/10.1155/2018/1042038

[61] Cherry, E.M., Eaton, J.K., 2013. Shear thinning effects on blood flow in straight and curved tubes. Physics of Fluids 25. https://doi.org/10.1063/1.4816369

[62] Cho, Y.I., Kensey, K.R., 1991. Effects of the non-Newtonian viscosity of blood on flows in a diseased arterial vessel. Part 1: Steady flows. Biorheology 28, 241–262. https://doi.org/10.3233/BIR-1991-283-415

[63] Choudhury, S., Anupindi, K., Patnaik, B.S.V., 2019. Influence of wall shear stress and geometry on the lumen surface concentration of low density lipoprotein in a model abdominal aortic aneurysm. Physics of Fluids 31. https://doi.org/10.1063/1.5074125

[64] Clogging of arteries treated - Parsi Teb [WWW Document], n.d. URL https://en.parsiteb.com/clogging-of-arteries-treated/ (accessed 7.2.23).

[65] Contijoch, F.J., Horowitz, M., Masutani, E., Kligerman, S., Hsiao, A., 2020. 4D Flow Vorticity Visualization Predicts Regions of Quantitative Flow Inconsistency for Optimal Blood Flow Measurement. Radiology: Cardiothoracic Imaging 2, e190054. https://doi.org/10.1148/ryct.2020190054

[66] Conway, E.M., Collen, D., Carmeliet, P., 2001. Molecular mechanisms of blood vessel growth.

Cardiovascular Research 49, 507–521. https://doi.org/10.1016/S0008-6363(00)00281-9

[67] Cordeiro, M.A.S., Lima, J.A.C., 2006. Atherosclerotic Plaque Characterization by Multidetector Row Computed Tomography Angiography. Journal of the American College of Cardiology 47. https://doi.org/10.1016/j.jacc.2005.09.076

[68] Corsini, C., Baker, C., Kung, E., Schievano, S., Arbia, G., Baretta, A., Biglino, G., Migliavacca, F., Dubini, G., Pennati, G., Marsden, A., Vignon-Clementel, I., Taylor, A., Hsia, T.-Y., Dorfman, A., 2014. An integrated approach to patient-specific predictive modeling for single ventricle heart palliation. Computer Methods in Biomechanics and Biomedical Engineering 17, 1572–1589. https://doi.org/10.1080/10255842.2012.758254

[69] Cox, C., Plesniak, M.W., 2021. The effect of entrance flow development on vortex formation and wall shear stress in a curved artery model. Physics of Fluids 33. https://doi.org/10.1063/5.0062565

[70] Creager, M.A., Loscalzo, J., 2018. Arterial Diseases of the Extremities, in: Jameson, J.L., Fauci, A.S., Kasper, D.L., Hauser, S.L., Longo, D.L., Loscalzo, J. (Eds.), Harrison's Principles of Internal Medicine, 20e. McGraw-Hill Education, New York, NY.

[71] CT arterial angiography [WWW Document], n.d. . CT arterial angiography. URL https://www.stritch.luc.edu/lumen/meded/radio/curriculum/neurology/cva_2013.htm (accessed 7.2.23).

[72] Cury, R.C., Abbara, S., Achenbach, S., Agatston, A., Berman, D.S., Budoff, M.J., Dill, K.E., Jacobs, J.E., Maroules, C.D., Rubin, G.D., Rybicki, F.J., Schoepf, U.J., Shaw, L.J., Stillman, A.E., White, C.S., Woodard, P.K., Leipsic, J.A., 2016. CAD-RADSTM Coronary Artery Disease – Reporting and Data System. An expert consensus document of the Society of Cardiovascular Computed Tomography (SCCT), the American College of Radiology (ACR) and the North American Society for Cardiovascular Imaging (NA. Journal of Cardiovascular Computed Tomography 10, 269–281. https://doi.org/10.1016/j.jcct.2016.04.005

[73] CV Physiology | Cardiac Cycle [WWW Document], n.d. URL https://cvphysiology.com/heart-disease/hd002 (accessed 7.2.23).

[74] Davies, P.F., Civelek, M., Fang, Y., Fleming, I., 2013. The atherosusceptible endothelium: Endothelial phenotypes in complex haemodynamic shear stress regions in vivo. Cardiovascular

Research 99, 315–327. https://doi.org/10.1093/cvr/cvt101

[75] DeBakey, M.E., Lawrie, G.M., Glaeser, D.H., 1985. Patterns of atherosclerosis and their surgical significance. Annals of Surgery 201, 115–131. https://doi.org/10.1097/00000658-198502000-00001

[76] Doenst, T., Spiegel, K., Reik, M., Markl, M., Hennig, J., Nitzsche, S., Beyersdorf, F., Oertel, H., 2009. Fluid-Dynamic Modeling of the Human Left Ventricle: Methodology and Application to Surgical Ventricular Reconstruction. Annals of Thoracic Surgery 87, 1187–1195. https://doi.org/10.1016/j.athoracsur.2009.01.036

[77] Doost, S.N., Ghista, D., Su, B., Zhong, L., Morsi, Y.S., 2016a. Heart blood flow simulation: A perspective review. BioMedical Engineering Online 15, 1–28. https://doi.org/10.1186/s12938-016-0224-8

[78] Doost, S.N., Zhong, L., Su, B., Morsi, Y.S., 2016b. The numerical analysis of non-Newtonian blood flow in human patient-specific left ventricle. Computer Methods and Programs in Biomedicine 127, 232–247. https://doi.org/10.1016/j.cmpb.2015.12.020

[79] Doost, S.N., Zhong, L., Su, B., Morsi, Y.S., 2015. The numerical analysis of non-Newtonian blood flow in human patient-specific left ventricle. Computer Methods and Programs in Biomedicine 127, 232–247. https://doi.org/10.1016/j.cmpb.2015.12.020

[80] Doyle, B.J., Cloonan, A.J., Walsh, M.T., Vorp, D.A., McGloughlin, T.M., 2010. Identification of rupture locations in patient-specific abdominal aortic aneurysms using experimental and computational techniques. Journal of Biomechanics 43, 1408–1416. https://doi.org/10.1016/j.jbiomech.2009.09.057

[81] Dwidmuthe, P.D., Dastane, G.G., Mathpati, C.S., Joshi, J.B., 2020. Study of blood flow in stenosed artery model using computational fluid dynamics and response surface methodology. The Canadian Journal of Chemical Engineering. https://doi.org/10.1002/cjce.23991

[82] Publication Information, 2016. . Journal of Biomechanics. https://doi.org/10.1016/S0021-9290(16)31175-7

[83] Egelhoff, C.J., Budwig, R.S., Elger, D.F., Khraishi, T.A., Johansen, K.H., 1999. Model studies of the flow in abdominal aortic aneurysms during resting and exercise conditions. Journal of

Biomechanics 32, 1319–1329. https://doi.org/10.1016/S0021-9290(99)00134-7

[84] Errill, E.W., 1969. Rheology of blood. Physiological Reviews 49, 863–888. https://doi.org/10.1152/physrev.1969.49.4.863

[85] EUSTICE, J., 1910. Flow of water in curved pipes.

[86] Faizan, M., Ali, F., Loganathan, K., Zaib, A., Reddy, C.A., Abdelsalam, S.I., 2022. Entropy Analysis of Sutterby Nanofluid Flow over a Riga Sheet with Gyrotactic Microorganisms and Cattaneo–Christov Double Diffusion. Mathematics 10. https://doi.org/10.3390/math10173157

[87] Faraji, A., Sahebi, M., SalavatiDezfouli, S., 2022. Numerical investigation of different viscosity models on pulsatile blood flow of thoracic aortic aneurysm (TAA) in a patient-specific model. Computer Methods in Biomechanics and Biomedical Engineering 0, 1–13. https://doi.org/10.1080/10255842.2022.2102423

[88] Fatahian, E., Kordani, N., Fatahian, H., 2018. A review on rheology of non-Newtonian properties of blood. IIUM Engineering Journal 19, 237–250. https://doi.org/10.31436/iiumej.v19i1.826

[89] Ferdows, M., Hoque, K.E., Bangalee, M.Z.I., Xenos, M.A., 2022. Wall shear stress indicators influence the regular hemodynamic conditions in coronary main arterial diseases: cardiovascular abnormalities. Computer Methods in Biomechanics and Biomedical Engineering 0, 1–14. https://doi.org/10.1080/10255842.2022.2054660

[90] Finegold, J.A., Asaria, P., Francis, D.P., 2013. Mortality from ischaemic heart disease by country, region, and age: Statistics from World Health Organisation and United Nations. International Journal of Cardiology 168, 934–945. https://doi.org/10.1016/j.ijcard.2012.10.046

[91] Finol, E.A., Amon, C.H., 2002. Flow-induced wall shear stress in abdominal aortic aneurysms: Part I - steady flow hemodynamics. Computer Methods in Biomechanics and Biomedical Engineering 5, 309 – 318. https://doi.org/10.1080/1025584021000009742

[92] Finol, E.A., Keyhani, K., Amon, C.H., 2003. The effect of asymmetry in abdominal aortic aneurysms under physiologically realistic pulsatile flow conditions. Journal of Biomechanical Engineering 125, 207–217. https://doi.org/10.1115/1.1543991

[93] Fleming, C., 2005. Clinical Guidelines Screening for Abdominal Aortic Aneurysm : A Best-

Evidence Systematic. Annals of Internal Medicine 142, 203–211.

