

PERSONAL DATA**Manuela Ferrario**

Date and place of birth: 14/01/1978, Busto Arsizio (VA)

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ACADEMIC APPOINTMENTS

- 08/11/2018-today **Politecnico di Milano, Milano, Italia**
Dipartimento di Elettronica, Informazione e Bioingegneria
 Assistant professor (RTDb)
- 1/01/2014-08/11/2018 **Politecnico di Milano, Milano, Italia**
Dipartimento di Elettronica, Informazione e Bioingegneria
 Assistant professor (RTDa)
 position supported by *FIRB2012 - Futuro in Ricerca-* Progetto RBFR12VHR7
 and successively by Shockmomics, UE project.
- 1/01/2011-31/12/2013 **Politecnico di Milano, Milano, Italia**
Dipartimento di Bioingegneria
 Assistant professor (RTD legge 2005)
 position supported by *FIRB2008 - Futuro in Ricerca-* Progetto RBFRo8VAB
- 07/2012 and 08/2017 **Renal Research Institute, NYC, NY, USA**
 Visiting period
- 15/03/2007-31/12/2010 **Politecnico di Milano, Milano, Italia**
Dipartimento di Bioingegneria
Research fellowship funded by *Fresenius Medical Care, Deutschland, GmbH*. Project title: "Analysis of the heart rate variability (HRV) and other biological signals of cardiovascular origin in hemodialysis patients and evaluation of their prognostic effectiveness".
- 24/04/2010 - 30/04/2010 **Research Lab of Electronics, MIT, Boston, MA, USA**
 Visiting period (Seed Funds - "Rocca project").
- 07/2009-09/2009 **Renal Research Institute, NYC, NY, USA**
 Visiting period
- 06/2003-03/2004 **Politecnico di Milano, Milano, Italia**
Dipartimento di Bioingegneria
Research fellowship funded by project FIRB 2003-2005, MURST:
 "Information and communication technology for the management of prevention, care and rehabilitation processes". PI: Prof. Mario Stefanelli

ORGANITION AND EDITORIAL ACTIVITY

- 06-2018 Member of the editorial board of *Scientific Reports* journal
- 01/2014- Member of the international advisory board of *Physiological Measurement* journal
- 27-29 July 2017 Member of the organizing committee for the International Conference on Complex Acute Illness (ICCAI), Politecnico di Milano

EDUCATION

- 03/2004-03/2007 **Politecnico di Milano, Milano, Italia**
 Dipartimento di Bioingegneria
 PhD in Bioengineering (XIX edition)
 “Advanced Methods and Techniques for the antepartum Diagnosis of Fetal Risk”.
 Score: cum laude. Tutor: Prof. Maria Gabriella Signorini, Advisor: Prof. Giovanni Magenes.
- 09/1997-06/2003 **Politecnico di Milano, Milano, Italia**
 Laurea (BSc+MSc) in Biomedical Engineering.
 Advisors: Prof. Sergio Cerutti and Prof. Maria Gabriella Signorini
- 09/2000-07/2001 **Technische Universität Wien, Vienna, Austria**
 Erasmus student
 Some of the attended courses are: Datenbanken Systeme (Basi di dati, Prof. G. Gottlob), Optische Nachrichtentechnik (Optoelettronica, Prof. W. Leeb).

LANGUAGE

Italian: mother tongue
 English: fluent
 German: good

GRANTS AND COLLABORATIONS

1. **Principal investigator of PoliMI research unit. FIRB2008 - Futuro in Ricerca- Project RBFRO8VAB.** (2010-2015)
 Title “Cardiorespiratory dysregulation in hypertensive cardiomyopathy and chronic obstructive pulmonary disease: a nonlinear signal processing approach to diagnostics, optimizing mechanical ventilation and reducing peri- and postoperative morbidity”. In collaboration with Tor Vergata Hospital, Medical Physics Section and Anesthesiology Section of Univeristà Tor Vergata, Rome. Project PI: Prof. Nicola Toschi. Total project funds: 468’200€. PoliMI research unit: 216’000€.
2. **Principal investigator of PoliMI research unit. FIRB2012 - Futuro in Ricerca- Porject RBFRI2VHR7.** (2012-2017)
 Title: “Interpreting emotions: a computational tool integrating facial expressions and biosignals based on shape analysis and bayesian networks”
 In collaboration with Università vita e salute San Raffaele, Milano, and Univeristà degli Studi di Milano. Project PI: Dr Chiara Brombin, Università Vita e Salute San Raffaele, Milan. Total project funds: €734’602, PoliMI research unit: €212’632
3. **WP leader and member of the Scientific Committee of the EU project “Shockomics: multiscale approach to the identification of molecular biomarkers in acute heart failure induced by shock” - #602706** (2013-2017). I helped in the writing of the project and in the creation of the consortium.
4. **Consultancy for SCHARPER S.P.A** (2017). I analyzed the metabolomics data and the clinical data from a clinical trial to evaluate the effectiveness of a dietary supplement in a population affected by chronic obstructive pulmonary disease (COPD)

