

CURRICULUM VITAE

DIANA NADA CATERINA MASSAI

CURRENT POSITION

Sep 2017 - ongoing. Assistant Professor, Industrial Bioengineering, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, IT

EDUCATION

Jun 2010. PhD in Biomedical Engineering, Thesis: "Quantitative analysis of hemodynamic disturbances in numeric models of healthy and pathological cardiovascular districts". Tutor: Prof. Montevecchi, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, IT

Jul 2006. Master Degree in Nuclear Engineering (score 110/110), Thesis: "Simulation of the therapeutic hadron beam in the control system of the Centro Nazionale di Adroterapia Oncologica". Tutor: Prof. Lavagno, Department of Physics, Politecnico di Torino, IT

TRAINING AND RESEARCH ACTIVITY

Oct 2015 - Aug 2017. Horizon 2020 Marie Skłodowska-Curie Individual Fellowship "Novel bioreactor platform for reproducible, scalable expansion and cardiac differentiation of hiPSC in suspension culture - POSEIDON", http://cordis.europa.eu/project/rcn/195954_en.html, Leibniz Research Laboratories for Biotechnology and Artificial Organs, Hannover Medical School, DE

Jul 2010 - Sep 2015. Postdoc Research Fellow, Industrial Bioengineering Group, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, IT. Research activities:

1. "Design and development of a bioreactor for culture of cardiospheres for cardiac regenerative medicine", National project "A bioprocess for the optimisation of 3D cardiosphere-based constructs for cardiac regenerative medicine - BEAT3DHEART", PRIN 2012, 2014-2016, Supervisor: Dr. Morbiducci
2. "Design and development of a mechanical sensorized bioreactor for cardiac regenerative medicine", National project "Prototype of Engineered Bioreactor - PROBING", Mi.S.E.-ICE-CRUI Agreement, 2012-2014, Supervisor: Prof. Bignardi
3. "Design and development of two bioreactors for cardiac differentiation of stem cells", European project "Bioactive Highly Porous and Injectable Scaffolds Controlling Stem Cell Recruitment, Proliferation and Differentiation and Enabling Angiogenesis for Cardiovascular Engineered Tissues - BIOSCENT", FP7 Cooperation - Collaborative Project, 2009-2013, Supervisors: Proff. Montevecchi and Audenino
4. "Design of a software platform for multiscale modelling to assist the design of polymeric cardiac patches", National project "Advanced Cardiovascular Therapies - ACTIVE", Piedmont Region Competitiveness and Employment Call, 2009-2012, Supervisor: Proff. Montevecchi and Ciardelli

Sep 2009 - Dec 2009. PhD Visiting Student, Supervisor: Prof. Xu, Department of Chemical Engineering, Imperial College London, UK

Jan 2008 - Dec 2008. PhD collaboration for scientific research, International project "Cardiac Tissue Engineering", British Programme, 2007-2008, Supervisors: Prof. Ciardelli, Prof. Long, Industrial Bioengineering Group, Department of Mechanics, Politecnico di Torino, IT – Brunel University, London, UK

Sep 2007 - Jun 2010. PhD collaboration for scientific research, National project "Novel biomaterials for intraoperative adjustable devices for fine tuning of prostheses' shape and performance in surgery - BIADS", Piedmont Region Industrial Research Call, 2007-2010, Supervisor: Prof. Montevecchi, Industrial Bioengineering Group, Department of Mechanics, Politecnico di Torino, IT

Sep 2006 - Nov 2006. Scholarship, Supervisor: Prof. Cirio, Medical Physics Group, Department of Medical Physics, Università degli Studi di Torino, IT

CURRENT RESEARCH INTERESTS

Bioreactors; Dynamic culture devices; Bioprocess automation; Microfluidics; Fluid dynamics and mass transport modelling; Multiscale mechanical characterization of soft tissues; Cardiac regenerative medicine; Cardiac tissue engineering.

RESEARCH GRANTS AS PRINCIPAL INVESTIGATOR

Oct 2015 - Aug 2017. Horizon 2020 Marie Skłodowska-Curie Individual Fellowship "Novel bioreactor platform for reproducible, scalable expansion and cardiac differentiation of hiPSC in suspension culture - POSEIDON", http://cordis.europa.eu/project/rcn/195954_en.html, Leibniz Research Laboratories for Biotechnology and Artificial Organs, Hannover Medical School, DE

RESEARCH GRANTS AND FUNDING PARTICIPATION

Nov 2017 - ongoing. External Advisory Board Member Horizon 2020 Research and Innovation Action Project "Tools and technologies for breakthrough in heart therapies - TECHNOBEAT", 2016-2019, Coordinator: Dr Zweigerdt, Leibniz Research Laboratories for Biotechnology and Artificial Organs, Hannover Medical School, DE