[94] Frauenfelder, T., Lotfey, M., Boehm, T., Wildermuth, S., 2006. Computational fluid dynamics: Hemodynamic changes in abdominal aortic aneurysm after stent-graft implantation. CardioVascular and Interventional Radiology 29, 613–623. https://doi.org/10.1007/s00270-005-0227-5

[95] Fry, D.L., n.d. Acute Vascular Endothelial Changes Associated with Increased Blood Velocity Gradients.

[96] Gasser, T.C., Ogden, R.W., Holzapfel, G.A., 2006. Hyperelastic modelling of arterial layers with distributed collagen fibre orientations. Journal of the Royal Society Interface 3, 15–35. https://doi.org/10.1098/rsif.2005.0073

[97] Gay, M., Zhang, L., 2009. Numerical studies of blood flow in healthy, stenosed, and stented carotid arteries. International Journal for Numerical Methods in Fluids 61, 453–472. https://doi.org/10.1002/fld.1966

[98] Gijsen, F.J.H., Wentzel, J.J., Thury, A., Lamers, B., Schuurbiers, J.C.H., Serruys, P.W., van der Steen, A.F., 2007. A new imaging technique to study 3-D plaque and shear stress distribution in human coronary artery bifurcations in vivo. Journal of Biomechanics 40, 2349–2357. https://doi.org/10.1016/j.jbiomech.2006.12.007

[99] Gillum, R.F., 1995. Epidemiology of aortic aneurysm in the United States. Journal of Clinical Epidemiology 48, 1289–1298. https://doi.org/10.1016/0895-4356(95)00045-3

[100] Global, regional, and national age–sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013, 2015. . The Lancet 385, 117–171. https://doi.org/https://doi.org/10.1016/S0140-6736(14)61682-2

[101] Goubergrits, L., Kertzscher, U., Schöneberg, B., Wellnhofer, E., Petz, C., Hege, H.-C., 2008. CFD analysis in an anatomically realistic coronary artery model based on non-invasive 3D imaging: comparison of magnetic resonance imaging with computed tomography. The international journal of cardiovascular imaging 24, 411–421. https://doi.org/10.1007/s10554-007-9275-z

[102] Guha, A., Pradhan, K., 2017. Secondary motion in three-dimensional branching networks. Physics of Fluids 29. https://doi.org/10.1063/1.4984919

[103] Guha, A., Pradhan, K., Halder, P.K., 2016. Finding order in complexity: A study of the fluid

dynamics in a three-dimensional branching network. Physics of Fluids 28. https://doi.org/10.1063/1.4971315

[104] Halabian, M., Karimi, A., Beigzadeh, B., Navidbakhsh, M., 2015. a Numerical Study on the Hemodynamic and Shear Stress of Double Aneurysm Through S-Shaped Vessel. Biomedical Engineering: Applications, Basis and Communications 27, 1550033. https://doi.org/10.4015/S1016237215500337

[105] Hammoud, A., Sharay, E.Y., Tikhomirov, A.N., 2019. Newtonian and non-Newtonian pulsatile flows through carotid artery bifurcation based on CT image geometry. AIP Conference Proceedings 2171. https://doi.org/10.1063/1.5133256

[106] Hamon, Michèle, Morello, R., Riddell, J.W., Hamon, Martial, 2007. Coronary arteries: Diagnostic performance of 16- versus 64-section spiral CT compared with invasive coronary angiography - Meta-analysis. Radiology 245, 720–731. https://doi.org/10.1148/radiol.2453061899

[107] Hance, K.A., Tataria, M., Ziporin, S.J., Lee, J.K., Thompson, R.W., 2002. Monocyte chemotactic activity in human abdominal aortic aneurysms: Role of elastin degradation peptides and the 67-kD cell surface elastin receptor. Journal of Vascular Surgery 35, 254–261. https://doi.org/10.1067/mva.2002.120382

[108] Harita, K., Anburajan, M., 2013. Patient specific CAD model of useful carotid artery (CA) for CFD analysis of CA with plaque condition. International Conference on Communication and Signal Processing, ICCSP 2013 - Proceedings 377–381. https://doi.org/10.1109/iccsp.2013.6577078

[109] Hazer, D., Unterhinninghofen, R., Kostrzewa, M., Kauczor, H.U., Dillmann, R., Richter, G.M., 2006. A Workflow for Computational Fluid Dynamics Simulations using Patient-Specific Aortic Models. International Congress on FEM technology 1–9.

[110] Helfant, R.H., Kemp, H.G., Gorlin, R., 1970. Coronary atherosclerosis, coronary collaterals, and their relation to cardiac function. Annals of internal medicine 73, 189–193. https://doi.org/10.7326/0003-4819-73-2-189

[111] Hsu, C.H., Vu, H.H., Kang, Y.H., 2009. The rheology of blood flow in a branched arterial system with three-dimensional model: A numerical study. Journal of Mechanics 25, 398–405. https://doi.org/10.1017/s1727719100002951

[112] Huang, R.F., Yang, T.F., Lan, Y.K., 2010. Pulsatile flows and wall-shear stresses in models simulating normal and stenosed aortic arches. Experiments in Fluids 48, 497–508. https://doi.org/10.1007/s00348-009-0754-y

[113] Hulten, E., Pickett, C., Bittencourt, M.S., Villines, T.C., Petrillo, S., Di Carli, M.F., Blankstein, R., 2013. Outcomes after coronary computed tomography angiography in the emergency department: A systematic review and meta-analysis of randomized, controlled trials. Journal of the American College of Cardiology 61, 880–892. https://doi.org/10.1016/j.jacc.2012.11.061

[114] Humphrey, J.D., Holzapfel, G.A., 2012. Mechanics, mechanobiology, and modeling of human abdominal aorta and aneurysms. Journal of Biomechanics 45, 805–814. https://doi.org/10.1016/j.jbiomech.2011.11.021

[115] I.E VIGNON-CLEMENTEL, C.. F.H.J.K., 2018. Enhanced Reader.pdf. Nature.

[116] Isselbacher, E.M., 2005. Thoracic and abdominal aortic aneurysms. Circulation 111, 816–828. https://doi.org/10.1161/01.CIR.0000154569.08857.7A

[117] Itatani, K., Miyazaki, S., Furusawa, T., Numata, S., Yamazaki, S., Morimoto, K., Makino, R., Morichi, H., Nishino, T., Yaku, H., 2017. New imaging tools in cardiovascular medicine: computational fluid dynamics and 4D flow MRI. General Thoracic and Cardiovascular Surgery 65, 611–621. https://doi.org/10.1007/s11748-017-0834-5

[118] Jahangiri, M., Saghafian, M., Sadeghi, M.R., 2015. Effects of Non-Newtonian Behavior of Blood on Wall Shear Stress in an Elastic Vessel with Simple and Consecutive Stenosis. Biomedical and Pharmacology Journal 8, 123–131. https://doi.org/10.13005/bpj/590

[119] Javadzadegan, A., Fakhim, B., Behnia, Masud, Behnia, Mehrdad, 2014. Fluid-structure interaction investigation of spiral flow in a model of abdominal aortic aneurysm. European Journal of Mechanics, B/Fluids 46, 109–117. https://doi.org/10.1016/j.euromechflu.2014.02.011

[120] Javadzadegan, A., Fulker, D., Barber, T., 2017. Recirculation zone length in renal artery is affected by flow spirality and renal-to-aorta flow ratio. Computer Methods in Biomechanics and Biomedical Engineering 20, 980–990. https://doi.org/10.1080/10255842.2017.1319942

[121] JEong, J., Hussain, F., 1995. On the identification of a vortex. Journal of Fluid Mechanics 285, 69–94. https://doi.org/10.1017/S0022112095000462

[122] Jiang, M., Machiraju, R., Thompson, D., 2005. Detection and visualization of vortices. Visualization Handbook 295–309. https://doi.org/10.1016/B978-012387582-2/50016-2

[123] Johnson, K., Sharma, P., Oshinski, J., 2008. Coronary artery flow measurement using navigator echo gated phase contrast magnetic resonance velocity mapping at 3.0 T. Journal of Biomechanics 41, 595–602. https://doi.org/10.1016/j.jbiomech.2007.10.010

[124] Johnston, B.M., Johnston, P.R., Corney, S., Kilpatrick, D., 2006. Non-Newtonian blood flow in human right coronary arteries : Transient simulations $ 39, 1116–1128. https://doi.org/10.1016/j.jbiomech.2005.01.034

[125] Johnston, B.M., Johnston, P.R., Corney, S., Kilpatrick, D., 2004. Non-Newtonian blood flow in human right coronary arteries : steady state simulations $, $$ 37, 709–720. https://doi.org/10.1016/j.jbiomech.2003.09.016

[126] Joly, F., Soulez, G., Garcia, D., Lessard, S., Kauffmann, C., 2018. Flow stagnation volume and abdominal aortic aneurysm growth: Insights from patient-specific computational flow dynamics of Lagrangian-coherent structures. Computers in Biology and Medicine. https://doi.org/10.1016/j.compbiomed.2017.10.033

[127] Jozwik, K., Obidowski, D., 2010. Numerical simulations of the blood flow through vertebral arteries. Journal of Biomechanics 43, 177–185. https://doi.org/10.1016/j.jbiomech.2009.09.026

[128] Jung, J., Hassanein, A., 2008. Three-phase CFD analytical modeling of blood flow. Medical Engineering and Physics 30, 91–103. https://doi.org/10.1016/j.medengphy.2006.12.004

[129] Kadhim, S.K., Nasif, M.S., Al-Kayiem, H.H., Al-Waked, R., 2018. Computational fluid dynamics simulation of blood flow profile and shear stresses in bileaflet mechanical heart valve by using monolithic approach. Simulation 94, 93–104. https://doi.org/10.1177/0037549717712603