FELLOWSHIP

PhD Fellowship (XIX edition, AY 2004-2007), Politecnico di Milano.

INVITATED TALKS:

- 02/02/2019 title: "AI & machine learning for clinical predictive analytics", Milan Critical Care Datathon and ESICM's Big Data Talk, Milano, Feb 1-3 2019.
- 28/10/2015 title: "Short term and long term mortality prediction model in severe septic shock: analysis of effectiveness of target metabolomics approach." Anschutz medical center, University of Colorado Denver, Aurora (CO)
- 08/10/2015 **keynote speaker 1st MetaboMI Meeting "Metabolomic phenotyping in health and disease", IFOM, Milano, Italy.** Title of the talk: "Short term and long term mortality prediction model in severe septic shock: analysis of effectiveness of target metabolomics approach".
- 11/07/2012 title: "Effects of dialysis treatment on the Autonomic Nervous System in Chronic Kidney Disease Patients measured by Heart Rate Variability Analysis". Renal Research Institute, New York City, USA.
- 11/5/2012 **invited speaker, SMART 2012 Conference, Milano.** Title: "Biomedical engineering research and its impact on clinical monitoring".
- 29/04/2010 title: "Evaluation of patients well-being from biological signal analysis. An overview of several applications", Laboratory for Computational Physiology, MIT, Boston, MA, USA.
- 25/04/2010 title: "Fetal monitoring: methods and techniques. Evaluation of fetal well-being from heart rate variability (HRV) analysis", Children Hospital, Boston, MA, USA.
- 20/08/2009 title: "Heart rate variability analysis: basics and clinical applications", Division of Nephrology and Hypertension, Beth Israel Medical Center, New York City, USA.

ORAL PRESENTATIONS AT CONFERENCES

- 08/09/2018: "An innovative approach to integrate proteomics and metabolomics data in severe septic shock", 15th International Conference on Computational Intelligence methods for Bioinformatics and Biostatistics, Sept 6-8, 2018, Caparica, Portugal.
- 13/08/2016: "Baroreflex analysis in the recovery after cardiac arrest in a porcine model", 15th International Conference on Complex Acute Illness, Aug. 10-14, 2016, Caltech, Pasadena, CA, USA
- 30/08/2012: "Comparisons of Predictors of Fluid Responsiveness in Major Surgery", 34th IEEE EMBS Conference, San Diego, CA, USA.
- 30/08/2012: **chairman and organizer of the special session** "Cardiovascular Modeling for Critical Care Monitoring", 34th IEEE EMBS Conference, San Diego, CA, USA.
- 1/9/2011: "System Identification of Baroreflex Response to Mild Lower Body Negative Pressure", 33rd IEEE EMBS Conference, Boston, USA.
- 2/9/2011: **chairman and organizer of the special session** "Cardiovascular signal processing & modeling: monitoring in critical care applications", 33rd IEEE EMBS Conference, Boston, USA.
- 3/9/2010: "Study of the Autonomic Response in Hemodialysis Patients with Different Fluid Overload Levels", Invited session "Cardiorespiratory Signal Processing & Modeling for Clinical Patient Monitoring: Non-Invasive Applications", 32nd IEEE EMBS Conference, Buenos Aires, AG.
- 4/9/2010: "Relative Blood Volume Monitoring during Hemodialysis in End Stage Renal Disease Patients", 32nd IEEE EMBS Conference, Buenos Aires, AG.
- 26/11/2008: "The Fetal Heart Rate Variability due to vibro-acoustic stimulation: a complexity analysis", 4th European Congress of the International Federation for Medical and Biological Engineering, Antwerp, Belgium.
- 31/08/2006: "New indexes from Fetal Heart Rate analysis for the identification of severe intra uterine growth restricted fetuses", 28th IEEE EMBS Conference, New York City, USA
- 3/08/2004: "Multiscale entropy analysis of 24 Hours Heart Rate Variability Time Series", 9th Mediterranean Conference on Medical and Biological Engineering, Ischia, Italy.