Mar 2014 - Feb 2017. Supervisor of Bioreactor Unit and Co-writer, National project "A bioprocess for the optimisation of 3D cardiosphere-based constructs for cardiac regenerative medicine - BEAT3DHEART", PRIN 2012, 2014-2016, Supervisor: Dr. Morbiducci, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, IT

Jun 2014 - May 2015. Supervisor of Bioreactor Unit, scientific consulting for Biocom srl "Ottimizzazione di un dispositivo per coltura cellulare di tipo dinamico per applicazioni di ingegneria tessutale e medicina rigenerativa", 2014-2015, Supervisor: Prof. Morbiducci, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, IT

Jan 2013 - Dec 2014. Delegate coordinator and Writer, National project "Prototype of Engineered Bioreactor - PROBING", Mi.S.E.-ICE-CRUI Agreement, 2012-2014, Supervisor: Prof. Bignardi, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, IT

Jan 2011 - Dec 2013. Supervisor of Bioreactor Unit, European project "Bioactive Highly Porous and Injectable Scaffolds Controlling Stem Cell Recruitment, Proliferation and Differentiation and Enabling Angiogenesis for Cardiovascular Engineered Tissues - BIOSCENT", FP7 Cooperation - Collaborative Project, 2009-2013, Supervisors: Proff. Montecvecchi and Audenino, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, IT

TEACHING AND SUPERVISION ACTIVITY at Politecnico di Torino, Italy

2017/18, 2014/15. Lecturer of "Bioreactors", Master in Biomedical Engineering

2017/18. Co-lecturer of "Cell and Tissue Engineering", Bachelor in Biomedical Engineering

2012/14. Lecturer of "Cell and Tissue Bioengineering", Bachelor in Biomedical Engineering

2011/14. Teaching assistant of "Design of Prostheses and Artificial Organs", Master in Biomedical Engineering

2011/12. Teaching assistant of "Regenerative Medicine Engineering", Master in Biomedical Engineering

2010/11. Lecturer of "Tissue Engineering and Biotechnological Applications", Master in Biomedical Engineering

2008/11. Teaching assistant of "Biomedical Applications of Radiations", Master in Nuclear Engineering

2007/09. Teaching assistant of "Assisted Surgery Biomechanics", Master in Biomedical Engineering

2007/09. Teaching assistant of "Tissue Engineering and Biotechnological Applications", Master in Biomedical Engineering

2007/08. Teaching assistant of "Industrial Bioengineering Lab", Master in Biomedical Engineering

Jan 2007 - ongoing. Co-supervisor of 4 PhD students, and 14 MSc students, Industrial Bioengineering Group, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, IT

PEER REVIEWER FOR THE SCIENTIFIC JOURNALS

Analyst (RSC), Annals of Biomedical Engineering (Springer), International Journal of Engineering Science and Technology (Engg Journals Publications), Journal of Biotechnology (Elsevier), Medical Engineering & Physics (Elsevier), Medical Science Monitor Basic Research (International Scientific Information), Plos One (Public Library of Science), Stem Cells and Cloning: Advances and Applications (Dove Medical Press Ltd)

EDITORIAL ACTIVITY

Aug 2015 - ongoing. Editorial board member of "Pediatric Cardiology" (Frontiers)

Nov 2017 - Scientific committee member of "VII Annual Meeting Italian Chapter of the European Society of Biomechanics ESB-ITA", Roma, IT

AWARDS

Apr 2017. Best Poster Presentation Award "Stem Cell Community Day 2017", Hamburg, DE

May 2016. Cover of the journal "Proteins: Structure, Functions, and Bioinformatics"

Jun 2014. SYIS-EU Poster Presentation Award 2nd place "European Chapter Meeting of the Tissue Engineering and Regenerative Medicine International Society TERMIS 2014", Genova, IT

Sep 2012. Young Investigator Travel Award "3rd Tissue Engineering and Regenerative Medicine International Society TERMIS World Congress 2012", Wien, A

Jun 2012. Best Oral Presentation Award "II Meeting del Capitolo Italiano della European Society of Biomechanics ESB-ITA 2012", Roma, IT

INVITED TALKS

Mar 2018. "Bioreactors vs Tumors", Educational Congress "Imaging & Cancro", Politecnico di Torino, IT

Nov 2017. "Dynamic systems for in vitro culture of tumoral spheroids", Workshop "L'integrazione di un approccio diagnostico innovativo in un modello terapeutico personalizzato - L'evoluzione del progetto NanoBioTech", Agenzia Spaziale Italiana, Rome, IT

Jun 2013. "Bioreactors as engineering support for cardiac regenerative medicine", International Conference "Recent advances in cardiac repair: from stem cells to biomaterials and small molecules", Molecular Biotechnology Center, Torino, IT