[130] Kamada, H., Nakamura, M., Ota, H., Higuchi, S., Takase, K., 2022. Blood flow analysis with computational fluid dynamics and 4D-flow MRI for vascular diseases. Journal of Cardiology 80, 386–396. https://doi.org/10.1016/j.jjcc.2022.05.007

[131] Kang, D.Y., Ahn, J.M., Kim, Y.W., Moon, J.Y., Lee, J.S., Koo, B.K., Lee, P.H., Park, D.W., Kang, S.J., Lee, S.W., Kim, Y.H., Park, S.W., Park, S.J., 2018. Impact of coronary lesion geometry on fractional flow reserve data from interventional cardiology research in-cooperation society-fractional

flow reserve and intravascular ultrasound registry. Circulation: Cardiovascular Imaging 11. https://doi.org/10.1161/CIRCIMAGING.117.007087

[132] Karimi, S., Dabagh, M., Vasava, P., Dadvar, M., Dabir, B., Jalali, P., 2014a. Journal of Non-Newtonian Fluid Mechanics Effect of rheological models on the hemodynamics within human aorta : CFD study on CT image-based geometry. JOURNAL OF NON-NEWTONIAN FLUID MECHANICS 207, 42–52. https://doi.org/10.1016/j.jnnfm.2014.03.007

[133] Karimi, S., Dabagh, M., Vasava, P., Dadvar, M., Dabir, B., Jalali, P., 2014b. Effect of rheological models on the hemodynamics within human aorta: CFD study on CT image-based geometry. Journal of Non-Newtonian Fluid Mechanics 207, 42–52. https://doi.org/10.1016/j.jnnfm.2014.03.007

[134] Karvelas, E.G., Lampropoulos, N.K., Karakasidis, T.E., Sarris, I.E., 2022. Blood flow and diameter effect in the navigation process of magnetic nanocarriers inside the carotid artery. Computer Methods and Programs in Biomedicine 221, 106916. https://doi.org/10.1016/j.cmpb.2022.106916

[135] Kelsey, L.J., Miller, K., Norman, P.E., Powell, J.T., Doyle, B.J., 2016. The influence of downstream branching arteries on upstream haemodynamics. Journal of Biomechanics 49, 3090–3096. https://doi.org/10.1016/j.jbiomech.2016.07.023

[136] Kenjereš, S., 2016. On Recent Progress in Modelling and Simulations of Multi-scale Transfer of Mass, Momentum and Particles in Bio-medical Applications. Flow, Turbulence and Combustion 96, 837–860. https://doi.org/10.1007/s10494-015-9669-2

[137] Kent, K.C., 2014. Abdominal Aortic Aneurysms. New England Journal of Medicine 371, 2101–2108. https://doi.org/10.1056/NEJMcp1401430

[138] Khalafvand, S.S., Ng, E.Y.K., Zhong, L., 2011. CFD simulation of flow through heart: A perspective review. Computer Methods in Biomechanics and Biomedical Engineering 14, 113–132. https://doi.org/10.1080/10255842.2010.493515

[139] Khalafvand, S.S., Ng, E.Y.K., Zhong, L., Hung, T.K., 2017. Three-dimensional diastolic blood flow in the left ventricle. Journal of Biomechanics 50, 71–76. https://doi.org/10.1016/j.jbiomech.2016.11.032

[140] Khalafvand, S.S., Ng, E.Y.K., Zhong, L., Hung, T.K., 2012. Fluid-dynamics modelling of the

human left ventricle with dynamic mesh for normal and myocardial infarction: Preliminary study. Computers in Biology and Medicine 42, 863–870. https://doi.org/10.1016/j.compbiomed.2012.06.010

[141] Khanafer, K.M., Gadhoke, P., Berguer, R., Bull, J.L., 2006. Modeling pulsatile flow in aortic aneurysms: Effect of non-Newtonian properties of blood. Biorheology 43, 661 – 679.

[142] Kharboutly, Z., Fenech, M., Treutenaere, J.M., Claude, I., Legallais, C., 2005. CFD modeling of unsteady blood flow in a arteriovenous fistula reconstructed from angioscanner. Computer Methods in Biomechanics and Biomedical Engineering 8, 161–162. https://doi.org/10.1080/10255840512331388759

[143] Kim, H.J., Vignon-Clementel, I.E., Coogan, J.S., Figueroa, C.A., Jansen, K.E., Taylor, C.A., 2010. Patient-specific modeling of blood flow and pressure in human coronary arteries. Annals of Biomedical Engineering 38, 3195–3209. https://doi.org/10.1007/s10439-010-0083-6

[144] Kim, T., Cheer, A.Y., Dwyer, H.A., 2004. A simulated dye method for flow visualization with a computational model for blood flow. Journal of Biomechanics 37, 1125–1136. https://doi.org/10.1016/j.jbiomech.2003.12.028

[145] Kim, Y.H., Kim, J.E., Ito, Y., Shih, A.M., Brott, B., Anayiotos, A., 2008. Hemodynamic analysis of a compliant femoral artery bifurcation model using a fluid structure interaction framework. Annals of Biomedical Engineering 36, 1753–1763. https://doi.org/10.1007/s10439-008-9558-0

[146] Kong, F., Shadden, S.C., 2020. Automating Model Generation for Image-Based Cardiac Flow Simulation. Journal of Heat Transfer 142, 1–13. https://doi.org/10.1115/1.4048032

[147] Krishan B. Chandran, Ajit P. Yoganathan, S.E.R., 2010. Biofluid Mechanics, Applied Mathematical Sciences (Switzerland). https://doi.org/10.1007/978-1-4419-1564-1_12

[148] Ku, D.N., Woodruff, G.W., 1997. Blood Flow in Arteries. Annu. Rev. Fluid Mech 29, 399–434. https://doi.org/10.1146/annurev.fluid.29.1.399

[149] Kuijer, J.P.A., Marcus, J.T., Götte, M.J.W., Van Rossum, A.C., Adèr, H.J., Heethaar, R.M., 2001. Variance components of two-dimensional strain parameters in the left-ventricular heart wall obtained by magnetic resonance tagging. International Journal of Cardiac Imaging 17, 49–60. https://doi.org/10.1023/A:1010629614081

[150] Kumar, N., Khader, S.M.A., B, R.P., 2015. A Review of Application of CFD in Stenosed A

Review of Application of CFD in Stenosed Arteries.

[151] kumar, S., Deoghare, A.B., 2018. Modelling of Human Abdominal Artery for Blood flow Analysis. Materials Today: Proceedings 5, 12877–12885. https://doi.org/10.1016/J.MATPR.2018.02.273

[152] Kumar, S., Deoghare, A.B., 2018. Modelling of Human Abdominal Artery for Blood flow Analysis. Materials Today: Proceedings 5, 12877–12885. https://doi.org/10.1016/j.matpr.2018.02.273

[153] Kumar, S., Kumar, B.V.R., Rai, S.K., 2023. Influence of abdominal aortic aneurysm shape on hemodynamics parameters in patient-specific human aortofemoral arteries : A transient open-loop study 041903. https://doi.org/10.1063/5.0139085

[154] Kumar, S., Rai, S.K., Kumar, B.V.R., Shankar, O., 2022. The pulsatile 3D-Hemodynamics in a doubly afflicted human descending abdominal artery with iliac branching. Computer Methods in Biomechanics and Biomedical Engineering 0, 1–20. https://doi.org/10.1080/10255842.2022.2082839

[155] Kung, E.O., Les, A.S., Figueroa, C.A., Medina, F., Arcaute, K., Wicker, R.B., McConnell, M. V., Taylor, C.A., 2011. In vitro validation of finite element analysis of blood flow in deformable models. Annals of Biomedical Engineering 39, 1947–1960. https://doi.org/10.1007/s10439-011-0284-7

[156] Le Dret, H., Lucquin, B., 2016. The Finite Volume Method, International Series of Numerical Mathematics. https://doi.org/10.1007/978-3-319-27067-8_10

[157] Lederle, F.A., Johnson, G.R., Wilson, S.E., Chute, E.P., Hye, R.J., Makaroun, M.S., Barone, G.W., Bandyk, D., Moneta, G.L., Makhoul, R.G., 2000. The Aneurysm Detection and Management study screening program: Validation cohort and final results. Archives of Internal Medicine 160, 1425–1430. https://doi.org/10.1001/archinte.160.10.1425

[158] Lee, U.Y., Jung, J., Kwak, H.S., Lee, D.H., Chung, G.H., Park, J.S., Koh, E.J., 2018. Wall shear stress and flow patterns in unruptured and ruptured anterior communicating artery aneurysms using computational fluid dynamics. Journal of Korean Neurosurgical Society 61, 689–699. https://doi.org/10.3340/jkns.2018.0155

[159] Les, A.S., Shadden, S.C., Figueroa, C.A., Park, J.M., Tedesco, M.M., Herfkens, R.J., Dalman, R.L., Taylor, C.A., 2010. Quantification of hemodynamics in abdominal aortic aneurysms during rest

and exercise using magnetic resonance imaging and computational fluid dynamics. Annals of Biomedical Engineering 38, 1288–1313. https://doi.org/10.1007/s10439-010-9949-x

[160] Li, Z., Kleinstreuer, C., 2005. Blood flow and structure interactions in a stented abdominal aortic aneurysm model. Medical Engineering and Physics 27, 369–382. https://doi.org/10.1016/j.medengphy.2004.12.003

[161] Lind, L., 2003. Circulating markers of inflammation and atherosclerosis. Atherosclerosis 169, 203–214. https://doi.org/https://doi.org/10.1016/S0021-9150(03)00012-1