RESEARCH COLLABORATIONS

1. *University of Virginia, Charlottesville, VA, USA.* Prof. Randall Moorman
2. *Anschutz Medical Center, University of Colorado, Denver, CO, USA.* Prof. Kirk Hansen, Dr. Angelo D'Alessandro.
3. Shockomics Consortium:
 - Filarete Servizi, Italy
 - Istituto di Ricerche Farmacologiche Mario Negri, Italy
 - Neurozone s.r.l., Italy
 - Custom Software Electronics, Spain
 - Hospital Universitari Mutua Terrassa, Spain
 - Parc Científic Barcelona, Spain
 - Genève University Hospital, Switzerland
 - Université Libre de Bruxelles, Belgium
 - University of California San Diego, USA
 - Antlia, Switzerland
4. *Centro Universitario di Statistica per le Scienze Biomediche e Facoltà di Psicologia, Università Vita-Salute San Raffaele, Milano*
Prof. Maria Clelia Di Serio, Dr. Chiara Brombin, Prof. Laura Bellodi, Dr. Anna Ogliari.
5. *Sezione di Fisica Medica, Dipartimento di Biopatologia e Diagnostica per Immagini, Università degli Studi di Roma Tor Vergata, Prof. Maria G. Guerrisi, Dr. Nicola Toschi.*
Sezione di Anestesiologia, Dipartimento di Chirurgia, Facoltà di Medicina e Policlinico Universitario Tor Vergata, Prof. A. Sabato, Prof. M. Dauri, Dr. F. Coniglione.
6. *Dipartimento di Informatica e Sistemistica, Prof. Giovanni Magenes.*
7. *Fresenius Medical Care Deutschland GmbH, R&D, Dr. Emanuele Gatti, Dr. Gail Brown, Dr. Ciro Tetta.*
8. *Dipartimento di Nefrologia, Ospedale San Bortolo, Vicenza, Dr. Claudio Ronco, Dr. Dinna Cruz.*
9. *Dipartimento di Scienze ostetrico-ginecologiche, urologiche e Medicina della riproduzione, Università degli Studi di NAPOLI, "Federico II", Prof. A. Di Lieto, Dr. M. Campanile.*
10. *Renal Research Institute, New York city, NY, USA, Dr. Natham W. Levin, Dr. Peter Kotanko. Dr. Manuela Ferrario was involved in the following projects:*
 - 'Comparison of Different Sugar Concentrations in Dialysate of Hemodialysis Patients (Dextrose)'- ClinicalTrials.gov identifier: NCT00618033.
 - 'Effects of Intensified Sodium Management in Hemodialysis Patients' - ClinicalTrials.gov Identifier: NCT01015313.
 - 'Frequent Hemodialysis Network: Daily Trial', ClinicalTrials.gov Identifier: NCT00264758.
11. *Toronto General Hospital – University Health Network, Toronto, Canada, Dr Christopher T Chan.*
Project: 'Frequent Hemodialysis Network: Daily Trial'.
12. *Dipartimento di Bioingegneria, Fondazione S. Maugeri, IRCCS, Montescano, Ing. Giandomenico Pinna e Ing. Roberto Maestri.*
13. *Fresenius Medical Care Italia S.P.A, Palazzo Pignano (CR), Ing. Flavio Mari.*
Collaboration for the development of classifiers for the system NephroCare IT (Euclid).
14. *Research Lab of Electronics, Massachusetts Institute of Technology, Boston, MT, USA, Dr. Thomas Heldt, Prof. George C. Verghese.*
'Mathematical Modeling and Signal Processing for Integrative Patient Monitoring' (*Seed Funds-Rocca project*). Prof. George C. Verghese, Prof. Giuseppe Baselli.
15. *Cardiorespiratory & Vascular Dynamics Lab, University of Waterloo, Waterloo, Ontario, Canada*
Prof. Richard L Hughson.
16. *Universidade Nove de Julho, São Paulo-SP, Brazil*
Prof. Luciana Maria Malosa Sampaio
Project: 'Heart rate variability analysis of newborns affected by congenital heart defects'.