May 2013. "Computational tools as support to tissue engineering and regenerative medicine", Departments of Surgery and Biomedicine, University of Basel, CH

Oct 2012. "Bioreactors for regenerative medicine applications", Training course "Tissue engineering and advanced cell cultures", Università del Piemonte Orientale "Amedeo Avogadro", Department of Health Sciences, Novara, IT

Jun 2012. "Bioreactors for stem cells expansion and myocardial differentiation in vitro", International Conference "3rd Lugano Stem Cell Meeting", Lugano, CH

TECHNOLOGY TRANSFER

Sep 2013 - Sep 2015. Project Creator, Cofounder and Technical Officer of BIOEXPANSYS Srl, Academic spinoff of Politecnico di Torino, IT

2011 - 2016. Italian Patent ITTO20110432/WO2012157007, Microgravity Generating Device

BIBLIOMETRICS

Articles: 20

Total citations: 335

h-index: 10

BIBLIOGRAPHY

Papers

Bignardi, C., Terzini, M., Audenino, A.L., Massai, D., Aprato, A., Massè, A., Costa, P., Zanetti, E.M. Pelvic manipulator for fractures reduction. (2018) International Journal of Mechanical Engineering and Technology, 9 (3), pp. 570-580.

Grasso, G., Morbiducci, U., Massai, D., Tuszynski, J.A., Danani, A., Deriu, M.A. Destabilizing the AXH Tetramer by Mutations: Mechanisms and Potential Antiaggregation Strategies. (2018) Biophysical Journal, 114 (2), pp. 323-330. DOI: 10.1016/j.bpj.2017.11.025

Massai, D., Bolesani, E., Diaz, D.R., Kropp, C., Kempf, H., Halloin, C., Martin, U., Braniste, T., Isu, G., Harms, V., Morbiducci, U., Dräger, G., Zweigerdt, R. Sensitivity of human pluripotent stem cells to insulin precipitation induced by peristaltic pump-based medium circulation: Considerations on process development. (2017) Scientific Reports, 7 (1), art. no. 3950. DOI: 10.1038/s41598-017-04158-x

Kropp, C., Massai, D., Zweigerdt, R. Progress and challenges in large-scale expansion of human pluripotent stem cells. (2017) Process Biochemistry, 59, pp. 244-254. DOI: 10.1016/j.procbio.2016.09.032

Chimenti, I., Massai, D., Morbiducci, U., Beltrami, A.P., Pesce, M., Messina, E. Stem Cell Spheroids and Ex Vivo Niche Modeling: Rationalization and Scaling-Up. (2017) Journal of Cardiovascular Translational Research, 10 (2), pp. 150-166. DOI: 10.1007/s12265-017-9741-5

Massai, D., Isu, G., Madeddu, D., Cerino, G., Falco, A., Frati, C., Gallo, D., Deriu, M.A., Labate, G.F.D., Quaini, F., Audenino, A., Morbiducci, U. A versatile bioreactor for dynamic suspension cell culture. Application to the culture of cancer cell spheroids. (2016) PLoS ONE, 11 (5), art. no. e0154610. DOI:10.1371/journal.pone.0154610

Deriu, M.A., Grasso, G., Tuszynski, J.A., Massai, D., Gallo, D., Morbiducci, U., Danani, A. Characterization of the AXH domain of Ataxin-1 using enhanced sampling and functional mode analysis. (2016) Proteins: Structure, Function and Bioinformatics, 84 (5), pp. 666-673. DOI: 10.1002/prot.25017

Salica, A., Pisani, G., Morbiducci, U., Scaffa, R., Massai, D., Audenino, A., Weltert, L., Wolf, L.G., De Paulis, R. The combined role of sinuses of Valsalva and flow pulsatility improves energy loss of the aortic valve. (2016) European Journal of Cardio-thoracic Surgery, 49 (4), art. no. ezv311, pp. 1222-1227. DOI: 10.1093/ejcts/ezv311

Cerino, G., Gaudiello, E., Grussenmeyer, T., Melly, L., Massai, D., Banfi, A., Martin, I., Eckstein, F., Grapow, M., Marsano, A. Three dimensional multi-cellular muscle-like tissue engineering in perfusion-based bioreactors. (2016) Biotechnology and Bioengineering, 113 (1), pp. 226-236. DOI: 10.1002/bit.25688

Massai, D., Pennella, F., Gentile, P., Gallo, D., Ciardelli, G., Bignardi, C., Audenino, A., Morbiducci, U. Image-based three-dimensional analysis to characterize the texture of porous scaffolds. (2014) BioMed Research International, 2014, art. no. 161437. DOI:10.1155/2014/161437