[162] Linge, F., Hye, M.A., Paul, M.C., 2014. Pulsatile spiral blood flow through arterial stenosis. Computer Methods in Biomechanics and Biomedical Engineering. https://doi.org/10.1080/10255842.2013.765411

[163] Liu, G., Wu, J., Ghista, D.N., Huang, W., Wong, K.K.L., 2015. Hemodynamic characterization of transient blood flow in right coronary arteries with varying curvature and side-branch bifurcation angles. Computers in Biology and Medicine 64, 117–126. https://doi.org/10.1016/j.compbiomed.2015.06.009

[164] Liu, H., Lan, L., Abrigo, J., Ip, H.L., Soo, Y., Zheng, D., Wong, K.S., Wang, D., Shi, L., Leung, T.W., Leng, X., 2021. Comparison of Newtonian and Non-newtonian Fluid Models in Blood Flow Simulation in Patients With Intracranial Arterial Stenosis. Frontiers in Physiology 12, 1–11. https://doi.org/10.3389/fphys.2021.718540

[165] Liu, X., Peng, C., Xia, Y., Gao, Z., Xu, P., Wang, X., Xian, Z., Yin, Y., Jiao, L., Wang, D., Shi, L., Huang, W., Liu, X., Zhang, H., 2017. Hemodynamics analysis of the serial stenotic coronary arteries. BioMedical Engineering Online 16, 1–16. https://doi.org/10.1186/s12938-017-0413-0

[166] Long, Q., Xu, X.Y., Ariff, B., Thom, S.A., Hughes, A.D., Stanton, A. V., 2000. Reconstruction of blood flow patterns in a human carotid bifurcation: A combined CFD and MRI study. Journal of Magnetic Resonance Imaging 11, 299–311. https://doi.org/10.1002/(SICI)1522-2586(200003)11:3<299::AID-JMRI9>3.0.CO;2-M

[167] Mahé, G., Kaladji, A., Faucheur, A. Le, Jaquinandi, V., Rosa, S. De, 2015. Internal iliac artery stenosis: diagnosis and how to manage it in 2015 2, 1–9. https://doi.org/10.3389/fcvm.2015.00033

[168] Malota, Z., Glowacki, J., Sadowski, W., Kostur, M., 2018. Numerical analysis of the impact of

flow rate, heart rate, vessel geometry, and degree of stenosis on coronary hemodynamic indices. BMC Cardiovascular Disorders 18, 1–16. https://doi.org/10.1186/s12872-018-0865-6

[169] Marrero, V.L., Tichy, J.A., Sahni, O., Jansen, K.E., 2014. Numerical study of purely viscous non-newtonian flow in an abdominal aortic aneurysm. Journal of Biomechanical Engineering 136. https://doi.org/10.1115/1.4027488

[170] Mekheimer, K.S., Abo-Elkhair, R.E., Abdelsalam, S.I., Ali, K.K., Moawad, A.M.A., 2022. Biomedical simulations of nanoparticles drug delivery to blood hemodynamics in diseased organs: Synovitis problem. International Communications in Heat and Mass Transfer 130, 105756. https://doi.org/10.1016/j.icheatmasstransfer.2021.105756

[171] Meng, H., Tutino, V.M., Xiang, J., Siddiqui, A., 2014. High WSS or Low WSS? Complex interactions of hemodynamics with intracranial aneurysm initiation, growth, and rupture: Toward a unifying hypothesis. American Journal of Neuroradiology 35, 1254–1262. https://doi.org/10.3174/ajnr.A3558

[172] Migliavacca, F., Balossino, R., Pennati, G., Dubini, G., Hsia, T.Y., De Leval, M.R., Bove, E.L., 2006. Multiscale modelling in biofluidynamics: Application to reconstructive paediatric cardiac surgery. Journal of Biomechanics 39, 1010–1020. https://doi.org/10.1016/j.jbiomech.2005.02.021

[173] Miguel, A.F., 2019. Optimal Y-shaped constructs heat sinks under different size constraints. International Journal of Heat and Mass Transfer 131, 64–71. https://doi.org/10.1016/j.ijheatmasstransfer.2018.11.033

[174] Mihalef, V., Ionasec, R.I., Sharma, P., Georgescu, B., Voigt, I., Suehling, M., Comaniciu, D., 2011. Patient-specific modelling of whole heart anatomy, dynamics and haemodynamics from four-dimensional cardiac CT images. Interface Focus 1, 286–296. https://doi.org/10.1098/rsfs.2010.0036

[175] Miller, F.J., Sharp, W.J., Fang, X., Oberley, L.W., Oberley, T.D., Weintraub, N.L., 2002. Oxidative Stress in Human Abdominal Aortic Aneurysms. Arteriosclerosis, Thrombosis, and Vascular Biology. https://doi.org/10.1161/01.atv.0000013778.72404.30

[176] Milutinović, A., Šuput, D., Zorc-Pleskovič, R., 2020. Pathogenesis of atherosclerosis in the tunica intima, media, and adventitia of coronary arteries: An updated review. Bosnian Journal of Basic Medical Sciences 20, 21–30. https://doi.org/10.17305/bjbms.2019.4320

[177] Moore, J.A., Rutt, B.K., Karlik, S.J., Yin, K., Ethier, C.R., 1999. Computational Blood Flow Modeling Based on In Vivo Measurements. Annals of Biomedical Engineering 27, 627–640. https://doi.org/10.1114/1.221

[178] Moore, J.E., Xu, C., Glagov, S., Zarins, C.K., Ku, D.N., 1994. Fluid wall shear stress measurements in a model of the human abdominal aorta: oscillatory behavior and relationship to atherosclerosis. Atherosclerosis 110, 225–240. https://doi.org/10.1016/0021-9150(94)90207-0

[179] Moosavi, M.H., Fatouraee, N., Katoozian, H., Pashaei, A., Camara, O., Frangi, A.F., 2014. Numerical simulation of blood flow in the left ventricle and aortic sinus using magnetic resonance imaging and computational fluid dynamics. Computer Methods in Biomechanics and Biomedical Engineering. https://doi.org/10.1080/10255842.2012.715638

[180] Moradi, H., Al-Hourani, A., Concilia, G., Khoshmanesh, F., Nezami, F.R., Needham, S., Baratchi, S., Khoshmanesh, K., 2023. Recent developments in modeling, imaging, and monitoring of cardiovascular diseases using machine learning. Biophysical Reviews 15, 19–33. https://doi.org/10.1007/s12551-022-01040-7

[181] Morbiducci, U., Kok, A.M., Kwak, B.R., Stone, P.H., Steinman, D.A., Wentzel, J.J., 2016. Atherosclerosis at arterial bifurcations: Evidence for the role of haemodynamics and geometry. Thrombosis and Haemostasis 115, 484–492. https://doi.org/10.1160/TH15-07-0597

[182] Morris, P.D., Narracott, A., von Tengg-Kobligk, H., Silva Soto, D.A., Hsiao, S., Lungu, A., Evans, P., Bressloff, N.W., Lawford, P. V, Hose, D.R., Gunn, J.P., 2015. Computational fluid dynamics modelling in cardiovascular medicine. Heart (British Cardiac Society) heartjnl-2015-308044-. https://doi.org/10.1136/heartjnl-2015-308044

[183] Motoyama, S., Anno, H., Sarai, M., Sato, T., Sanda, Y., Ozaki, Y., Mochizuki, T., Katada, K., Hishida, H., 2008. Noninvasive Coronary Angiography With a Prototype 256-Row Area Detector Computed Tomography System Comparison With Conventional Invasive Coronary Angiography. Journal of the American College of Cardiology 51, 773–775. https://doi.org/10.1016/j.jacc.2007.09.062

[184] Motoyama, S., Kondo, T., Sarai, M., Sugiura, A., Harigaya, H., Sato, T., Inoue, K., Okumura, M., Ishii, J., Anno, H., Virmani, R., Ozaki, Y., Hishida, H., Narula, J., 2007. Multislice Computed

Tomographic Characteristics of Coronary Lesions in Acute Coronary Syndromes. Journal of the American College of Cardiology 50, 319–326. https://doi.org/10.1016/j.jacc.2007.03.044

[185] Motoyama, S., Sarai, M., Harigaya, H., Anno, H., Inoue, K., Hara, T., Naruse, H., Ishii, J., Hishida, H., Wong, N.D., Virmani, R., Kondo, T., Ozaki, Y., Narula, J., 2009. Computed Tomographic Angiography Characteristics of Atherosclerotic Plaques Subsequently Resulting in Acute Coronary Syndrome. Journal of the American College of Cardiology 54, 49–57. https://doi.org/10.1016/j.jacc.2009.02.068

[186] Murray, C.D., 1926. The Physiological Principle of Minimum Work. Proceedings of the National Academy of Sciences 12, 207–214. https://doi.org/10.1073/pnas.12.3.207

[187] Nader, E., Skinner, S., Romana, M., Fort, R., Lemonne, N., Guillot, N., Gauthier, A., Antoine-Jonville, S., Renoux, C., Hardy-Dessources, M.D., Stauffer, E., Joly, P., Bertrand, Y., Connes, P., 2019. Blood rheology: Key parameters, impact on blood flow, role in sickle cell disease and effects of exercise. Frontiers in Physiology 10, 1–14. https://doi.org/10.3389/fphys.2019.01329

[188] Nagargoje, M., Gupta, R., 2020. Effect of sinus size and position on hemodynamics during pulsatile flow in a carotid artery bifurcation. Computer Methods and Programs in Biomedicine 105440. https://doi.org/10.1016/j.cmpb.2020.105440