SUMMER SCHOOLS AND ADVANCED COURSES

- **Summer school** “Modeling Transport and Metabolism in Cardiovascular and Respiratory Systems”, 22-26/08/2011, University of Washington, Seattle, WA, organized by Prof. James Bassingthwaighe.
- Course “Cardiovascular Mechanics and System Modeling”, Prof. Thomas Heldt, Politecnico di Milano, 20-30/09/2010.
- 17th International Vicenza Course on Hemodialysis, 3-6 /06/2008. Organized by Prof. Claudio Ronco.
- XXV Scuola Annuale di Bioingegneria “NEURO-ROBOTICA: neuroscienze e robotica per lo sviluppo di macchine intelligenti”, Gruppo Nazionale di Bioingegneria (GNB), Bressanone (BZ), 25-29 /09/2006.
- Course: “Soft Computing: Teoria, Tecniche e Applicazioni”, organized by Prof. A. Bonarini, Politecnico di Milano, 22-24 /03/ 2006.
- XXIV Scuola Annuale di Bioingegneria “BIOMATERIALI: Dagli impianti protesici alla medicina rigenerativa ” organizzata dal Gruppo Nazionale di Bioingegneria (GNB), Bressanone (BZ), 26-29 /09/ 2005.
- **Summer school** “Systems Biology Dynamics: from Genes to Organisms”, 14-27 /05/2004, McGill University, Centre for Nonlinear Dynamics, Montreal (Canada), organizzata dal prof. Leon Glass e prof. Michael Mackey.
- XXIII Scuola Annuale di Bioingegneria “Metodi avanzati di elaborazione di segnali biomedici” organizzata dal Gruppo Nazionale di Bioingegneria (GNB), Bressanone (BZ), 20-23 /09/ 2004.
- XXII Scuola Annuale di Bioingegneria “Bioingegneria della Postura e del Movimento” organizzata dal Gruppo Nazionale di Bioingegneria (GNB), Bressanone (BZ), 22-25 /09/ 2003.

TEACHING ACTIVITY**AY 2004/03 – AY 2007/08**

Teaching assistant of the course “Fundamentals of electronic Engineering” (Prof. Maria Gabriella Signorini). Bachelor in Biomedical Engineering, Politecnico di Milano (5 CFU).

AY 2008/09 – AY 2011/12; AY 2013/14 – AY 2015/16

Teaching assistant of the course “Fundamentals of Biomedical signal” (Prof. Maria Gabriella Signorini). Bachelor in Biomedical Engineering, Politecnico di Milano (5 CFU).

AY 2014/15

Lecturer of the course “Project: instrumentation and functional evaluation”. Bachelor in Biomedical Engineering, Politecnico di Milano (5 CFU).

AY 2016/17

Lecturer of the course “Project: information”. Bachelor in Biomedical Engineering, Politecnico di Milano (5 CFU).

AY 2015/16, AY 2016/17 AY 2017/2018

Lecturer of the course “Elements of Medical Informatics”. Bachelor in Biomedical Engineering, Politecnico di Milano (3 CFU).

AY 2017/2018

Lecturer of the course “Fundamentals of Biomedical signal”. Bachelor in Biomedical Engineering, Politecnico di Milano (5 CFU).

SEMINARS

I held several seminars for the courses “Bioengineering of physiological control systems” (Prof. Giuseppe Baselli) and “Biomedical signal processing” (Prof. Sergio Cerutti)

I held several seminars for the PhD course “Advanced Signal Processing” (Prof. Sergio Cerutti)

