

Prof. Maria Laura Costantino

Curriculum

Maria Laura Costantino took the Master degree in Mechanical Engineering in 1982 and in 1987 the Ph.D. in Bioengineering.

Currently she is full professor in Industrial Bioengineering at Politecnico di Milano, where she holds the courses "Life Support Systems" and "Biomachines (with Laboratory)" both offered at the Master Programme in Biomedical Engineering.

During her academic career she has been supervising a number of Bachelor Theses, Master Theses at the Biomedical Engineering Programme. In addition she has been supervising PhD Theses in the field of Biomedical Engineering and of Structural Engineering.

She is author of a number of international scientific papers.

Maria Laura Costantino belongs to the Department of Chemistry, Materials and Chemical Engineering "Giulio Natta" of the Politecnico di Milano. Professor Costantino is the responsible of the Laboratory of Life Support Systems, part of the Laboratory of Biological Structure Mechanics (LaBS) of the same Department, for research, consulting and teaching activities.

Her research activity has always been dealing with both experimental and theoretical biomechanics focusing mass, momentum and energy transfer in artificial internal organs and in the biological system (e.g. hemodynamic alteration induced by the dialytic therapy), cardiovascular fluid dynamics both in the human adult and the foetus (e.g. hemodynamics and gas transfer in the foeto-placental system), artificial ventilation (namely Total Liquid Ventilation), design of biomedical devices interacting with blood or biological districts (e.g. blood oxygenators, blood pumps, polymeric heart valve prostheses, cannulae, circuits for the processing of total liquid ventilation) and the study of biological-system-to-artificial-organs interaction.

The competences in these fields of research have been strengthened by the cooperation with Italian and foreign institutions (e.g. Department of Pharmaceutical Sciences "Pietro Pratesi," Università degli Studi di Milano, Milan (I); Division of Cardiac Surgery, University Hospital of Verona(I); Dept. of Cardiac Surgery and Intensive Care Unit Ospedale Ca' Granda di Niguarda, Milano (I); Dept. of Obstetrics and Gynaecology and Dept. of Nephrology and Dialysis, Ospedale S.Paolo, Milano (I); Dept. of Cardiac Surgery and Dept. of Nephrology, Ospedali Riuniti di Bergamo (I); Mario Negri Research Institute, Bergamo (I); Dept of Thoracic and Cardiac Surgery, Centro Cardiologico Monzino, Milano (I); Biomedical Engineering Department and ECMO Research Laboratory, Department of General Surgery, The University of Michigan, Ann Arbor (MI, U.S.A.); Dept. of Chemical Engineering & Biotechnology, University of Cambridge (UK)).

She is responsible of many contracts signed with important Italian and foreign biomedical companies in terms of both third part activity and research.

She participated to projects co-financed by the Italian Ministry of Education, University and Research and by private Foundations, either as leading researcher or as a partner.

At present she is the project leader of the Research Project "Dialysis (Dialysis therapy between Italy and Switzerland)" in the frame of INTERREG Italy-Switzerland Funding programme 2007-2013.

She is co-holder of the European Patents: "Aortic Cannula" and "Portable Electrocardiographic Apparatus".

From 2004 to 2010 she was vice president of the Biomedical Engineering Programme Council at the School of Systems Engineering of Politecnico di Milano. From January 2013 she is President of the Biomedical Engineering Programme Council at Politecnico di Milano. She is a member of the Council of the School of Industrial and Information Engineering of Politecnico di Milano.

Professor Costantino has been often appointed as an expert in the field, by the Public Prosecutor or the Judge in judicial proceedings dealing with health related technological aspects.

Reviewer for the following journals: Artificial Organs, The International Journal of Artificial Organs, ASAIO Journal, ASME Journal, Journal of Applied Biomaterials and Biomechanics.

She is a member of the European Society of Artificial Organs (ESAO), of the American Society for Artificial Internal Organs (ASAIO) and of the European Society of Biomechanics (ESB).

Selection of publications:

E. Cutrì, P. Bagnoli, E. Marcelli, F. Biondi, L. Cercenelli, M.L. Costantino, G. Plicchi, R. Fumero. A Mechanical Simulator of Cardiac Wall Kinematics. *ASAIO Journal* 2010; 56(3): 164-171.

J. Stasiak, G.D. Moggridge, A. Zaffora, A. Pandolfi, M.L. Costantino. Engineering orientation in block copolymers for application to prosthetic heart valves. *Functional Materials Letters*, World Scientific Publishing Company, Hackensack, (NJ, U.S.A.), vol.3, n.4, 2010, pp. 249-252. doi: 10.1142/S1793604710001342.

P. Bagnoli, N. Malagutti, D. Gastaldi, E. Marcelli, E. Lui, L. Cercenelli, M.L. Costantino, G. Plicchi, R. R. Fumero. Computational finite element model of cardiac torsion. *The Int. J. Artif. Organs*, Wichtig, Milan (I), vol. 34, n. 1, 2011, pp. 44-53.

P. Bagnoli, B. Cozzi, A. Zaffora, F. Acocella, R. Fumero, M.L. Costantino. Experimental and computational biomechanical characterization of the tracheo-bronchial tree of the bottlenose dolphin (*Tursiops truncatus*) during diving. *Journal of Biomechanics, Elsevier New York (NY, U.S.A.)*, vol.44, n.6, 2011, pp. 1040-1045. DOI:10.1016/j.jbiomech.2011.02.005.

G. Dubini, D. Ambrosi, P. Bagnoli, F. Boschetti, E.G. Caiani, C. Chiastra, C.A. Conti, C. Corsini, M.L. Costantino, C. D'Angelo, L. Formaggia, R. Fumero, D. Gastaldi, F. Migliavacca, S. Morlacchi, F. Nobile, G. Pennati, L. Petrini, A. Quarteroni, A. Redaelli, M. Stevanella, A. Veneziani, C. Vergara, E. Votta, Wei Wu, P. Zunino. Trends in biomedical engineering: focus on Patient Specific Modeling and Life Support Systems. *J. Appl. Biomater. Biomech.*, vol. 9, n.2, 2011, pp. 109-117. DOI: 10.5301/JABB.2011.8585.

J. Stasiak, A. Zaffora, M.L. Costantino, G.D. Moggridge. A real time SAXS study of oriented block copolymers during fast cyclical deformation, with potential application for prosthetic heart valves. *Soft Matter*, vol.7, 2011, pp. 11475–11482. DOI: 10.1039/c1sm06503c.

P. Bagnoli, A. Peruffo, M.L. Costantino, B. Cozzi. The upper respiratory tract of dolphins. *IJAE*, vol. 116, n.3, 2011, pp. 201-206.

P. Bagnoli, F. Acocella, M. Di Giancamillo, R. Fumero, M.L. Costantino. Finite element analysis of the mechanical behavior of preterm lamb tracheal bifurcation during total liquid ventilation. *Journal of Biomechanics, Elsevier New York (NY, U.S.A.)*, vol. 46, n. 3, 2013, pp. 462-469.

J. Stasiak, J. Brubert, M. Serrani, Sukumaran Nair, F. De Gaetano, M.L. Costantino and G. Moggridge. A bio-inspired microstructure induced by slow injection moulding of cylindrical block copolymers. *Soft Matter*, vol.10, 2014, pp. 6077-6086.