[189] Nagargoje, M.S., Mishra, D.K., Gupta, R., 2021. Pulsatile flow dynamics in symmetric and asymmetric bifurcating vessels. Physics of Fluids. https://doi.org/10.1063/5.0056414

[190] Nagargoje, M.S., Valeti, C., Manjunath, N., Akhade, B., Sudhir, B.J., Patnaik, B.S.V., Kannath, S.K., 2022. Influence of morphological parameters on hemodynamics in internal carotid artery bifurcation aneurysms. Physics of Fluids 34. https://doi.org/10.1063/5.0117879

[191] Nakamura, M., Sawada, T., 1988. Numerical study on the flow of a non-newtonian fluid through an axisymmetric stenosis. Journal of Biomechanical Engineering 110, 137–143. https://doi.org/10.1115/1.3108418

[192] Nguyen, N.D., Haque, A.K., 1990. Effect of hemodynamic factors on atherosclerosis in the abdominal aorta. Atherosclerosis 84, 33–39. https://doi.org/10.1016/0021-9150(90)90005-4

[193] Nguyen, V.-T., Loon, C.J., Nguyen, H.H., Liang, Z., Leo, H.L., 2015. A semi-automated method for patient-specific computational flow modelling of left ventricles. Computer Methods in

Biomechanics and Biomedical Engineering 18, 401–413. https://doi.org/10.1080/10255842.2013.803534

[194] Nordestgaard, B.G., Palmer, T.M., Benn, M., Zacho, J., Tybjærg-Hansen, A., Smith, G.D., Timpson, N.J., 2012. The effect of elevated body mass index on ischemic heart disease risk: Causal estimates from a mendelian randomisation approach. PLoS Medicine 9. https://doi.org/10.1371/journal.pmed.1001212

[195] Nowak, M., Melka, B., Rojczyk, M., Gracka, M., Nowak, A.J., Golda, A., Adamczyk, W.P., Isaac, B., Białecki, R.A., Ostrowski, Z., 2019. The protocol for using elastic wall model in modeling blood flow within human artery. European Journal of Mechanics, B/Fluids 77, 273–280. https://doi.org/10.1016/j.euromechflu.2019.03.009

[196] Numer Methods Biomed Eng - 2014 - Khalafvand - Three-dimensional CFD MRI modeling reveals that ventricular surgical.pdf, n.d.

[197] Obermeier, L., Vellguth, K., Schlief, A., Tautz, L., Bruening, J., Knosalla, C., Kuehne, T., Solowjowa, N., Goubergrits, L., 2022. CT-Based Simulation of Left Ventricular Hemodynamics: A Pilot Study in Mitral Regurgitation and Left Ventricle Aneurysm Patients. Frontiers in Cardiovascular Medicine 9, 1–18. https://doi.org/10.3389/fcvm.2022.828556

[198] Opie, L.H., 2004. Heart physiology : from cell to circulation, 4th ed. ed, TA - TT -. Lippincott Williams & Wilkins, Philadelphia SE -. https://doi.org/LK - https://worldcat.org/title/52845496

[199] Otero-Cacho, A., Aymerich, M., Flores-Arias, M.T., Abal, M., Álvarez, E., Pérez-Muñuzuri, V., Muñuzuri, A.P., 2018. Determination of hemodynamic risk for vascular disease in planar artery bifurcations. Scientific Reports 8, 1–7. https://doi.org/10.1038/s41598-018-21126-1

[200] Pandey, R., Kumar, M., Majdoubi, J., Rahimi-Gorji, M., Srivastav, V.K., 2020a. A review study on blood in human coronary artery: Numerical approach. Computer Methods and Programs in Biomedicine 187, 1–12. https://doi.org/10.1016/j.cmpb.2019.105243

[201] Pandey, R., Kumar, M., Srivastav, V.K., 2020b. Numerical computation of blood hemodynamic through constricted human left coronary artery: Pulsatile simulations. Computer Methods and Programs in Biomedicine 197. https://doi.org/10.1016/j.cmpb.2020.105661

[202] Pandey, R., Yadav, P.K., 2022. Effect of Reynold number and blood viscosity models on the

Left Coronary Artery with multiple stenosis . Physics of Fluids. https://doi.org/10.1063/5.0099822

[203] Park, J.-B., Choi, G., Chun, E.J., Kim, H.J., Park, J., Jung, J.-H., Lee, M.-H., Otake, H., Doh, J.-H., Nam, C.-W., Shin, E.-S., Bruyne, B. De, Taylor, C.A., Koo, B.-K., 2016. Computational fluid dynamic measures of wall shear stress are related to coronary lesion characteristics. Heart 102, 1655 LP – 1661. https://doi.org/10.1136/heartjnl-2016-309299

[204] Patel, B., Wonski, B.T., Saliganan, D.M., Rteil, A., Kabbani, L.S., Lam, M.T., 2021. Decellularized dermis extracellular matrix alloderm mechanically strengthens biological engineered tunica adventitia-based blood vessels. Scientific Reports 11, 1–16. https://doi.org/10.1038/s41598-021-91005-9

[205] Patel, S., Usmani, A.Y., Muralidhar, K., 2017. Effect of aorto-iliac bifurcation and iliac stenosis on flow dynamics in an abdominal aortic aneurysm. Fluid Dynamics Research 49. https://doi.org/10.1088/1873-7005/aa6a6b

[206] Peripheral Artery Disease – Symptoms & Risks | 50+ World - 50+ World [WWW Document], n.d. URL https://50plusworld.com/peripheral-artery-disease-symptoms-risks/ (accessed 7.2.23).

[207] Perktold, K., Resch, M., Florian, H., 1991. Pulsatile non-newtonian flow characteristics in a three-dimensional human carotid bifurcation model. Journal of Biomechanical Engineering 113, 464–475. https://doi.org/10.1115/1.2895428

[208] Petersen, K.S., Kris-Etherton, P.M., 2021. Diet quality assessment and the relationship between diet quality and cardiovascular disease risk. Nutrients 13, 1–12. https://doi.org/10.3390/nu13124305

[209] Pfaller, M.R., Pham, J., Verma, A., Pegolotti, L., Wilson, N.M., Parker, D.W., Yang, W., Marsden, A.L., 2022. Automated generation of 0D and 1D reduced-order models of patient-specific blood flow. International Journal for Numerical Methods in Biomedical Engineering 38, 1–25. https://doi.org/10.1002/cnm.3639

[210] Philip, N.T., Patnaik, B.S.V., Sudhir, B.J., 2022. Hemodynamic simulation of abdominal aortic aneurysm on idealised models: Investigation of stress parameters during disease progression. Computer Methods and Programs in Biomedicine 213. https://doi.org/10.1016/j.cmpb.2021.106508

[211] Pinho, N., Castro, C.F., António, C.C., Bettencourt, N., Sousa, L.C., Pinto, S.I.S., 2019a. Correlation between geometric parameters of the left coronary artery and hemodynamic descriptors of

atherosclerosis: FSI and statistical study. Medical and Biological Engineering and Computing 57, 715–729. https://doi.org/10.1007/s11517-018-1904-2

[212] Pinho, N., Sousa, L.C., Castro, C.F., António, C.C., Carvalho, M., Ferreira, W., Ladeiras-Lopes, R., Ferreira, N.D., Braga, P., Bettencourt, N., Pinto, S.I.S., 2019b. The Impact of the Right Coronary Artery Geometric Parameters on Hemodynamic Performance. Cardiovascular Engineering and Technology 10, 257–270. https://doi.org/10.1007/s13239-019-00403-8

[213] Pinto, S.I.S., Romano, E., António, C.C., Sousa, L.C., Castro, C.F., 2020. The impact of non-linear viscoelastic property of blood in right coronary arteries hemodynamics — A numerical implementation. International Journal of Non-Linear Mechanics 123, 103477. https://doi.org/10.1016/j.ijnonlinmec.2020.103477

[214] Piskin, S., Serdar Celebi, M., 2013. Analysis of the effects of different pulsatile inlet profiles on the hemodynamical properties of blood flow in patient specific carotid artery with stenosis. Computers in Biology and Medicine 43, 717–728. https://doi.org/10.1016/j.compbiomed.2013.02.014

[215] Polzer, S., Kracík, J., Novotný, T., Kubíček, L., Staffa, R., Raghavan, M.L., 2021. Methodology for Estimation of Annual Risk of Rupture for Abdominal Aortic Aneurysm. Computer Methods and Programs in Biomedicine 200. https://doi.org/10.1016/j.cmpb.2020.105916

[216] Qin, S., Wu, B., Liu, J., Shiu, W.S., Yan, Z., Chen, R., Cai, X.C., 2021. Efficient parallel simulation of hemodynamics in patient-specific abdominal aorta with aneurysm. Computers in Biology and Medicine 136, 104652. https://doi.org/10.1016/j.compbiomed.2021.104652

[217] Qiu, Y., Tarbell, J.M., 2000. Numerical simulation of pulsatile flow in a compliant curved tube model of a coronary artery. Journal of Biomechanical Engineering 122, 77–85. https://doi.org/10.1115/1.429629

[218] R, W., 1911. Note on the Motion of Fluid in a Curved Pipe Ixxxv. https://doi.org/https://doi.org/10.1080/14786440708564324

[219] Ramaswamy, S.D., Vigmostad, S.C., Wahle, A., Lai, Y.G., Olszewski, M.E., Braddy, K.C., Brennan, T.M.H., Rossen, J.D., Sonka, M., Chandran, K.B., 2004. Fluid dynamic analysis in a human left anterior descending coronary artery with arterial motion. Annals of biomedical engineering 32, 1628–1641. https://doi.org/10.1007/s10439-004-7816-3

[220] Raptis, A., Tasso, P., Batzalexis, K., Gallo, D., Xenos, M., Morbiducci, U., Giannoukas, A., 2022. Remodeling effects of carotid artery stenting versus endarterectomy with patch angioplasty in terms of morphology and hemodynamics. Computers in Biology and Medicine 140, 105072. https://doi.org/10.1016/j.compbiomed.2021.105072

[221] Rayz, V.L., Boussel, L., Lawton, M.T., Acevedo-Bolton, G., Ge, L., Young, W.L., Higashida, R.T., Saloner, D., 2008. Numerical modeling of the flow in intracranial aneurysms: Prediction of regions prone to thrombus formation. Annals of Biomedical Engineering 36, 1793–1804. https://doi.org/10.1007/s10439-008-9561-5

[222] Renal artery stenosis - Symptoms and causes - Mayo Clinic [WWW Document], n.d. URL https://www.mayoclinic.org/diseases-conditions/renal-artery-stenosis/symptoms-causes/syc-20352777 (accessed 7.2.23).