ACTIVITY AS ADVISOR

Master Thesis

1. Identification of atrial fibrillation from RR intervals: a feasibility study on Long Short Term Memory neural networks, **Alessandro Crivellari**, a.a. 2016/17 (in collaboration with Prof. J.R. Moorman, University of Virginia)
2. Advanced approaches for blood pressure regulation assessment. Application in a porcine model of cardiac arrest, **Mario Lavanga** AY 2014/2015.
3. Predictive Models of Hemorrhagic Events in a Surgical Intensive Care Unit, **Marco De Pasquale**, AY 2014/2015 (in collaboration with Prof. JR Moorman, University of Virginia, USA).
4. Cardiac rhythm classification and mortality risk assessment from RR intervals using non-linear dynamics indexes, **Marta Carrara e Luca Carozzi** AY 2013/2014 (in collaboration with Prof. JR Moorman, University of Virginia, USA)
5. Descrizione delle dinamiche di pressione arteriosa e battito cardiaco attraverso indici spettrali e non lineari durante ischemia intestinale prolungata, **Stefano Ferlisi** AY 2013/2014.
6. Monitoraggio della portata cardiaca, mediante stima indiretta da pressione arteriosa, in modello animale di ischemia intestinale, **Cruanes Aguilar Francesca** AY 2013/2014.
7. Studio del controllo autonomo in un modello animale di ischemia intestinale mediante analisi del baroriflesso cardiaco. **Nicolò Gambarotta** AY 2012/2013
8. Analisi beat to beat dell'intervallo QT durante trattamento dialitico, Luca Sorrentino, AY 2012/2013.
9. Analisi e confronto di indici emodinamici per la valutazione di manovre di rapid infusion in chirurgia epatica. **Salvatore Pala** AY 2010/2011
10. Metodi di signal and image processing per l'analisi spazio-temporale della propagazione di onde calcio in cellule non eccitabili. **Jasmine Ion Titapiccolo** AY 2009/2010
11. Metodi di analisi del segnale di variabilità cardiaca per lo studio dello scompenso cardiaca. **Giuseppe Gentil** AY 2006/07
12. Valutazione di metodi di stima del coefficiente di autosomiglianza: applicazione a serie temporali sperimentali. **Federico Esposti** AY 2004/2005
13. Metodi non lineari di analisi e classificazione per l'identificazione dello scompenso cardiaco. **Miriam Marchetti, Alessio Marseglia** AY 2004/2005.
14. Studio del segnale di variabilità cardiaca in gravidanze gemellari. **Roberta Badiali, Maria Vittoria Nicolini** AY 2003/2004.

PhD Thesis

- Dr. Guadalupe Dorantes Mendez, “Dynamic cardiovascular control of arterial blood pressure and heart rate in response to central volume variations and anesthesia” (defense date: 22/10/2013).
- Dr. Jasmine Ion Titapiccolo, “Mining medical data to develop clinical decision making tools in hemodialysis: prediction of cardiovascular events” (defense date: 22/10/2013).
- Dr. Alice Cambiaghi, “Characterization of metabolomic signatures in septic shock patients: a data mining approach” (defense date: 22/05/2017).
- Dr. Marta Carrara, “Cardiovascular models in septic shock” (expected defense date: 2019).

I was advisor of several Bachelor Thesis.

REVIEWER AND ORGANIZATION ACTIVITIES

I served as reviewer for the following journals

- IEEE Transactions on Biomedical Engineering
- Medical Engineering and Physics
- Physiological Measurement
- The Journal of Obstetrics and Gynaecology Research
- Computers in Biology and Medicine
- Plos One
- Scientific Reports

I served as reviewer for the following conferences

- IEEE EMBS (since 2005)
- IEEE Italy chapter

I managed the activity of the volunteers (85 people) at the 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS), Milano, 2015.

LIST OF PUBLICATIONS

Book chapters

- [B1] M.G. Signorini, M. Ferrario, “Non linear analysis of experimental time series”, in: *Advanced Methods of Biomedical Signal Processing*, S. Cerutti and C. Marchesi (eds.), IEEE-Wiley Press, New York, NY, pp 347-375, 2011.
- [B2] M.G. Signorini, M. Ferrario, “Metodi per l’analisi non lineare di serie temporali”. In: *Metodi avanzati di elaborazione di segnali biomedici*, Cerutti S., Marchese C. (eds.), Pàtron Editore, Bologna, pp. 317-340, 2004
- [B3] M. Ferrario, F. Aletti, G. Baselli, M.G. Signorini, S. Cerutti, “Heart rate variability analysis for the monitoring of fetal distress and neonatal critical care”. In: *Heart Rate Variability (HRV) Signal Processing. Clinical Applications*, Markad V.Kamath, Mari Watanabe and Adrian Upton (eds.), CRC editor, pp. 113-136, 2012
- [B4] MG Signorini, G Magenes, M Ferrario, M Lucchini, *Complex and Nonlinear Analysis of Heart Rate Variability in the Assessment of Fetal and Neonatal Wellbeing*. In: *Complexity and Nonlinearity in Cardiovascular Signals*. Springer, Cham, pp. 427-450, 2017