Pennella, F., Cerino, G., Massai, D., Gallo, D., Falvo D'Urso, Labate, G., Schiavi, A., Deriu, M.A., Audenino, A., Morbiducci, U. A survey of methods for the evaluation of tissue engineering scaffold permeability. (2013) Annals of Biomedical Engineering, 41 (10), pp. 2027-2041. DOI: 10.1007/s10439-013-0815-5

- Massai, D., Cerino, G., Gallo, D., Pennella, F., Deriu, M.A., Rodriguez, A., Montevecchi, F.M., Bignardi, C., Audenino, A., Morbiducci, U. Bioreactors as engineering support to treat cardiac muscle and vascular disease. (2013) *Journal of Healthcare Engineering*, 4 (3), pp. 329-370. DOI: 10.1260/2040-2295.4.3.329
- Massai, D., Soloperto, G., Gallo, D., Xu, X.Y., Morbiducci, U. Shear-induced platelet activation and its relationship with blood flow topology in a numerical model of stenosed carotid bifurcation. (2012) *European Journal of Mechanics, B/Fluids*, 35, pp. 92-101. DOI: 10.1016/j.euromechflu.2012.03.011
- Gallo, D., De Santis, G., Negri, F., Tresoldi, D., Ponzini, R., Massai, D., Deriu, M.A., Segers, P., Verhegghe, B., Rizzo, G., Morbiducci, U. On the use of in vivo measured flow rates as boundary conditions for image-based hemodynamic models of the human aorta: Implications for indicators of abnormal flow. (2012) *Annals of Biomedical Engineering*, 40 (3), pp. 729-741. DOI: 10.1007/s10439-011-0431-1
- Bidone, T.C., Deriu, M.A., Labate, G.F.D., Massai, D., Morbiducci, U., Montevecchi, F.M. Scale/Physics/Time properties and functions in bioartificial systems. (2012) *Materials Science Forum*, 706-709, pp. 121-126. DOI: 10.4028/www.scientific.net/MSF.706-709.121
- Morbiducci, U., Gallo, D., Massai, D., Ponzini, R., Deriu, M.A., Antiga, L., Redaelli, A., Montevecchi, F.M. On the importance of blood rheology for bulk flow in hemodynamic models of the carotid bifurcation. (2011) *Journal of Biomechanics*, 44 (13), pp. 2427-2438. DOI: 10.1016/j.jbiomech.2011.06.028
- Morbiducci, U., Gallo, D., Ponzini, R., Massai, D., Antiga, L., Montevecchi, F.M., Redaelli, A. Quantitative analysis of bulk flow in image-based hemodynamic models of the carotid bifurcation: The influence of outflow conditions as test case. (2010) *Annals of Biomedical Engineering*, 38 (12), pp. 3688-3705. DOI: 10.1007/s10439-010-0102-7
- Morbiducci, U., Gallo, D., Massai, D., Consolo, F., Ponzini, R., Antiga, L., Bignardi, C., Deriu, M.A., Redaelli, A. Outflow conditions for image-based hemodynamic models of the carotid bifurcation: Implications for indicators of abnormal flow. (2010) *Journal of Biomechanical Engineering*, 132 (9), art. no. 91005-1. DOI: 10.1115/1.4001886
- Morbiducci, U., Ponzini, R., Nobili, M., Massai, D., Montevecchi, F.M., Bluestein, D., Redaelli, A. Blood damage safety of prosthetic heart valves. Shear-induced platelet activation and local flow dynamics: A fluid-structure interaction approach. (2009) *Journal of Biomechanics*, 42 (12), pp. 1952-1960. DOI: 10.1016/j.jbiomech.2009.05.014
- Bourhaleb, F., Marchetto, F., Attili, A., Pittà, G., Cirio, R., Donetti, M., Giordanengo, S., Givehchi, N., Iliescu, S., Krengli, M., La Rosa, A., Massai, D., Pecka, A., Pardo, J., Peroni, C. A treatment planning code for inverse planning and 3D optimization in hadrontherapy. (2008) *Computers in Biology and Medicine*, 38 (9), pp. 990-999. DOI: 10.1016/j.combiomed.2008.07.005

Book chapters

- Gallo, D., Isu, G., Massai, D., Pennella, F., Deriu, M.A., Ponzini, R., Bignardi, C., Audenino, A., Rizzo, G., Morbiducci, U. A survey of quantitative descriptors of arterial flows. (2014) *Lecture Notes in Computational Vision and Biomechanics*, 12, pp. 1-24. DOI: 10.1007/978-94-007-7769-9_1
- Pennella, F., Mastrangelo, F., Gallo, D., Massai, D., Deriu, M.A., Labate, G.F.D., Bignardi, C., Montevecchi, F., Morbiducci, U. A survey of microchannel geometries for mixing of species in biomicrofluidics. (2012) *Single and Two-Phase Flows on Chemical and Biomedical Engineering*, pp. 548-578. DOI: 10.2174/978160805295011201010548