[223] Revellin, R., Rousset, F., Baud, D., Bonjour, J., 2009. Extension of murray's law using a non-newtonian model of blood flow. Theoretical Biology and Medical Modelling 6, 1–9. https://doi.org/10.1186/1742-4682-6-7

[224] Rispoli, V.C., Nielsen, J.F., Nayak, K.S., Carvalho, J.L.A., 2015. Computational fluid dynamics simulations of blood flow regularized by 3D phase contrast MRI 1–23. https://doi.org/10.1186/s12938-015-0104-7

[225] Rissland, P., Alemu, Y., Einav, S., Ricotta, J., Bluestein, D., 2009. Abdominal aortic aneurysm risk of rupture: patient-specific FSI simulations using anisotropic model. Journal of biomechanical engineering 131, 31001. https://doi.org/10.1115/1.3005200

[226] Salman, H.E., Yalcin, H.C., 2021. Computational modeling of blood flow hemodynamics for biomechanical investigation of cardiac development and disease. Journal of Cardiovascular Development and Disease 8, 1–27. https://doi.org/10.3390/JCDD8020014

[227] Sanderson, C.J., 1992. o f The American Society o f Hematology. Science 80, 1–2.

[228] Sankaran, S., Moghadam, M.E., Kahn, A.M., Tseng, E.E., Guccione, J.M., Marsden, A.L., 2012. Patient-specific multiscale modeling of blood flow for coronary artery bypass graft surgery. Annals of Biomedical Engineering 40, 2228–2242. https://doi.org/10.1007/s10439-012-0579-3

[229] Santamarina, a, Weydahl, E., Siegel, J.M., Moore, J.E., 1998. of the Coronary Arteries : Effects

of Time-varying Curvature. Annals of Biomedical Engineering 26, 944–954.

[230] Saremi, F., Achenbach, S., 2015. Coronary plaque characterization using CT. American Journal of Roentgenology 204, W249–W260. https://doi.org/10.2214/AJR.14.13760

[231] Schenkel, T., Malve, M., Reik, M., Markl, M., Jung, B., Oertel, H., 2009. MRI-Based CFD analysis of flow in a human left ventricle: Methodology and application to a healthy heart. Annals of Biomedical Engineering 37, 503–515. https://doi.org/10.1007/s10439-008-9627-4

[232] Scherer, P.W., 1973. Flow in axisymmetrical glass model aneurysms. Journal of Biomechanics 6, 695–700. https://doi.org/https://doi.org/10.1016/0021-9290(73)90025-0

[233] Schobeiri, M.T., 2010. Boundary Layer Theory, in: Fluid Mechanics for Engineers: A Graduate Textbook. Springer Berlin Heidelberg, Berlin, Heidelberg, pp. 357–421. https://doi.org/10.1007/978-3-642-11594-3_11

[234] Seetharaman, A., Keramati, H., Ramanathan, K., E Cove, M., Kim, S., Chua, K.J., Leo, H.L., 2021. Vortex dynamics of veno-arterial extracorporeal circulation: A computational fluid dynamics study. Physics of Fluids 33, 1–30. https://doi.org/10.1063/5.0050962

[235] Seo, T., 2013. Numerical simulations of blood flow in arterial bifurcation models 25, 153–161. https://doi.org/10.1007/s13367-013-0016-7

[236] Shojima, M., 2004. Magnitude and Role of Wall Shear Stress on Cerebral Aneurysm. Computational Fluid Dynamic Study of 20 Middle Cerebral Artery Aneurysms. Stroke 2500–2505. https://doi.org/10.1161/01.str.0000144648.89172.of

[237] Siauw, W.L., Ng, E.Y.K., Mazumdar, J., 2000. Unsteady stenosis flow prediction: A comparative study of non-Newtonian models with operator splitting scheme. Medical Engineering and Physics 22, 265–277. https://doi.org/10.1016/S1350-4533(00)00036-9

[238] Siouffi, M., Pelissier, R., Farahifar, D., Rieu, R., 1984. The effect of unsteadiness on the flow through stenoses and bifurcations. Journal of Biomechanics 17, 299–315. https://doi.org/10.1016/0021-9290(84)90025-3

[239] Slager, C.J., Wentzel, J.J., Gijsen, F.J.H., Schuurbiers, J.C.H., van der Wal, A.C., van der Steen, A.F.W., Serruys, P.W., 2005. The role of shear stress in the generation of rupture-prone vulnerable plaques. Nature Clinical Practice Cardiovascular Medicine 2, 401–407.

https://doi.org/10.1038/ncpcardio0274

[240] Sochi, T., 2013. Non-Newtonian Rheology in Blood Circulation 1–26.

[241] Soh, W.Y., Berger, S.A., 1984. Laminar entrance flow in a curved pipe. Journal of Fluid Mechanics 148, 109–135. https://doi.org/10.1017/S0022112084002275

[242] Song, P., Fang, Z., Wang, H., Cai, Y., Rahimi, K., Zhu, Y., Fowkes, F.G.R., Fowkes, F.J.I., Rudan, I., 2020. Global and regional prevalence, burden, and risk factors for carotid atherosclerosis: a systematic review, meta-analysis, and modelling study. The Lancet Global Health 8, e721–e729. https://doi.org/10.1016/S2214-109X(20)30117-0

[243] Soni, B., Miguel, A.F., Kumar Nayak, A., 2020. A mathematical analysis for constructal design of tree flow networks under unsteady flow. Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences 476. https://doi.org/10.1098/rspa.2020.0377

[244] Soulis, J. V., Giannoglou, G.D., Chatzizisis, Y.S., Seralidou, K. V., Parcharidis, G.E., Louridas, G.E., 2008. Non-Newtonian models for molecular viscosity and wall shear stress in a 3D reconstructed human left coronary artery. Medical Engineering and Physics 30, 9–19. https://doi.org/10.1016/j.medengphy.2007.02.001

[245] Sridhar, V., Ramesh, K., Gnaneswara Reddy, M., Azese, M.N., Abdelsalam, S.I., 2022. On the entropy optimization of hemodynamic peristaltic pumping of a nanofluid with geometry effects. Waves in Random and Complex Media. https://doi.org/10.1080/17455030.2022.2061747

[246] Stather, P.W., Sidloff, D.A., Rhema, I.A., Choke, E., Bown, M.J., Sayers, R.D., 2014. A review of current reporting of abdominal aortic aneurysm mortality and prevalence in the literature. European Journal of Vascular and Endovascular Surgery 47, 240–242. https://doi.org/10.1016/j.ejvs.2013.11.007

[247] Steele, B.N., Olufsen, M.S., Taylor, C.A., 2007. Fractal network model for simulating abdominal and lower extremity blood flow during resting and exercise conditions. Computer Methods in Biomechanics and Biomedical Engineering 10, 39–51. https://doi.org/10.1080/10255840601068638

[248] Stehbens, W.E., 1974. FLOW DISTURBANCES IN GLASS MODELS OF ANEURYSMS AT LOW REYNOLDS NUMBERS. Quarterly Journal of Experimental Physiology and Cognate

Medical Sciences 59, 167–174. https://doi.org/https://doi.org/10.1113/expphysiol.1974.sp002256

[249] Steinman, D.A., 2002. Image-based computational fluid dynamics modeling in realistic arterial geometries. Annals of Biomedical Engineering 30, 483–497. https://doi.org/10.1114/1.1467679

[250] Student, G., Tseng, Y., Hu, B., n.d. 3D Reconstruction and Geometry Analysis of Coronary Artery Using CFD 3.

[251] Su, B., Tan, R.S., Tan, J. Le, Guo, K.W.Q., Zhang, J.M., Leng, S., Zhao, X., Allen, J.C., Zhong, L., 2016. Cardiac MRI based numerical modeling of left ventricular fluid dynamics with mitral valve incorporated. Journal of Biomechanics 49, 1199–1205. https://doi.org/10.1016/j.jbiomech.2016.03.008

[252] Sumner, D.S., 1988. Buttock claudication from isolated bilateral internal iliac arterial stenoses 6–8.

[253] Sun, Z., Xu, L., 2014. Computerized Medical Imaging and Graphics. Computerized Medical Imaging and Graphics 38, 651–663. https://doi.org/10.1016/j.compmedimag.2014.09.002

[254] Tabe, R., Ghalichi, F., Hossainpour, S., Ghasemzadeh, K., 2011. Numerical simulation of transitional blood flow in large arteries. 2011 18th Iranian Conference of Biomedical Engineering, ICBME 2011 68–71. https://doi.org/10.1109/ICBME.2011.6168588

[255] Tang, B.T., Cheng, C.P., Draney, M.T., Wilson, N.M., Tsao, P.S., Herfkens, R.J., Taylor, C.A., 2006. Abdominal aortic hemodynamics in young healthy adults at rest and during lower limb exercise: Quantification using image-based computer modeling. American Journal of Physiology - Heart and Circulatory Physiology 291, 668–676. https://doi.org/10.1152/ajpheart.01301.2005

[256] Taylor, C.A., Draney, M.T., Ku, J.P., Parker, D., Steele, B.N., Wang, K., Zarins, C.K., 1999. Predictive medicine: computational techniques in therapeutic decision-making. Computer aided surgery : official journal of the International Society for Computer Aided Surgery 4, 231–247. https://doi.org/10.1002/(SICI)1097-0150(1999)4:5<231::AID-IGS1>3.0.CO;2-Z

[257] Taylor, C.A., Figueroa, C.A., 2009. Patient-specific modeling of cardiovascular mechanics. Annual Review of Biomedical Engineering 11, 109–134. https://doi.org/10.1146/annurev.bioeng.10.061807.160521

[258] Taylor, C.A., Fonte, T.A., Min, J.K., 2013. Computational fluid dynamics applied to cardiac

computed tomography for noninvasive quantification of fractional flow reserve: Scientific basis. Journal of the American College of Cardiology 61, 2233–2241. https://doi.org/10.1016/j.jacc.2012.11.083

[259] Taylor, C.A., Hughes, T.J.R., Zarins, C.K., 1998. Finite element modeling of blood flow in arteries. Computer Methods in Applied Mechanics and Engineering 158, 155–196. https://doi.org/10.1016/S0045-7825(98)80008-X

[260] Taylor, C.A., Steinman, D.A., 2010. Image-based modeling of blood flow and vessel wall dynamics: Applications, methods and future directions: Sixth international bio-fluid mechanics symposium and workshop, March 28-30, 2008 Pasadena, California. Annals of Biomedical Engineering 38, 1188–1203. https://doi.org/10.1007/s10439-010-9901-0

[261] Taylor, T.W., Yamaguchi, T., 1994. Three-Dimensional Simulation of Blood Flow in an Abdominal Aortic Aneurysm—Steady and Unsteady Flow Cases. Journal of Biomechanical Engineering 116, 89–97. https://doi.org/10.1115/1.2895709

[262] Texon, M., 1957. A Hemodynamic Concept of Atherosclerosis, with Particular Reference to Coronary Occlusion. A.M.A Archives of Internal Medicine 99, 418–427. https://doi.org/10.1001/archinte.1957.00260030100010

[263] Tholl, U., Forstner, K., Anlauf, M., 2004. Measuring blood pressure: Pitfalls and recommendations. Nephrology Dialysis Transplantation 19, 766–770. https://doi.org/10.1093/ndt/gfg602

[264] Thomas, B., Sumam, K.S., 2016a. Blood Flow in Human Arterial System-A Review. Procedia Technology 24, 339–346. https://doi.org/10.1016/j.protcy.2016.05.045

[265] Thomas, B., Sumam, K.S., 2016b. Blood Flow in Human Arterial System-A Review 24, 339–346. https://doi.org/10.1016/j.protcy.2016.05.045

[266] Thompson, R.W., Holmes, D.R., Mertens, R.A., Liao, S., Botney, M.D., Mecham, R.P., Welgus, H.G., Parks, W.C., 1995. Production and localization of 92-kilodalton gelatinase in abdominal aortic aneurysms: An elastolytic metalloproteinase expressed by aneurysm-infiltrating macrophages. Journal of Clinical Investigation 96, 318–326. https://doi.org/10.1172/JCI118037

[267] Tian, F.B., Zhu, L., Fok, P.W., Lu, X.Y., 2013. Simulation of a pulsatile non-Newtonian flow

past a stenosed 2D artery with atherosclerosis. Computers in Biology and Medicine 43, 1098–1113. https://doi.org/10.1016/j.compbiomed.2013.05.023

[268] Tripathi, J., Vasu, B., Bég, O.A., Gorla, R.S.R., Kameswaran, P.K., 2021. Computational simulation of rheological blood flow containing hybrid nanoparticles in an inclined catheterized artery with stenotic, aneurysmal and slip effects. Computers in Biology and Medicine 139. https://doi.org/10.1016/j.compbiomed.2021.105009

[269] Tsubota, K., Wada, S., Kamada, H., Kitagawa, Y., 2006. A Particle Method for Blood Flow Simulation , – Application to Flowing Red Blood Cells and Platelets –. Journal of the Earth Simulator 5, 2–7.

[270] Tsukahara, T., Tsukahara, R., Haniu, H., Matsuda, Y., Murakami-Murofushi, K., 2015. Cyclic phosphatidic acid inhibits the secretion of vascular endothelial growth factor from diabetic human coronary artery endothelial cells through peroxisome proliferator-activated receptor gamma. Molecular and Cellular Endocrinology 412, 320–329. https://doi.org/https://doi.org/10.1016/j.mce.2015.05.021

[271] Updegrove, A., Wilson, N.M., Merkow, J., Lan, H., Marsden, A.L., Shadden, S.C., 2017. SimVascular: An Open Source Pipeline for Cardiovascular Simulation. Annals of Biomedical Engineering 45, 525–541. https://doi.org/10.1007/s10439-016-1762-8

[272] Uziębło-Życzkowska, B., Jurek, A., Witek, P., Zieliński, G., Gielerak, G., Krzesiński, P., 2020. Left Heart Dysfunction in Acromegaly Revealed by Novel Echocardiographic Methods. Frontiers in Endocrinology 11, 1–8. https://doi.org/10.3389/fendo.2020.00418

[273] Van Huis, G.A., Sipkema, P., Westerhof, N., 1987. Coronary input impedance during cardiac cycle as determined by impulse response method. American Journal of Physiology-Heart and Circulatory Physiology 253, H317–H324. https://doi.org/10.1152/ajpheart.1987.253.2.H317

[274] Vasava, P., 2011. Application of Computational Fluid Dynamics in Modelling Blood Flow in.

[275] Vasava, P., Jalali, P., Dabagh, M., Kolari, P.J., 2012. Finite element modelling of pulsatile blood flow in idealized model of human aortic arch: Study of hypotension and hypertension. Computational and Mathematical Methods in Medicine 2012. https://doi.org/10.1155/2012/861837

[276] Vignon-Clementel, I.E., Alberto Figueroa, C., Jansen, K.E., Taylor, C.A., 2006. Outflow

boundary conditions for three-dimensional finite element modeling of blood flow and pressure in arteries. Computer Methods in Applied Mechanics and Engineering 195, 3776–3796. https://doi.org/10.1016/j.cma.2005.04.014

[277] Vignon-Clementel, I.E., Figueroa, C.A., Jansen, K.E., Taylor, C.A., 2010. Outflow boundary conditions for 3D simulations of non-periodic blood flow and pressure fields in deformable arteries. Computer methods in biomechanics and biomedical engineering 13, 625–640. https://doi.org/10.1080/10255840903413565

[278] Vinoth, R., Adhikari, R., Kumar, D., 2016. Computational Simulation of Blood Flow in Normal and Diseased Artery : A Review 9, 1–15. https://doi.org/10.17485/ijst/2016/v9i15/72442

[279] Vollmar, J.F., Pauschinger, P., Paes, E., Henze, E., Friesch, A., 1989. Aortic Aneurysms As Late Sequelae of Above-Knee Amputation. The Lancet 334, 834–835. https://doi.org/10.1016/S0140-6736(89)92999-1

[280] Volpi, S.L., Antonelli, M., Lazzerini, B., Marcelloni, F., Stefanescu, D.C., 2009. Segmentation and reconstruction of the lung and the mediastinum volumes in CT images. 2nd International Symposium on Applied Sciences in Biomedical and Communication Technologies, ISABEL 2009 i, 255–259. https://doi.org/10.1109/ISABEL.2009.5373701

[281] Vorp, D. a., 2009. Biomechanics of abdominal aortic aneurysms. Journal of biomechanics 40, 1887–1902. https://doi.org/10.1016/j.jbiomech.2006.09.003.BIOMECHANICS

[282] Vorp, D.A., 2007. Biomechanics of abdominal aortic aneurysm. Journal of Biomechanics 40, 1887–1902. https://doi.org/10.1016/j.jbiomech.2006.09.003

[283] Whiting, C.H., Jansen, K.E., 2001. A stabilized finite element method for the incompressible Navier-Stokes equations using a hierarchical basis. International Journal for Numerical Methods in Fluids 35, 93–116. https://doi.org/10.1002/1097-0363(20010115)35:1<93::AID-FLD85>3.0.CO;2-G

[284] Williamson, P.N., Docherty, P.D., Yazdi, S.G., Khanafer, A., Kabaliuk, N., Jermy, M., Geoghegan, P.H., 2022. Review of the Development of Hemodynamic Modeling Techniques to Capture Flow Behavior in Arteries Affected by Aneurysm, Atherosclerosis, and Stenting. Journal of biomechanical engineering 144, 1–13. https://doi.org/10.1115/1.4053082

[285] Wilson, N.M., Ortiz, A.K., Johnson, A.B., 2013. The vascular model repository: A public

resource of medical imaging data and blood flow simulation results. Journal of Medical Devices, Transactions of the ASME 7, 1. https://doi.org/10.1115/1.4025983

[286] Wong, E.Y., Milner, J.S., Steinman, D.A., Poepping, T.L., Holdsworth, D.W., 2009. Characterization of 3-D flow structures in the stenosed carotid bifurcation with plaque ulceration. Proceedings - IEEE Ultrasonics Symposium 1391–1394. https://doi.org/10.1109/ULTSYM.2009.5441531

[287] Wong, K.K.L., Dong, J., Tu, J., 2012. Numerical Study of Stenosed Carotid Bifurcation Models Based on Wall Shear Stress Distribution 34, 40–44.

[288] Wong, K.K.L., Wu, J., Liu, G., Huang, W., Ghista, D.N., 2020. Coronary arteries hemodynamics: effect of arterial geometry on hemodynamic parameters causing atherosclerosis. Medical and Biological Engineering and Computing 58, 1831–1843. https://doi.org/10.1007/s11517-020-02185-x

[289] Wong, N.D., 2014. Epidemiological studies of CHD and the evolution of preventive cardiology. Nature Reviews Cardiology 11, 276–289. https://doi.org/10.1038/nrcardio.2014.26

[290] Wu, J., Liu, G., Huang, W., Ghista, D.N., Wong, K.K.L., 2015. Transient blood flow in elastic coronary arteries with varying degrees of stenosis and dilatations: CFD modelling and parametric study. Computer Methods in Biomechanics and Biomedical Engineering 18, 1835–1845. https://doi.org/10.1080/10255842.2014.976812

[291] Xiang, J., Tutino, V.M., Snyder, K. V., Meng, H., 2014. CFD: Computational fluid dynamics or confounding factor dissemination? the role of hemodynamics in intracranial aneurysm rupture risk assessment. American Journal of Neuroradiology 35, 1849–1857. https://doi.org/10.3174/ajnr.A3710

[292] Xu, F., Kenjereš, S., 2021. Numerical simulations of flow patterns in the human left ventricle model with a novel dynamic mesh morphing approach based on radial basis function. Computers in Biology and Medicine 130. https://doi.org/10.1016/j.compbiomed.2020.104184

[293] Yilmaz, F., Gundogdu, M.Y., 2008. A critical review on blood flow in large arteries; relevance to blood rheology, viscosity models, and physiologic conditions. Korea Australia Rheology Journal 20, 197–211.

[294] Yoganathan, A.P., He, Z., Casey Jones, S., 2004. Fluid Mechanics of Heart Valves. Annual

Review of Biomedical Engineering 6, 331–362. https://doi.org/10.1146/annurev.bioeng.6.040803.140111

[295] Yu, S.C.M., 2000. Steady and pulsatile flow studies in Abdominal Aortic Aneurysm models using Particle Image Velocimetry. International Journal of Heat and Fluid Flow 21, 74–83. https://doi.org/https://doi.org/10.1016/S0142-727X(99)00058-2

[296] Zarins, C.K., Taylor, C.A., Min, J.K., 2013. Computed fractional flow reserve (FFTCT) derived from coronary CT angiography. Journal of Cardiovascular Translational Research 6, 708–714. https://doi.org/10.1007/s12265-013-9498-4

[297] Zeng, D., Boutsianis, E., Ammann, M., Boomsma, K., Wildermuth, S., Poulikakos, D., 2008. A study on the compliance of a right coronary artery and its impact on wall shear stress. Journal of Biomechanical Engineering 130, 1–11. https://doi.org/10.1115/1.2937744

[298] Zhong, L., Zhang, J.M., Su, B., Tan, R.S., Allen, J.C., Kassab, G.S., 2018. Application of patient-specific computational fluid dynamics in coronary and intra-cardiac flow simulations: Challenges and opportunities. Frontiers in Physiology 9. https://doi.org/10.3389/fphys.2018.00742

[299] Zhou, Y., Kassab, G.S., Molloi, S., 1999. Contact us My IOPscience On the design of the coronary arterial tree : a generalization of Murray ' s law On the design of the coronary arterial tree : a generalization of Murray ' s law. Sciences-New York 2929, 2929–2945.

ETHICAL CLEARANCE

BANARAS HINDU UNIVERSITY
INSTITUTE OF MEDICAL SCIENCES
VARANASI, INDIA -221 005

ECR/526/Inst/UP/2014/RR-20 dt. 19.5.2020

No. Dean/2022/EC/ 3352

Dated: 03.06.2022
06

Dr. Sanjay Kumar Rai
Associate Professor
School of Biomedical Engineering
Indian Institute of Technology
Banaras Hindu University

Dear Sir,

The Ethics Committee meeting was held on 03.06.2022 at 3.00 PM in the Chamber of the Dean, Faculty of Medicine, IMS for Ethical clearance of the MD/MS/DM/M.Ch/MBBS/**Ph.D**/PDCC/fellowship/synopsis/Short Project/Project submitted by the following:

Name of the Student	Sumit Kumar
Synopsis Title	Development of Computational model for structural and functional analysis of normal and diseased human abdominal artery using Non-invasive imaging and CFD technique
Suggestions/Comments	-
Remarks	**The Synopsis is approved by the Institutional Ethics Committee**

This is for your information and necessary action at your end.

(DR. KIRAN GIRI)
MEMBER SECRETARY

Yours sincerely,

V. Bhattacharya

(PROF. V. BHATTACHARYA)
CHAIRPERSON OF THE ETHICAL COMMITTEE

LIST OF PUBLICATIONS

Journals

1. **Sumit Kumar,** S. K. Rai, B.V. Rathish Kumar and Om Shankar "The pulsatile 3D-Hemodynamics in a doubly afflicted human descending abdominal artery with iliac branching" Computer Methods in Biomechanics and Biomedical Engineering, 21 June, 2022. (Link)

2. **Sumit Kumar**, B.V Rathish Kumar, S.K Rai, Om Shankar ", Effect of rheological models on pulsatile hemodynamics in a multiply afflicted descending human aortic network". Computer Methods in Biomechanics and Biomedical Engineering, Jan 2023. (Link)

3. **Sumit Kumar**, B.V Rathish Kumar, S.K Rai, " Influence of abdominal aortic aneurysm shape on hemodynamics in human aortofemoral arteries: A transient open-loop study ", Physics of Fluids, (Link)

4. **Sumit Kumar**, B.V Rathish Kumar, S.K Rai, "An open loop 0D-3D modelling of pulsatile hemodynamics for the diagnosis of a suspected coronary arterial disease with patient data", (Accepted), Physics of Fluid.

5. **Sumit Kumar**, B.V Rathish Kumar, S.K Rai, "Analysis of hemodynamics parameters during arterial disease progression under various pathological conditions using open loop system", (Submitted to journal), Computer in Biology and Medicine.

6. Priyanshu Soni, **Sumit Kumar,** B.V Rathish Kumar, S.K Rai. "Transient blood flow dynamics models in 3D ellipsoidal models of LV", (Under Review), Physics of Fluids

7. P Soni, **Sumit Kumar**, BV Rathish Kumar, S.K Rai, Ashish Verma, Om Shankar, "Investigations of Blood Flow Dynamics in The Human Heart Using Numerical & Experimental Methods: A Comprehensive Review, (Submitted to journal).

CONFERENCES/WORKSHOPS/SEMINARS

Conferences

1. **Sumit Kumar,** B.V Rathish Kumar, Sanjay Kumar Rai, "Effect of left ventricular shape on hemodynamics using computational fluid dynamics and noninvasive imaging data", VPH 22, Virtual Physiological Human, Porto, Portugal, (Poster Presentation).

2. **Sumit Kumar**, "An answer to the challenges in a CT-Data based realistic complex artery network flow study" at 86th Annual Conference of the Indian Mathematical Society - IMS 2020" - (An International Meet) organized by Department of, Mathematics, VIT, Vellore, (Oral Presentation).

3. **Sumit Kumar**, BV Rathish Kumar, Sanjay Kumar Rai, Om Shankar, Ashish Verma "An open-loop system for the computational investigation of suspected coronary disease with the patient-specific CT-data, Poster presentation Summer, Biomechanics, Bioengineering, and Bio transport Conference (Virtual), June 20-23, 2022, Maryland the USA.

4. **Sumit Kumar**, B.V Rathish Kumar, S.K Rai, "An open loop 0D-3D modelling of pulsatile hemodynamics for the diagnosis of a suspected coronary arterial disease with patient data", Oral Presentation, July 12-14, ICRFMN 2023, Bangalore, India

5. Priyanshu Soni**, Sumit Kumar**, B.V Rathish Kumar, S.K Rai. "Transient blood flow dynamics in 3D ellipsoidal models of LV", Oral Presentation, July 12-14, ICRFMN 2023, Bangalore, India

Workshops

1. Simvascular Virtual Workshop organized by Prof. Alison Marsden lab, Cardiovascular Biomechanics, Stanford University SB3C, USA, June 13, 2021.

2. Participated at IIT Kanpur – University of Heidelberg Collaborative Workshop on DEAL.II – An Open-Source Finite Element Library, May 2017.

3. Workshop at Virtual Physiological Human Conference 2022, Porto, Portugal Sim cardio test Open Source Software – DEMO on OASIS: Computational fluid dynamics solver & SOFA: Simulation Open Framework Architecture

RESEARCH WORK IN PRESS NEWS

1. Detecting, Predicting, and Preventing Aortic Ruptures with Computational Modeling, (https://publishing.aip.org/publications/latest-content/detecting-predicting-and-preventing-aortic-ruptures-with-computational-modeling/)

2. Computational model found to predict early aortic abdominal aneurysm rupture, https://vascularspecialistonline.com/computational-model-found-to-predict-early-aortic-abdominal-aneurysm-rupture /)

RESEARCH AWARD