Peer-reviewed International Journals

- [P1] M. Carrara, A. Herpain, G. Baselli, M. Ferrario, (2019) “A mathematical model of dP/dt max for the evaluation of the dynamic control of heart contractility in septic shock”, *IEEE Trans. Biomedical Engineering* (accepted)
- [P2] M.Ferrario, L. Brunelli, F. Su, A. Herpain, R. Pastorelli (2019). “The systemic alterations of lipids, alanine-glucose cycle and inter-organ amino acid metabolism in swine model confirms the role of liver in early phase of septic shock.” *Frontiers in Physiology*, 10, 11. doi: 10.3389/fphys.2019.00011.
- [P3] F. Cugnata, R.M. Martoni, M. Ferrario, C. Di Serio, C. Brombin (2018), “Modeling physiological responses induced by an emotion recognition task using latent class mixed models”, *Plos one* 13 (11), e0207123.
- [P4] M. Carrara, G.Babini, G. Baselli, G. Ristagno, R. Pastorelli, L. Brunelli, M. Ferrario (2018), “Blood pressure variability, heart functionality and left ventricular tissue alterations in a protocol of severe hemorrhagic shock and resuscitation”, *J Appl Physiol* 125: 1011–1020, 2018. doi: 10.1152/jappphysiol.00348.2018
- [P5] F. De Benedetto, R. Pastorelli, M. Ferrario, F. de Blasio, S. Marinari, L. Brunelli, E.F. M. Wouters, F. Polverino, B.R. Celli (2018), “Supplementation with Qter® and Creatine improves functional performance in COPD patients on long term oxygen therapy”. *Respiratory medicine*, 142, 86-93.
- [P6] A. Cambiaghi, R. Díaz, J. Bauzá; A. Odena, L. Brunelli, P Caironi, S. Masson, G. Baselli, G. Ristagno, L Gattinoni, E. de Oliveira, R. Pastorelli, M Ferrario (2018), “Integration of metabolomics and proteomics data for early mortality prediction in severe septic shock patients”, *Scientific Reports* 8, 6681 (2018). doi:10.1038/s41598-018-25035-1
- [P7] M.Carrara, B. Pinto Bollen, G. Baselli, K. Bendjelid, M. Ferrario (2017) “Baroreflex sensitivity and blood pressure variability can help in understanding the different response to therapy during acute phase of septic shock.” *Shock* (Augusta, Ga.). doi: 10.1097/SHK.0000000000001046 (Publication Date: November 2017)
- [P8] A. Cambiaghi, B Bollen Pinto, L. Brunelli, F Falchetta, F Aletti , K. Bendjelid , R. Pastorelli, M. Ferrario (2017) “Characterization of a metabolomic profile associated with responsiveness to therapy in the acute phase of septic shock”, *Scientific reports*, 7(1), 9748. doi:10.1038/s41598-017-09619-x
- [P9] N. Clendenen, A. Tollefson, M. Dzieciatkowska, A. Cambiaghi, M. Ferrario, M. Kroehl, A. Banerjee, A. D’Alessandro, K. C. Hansen, N. Weitzel (2017), “Correlation of pre-operative plasma protein concentrations in cardiac surgery patients with bleeding outcomes using a targeted quantitative proteomics approach”, *Proteomics Clin Appl.*, 1600175, doi: 10.1002/prca.201600175.
- [P10] B. Bollen Pinto, C. Ritter, M. Michels, N. Gambarotta, M. Ferrario, F. Dal-Pizzol, M. Singer, (2017) “Characterization of brain-heart interactions in a rodent model of sepsis”, *Molecular neurobiology*, 54(3), pp.3745-3752, doi: 10.1007/s12035-016-9941-z.
- [P11] M. De Pasquale, T. J. Moss, S. Cerutti, J. F. Calland, D.E. Lake, J. R. Moorman, M.Ferrario (2017), “Hemorrhage prediction models in surgical intensive care: bedside monitoring data adds information to lab values”, *IEEE journal of biomedical and health informatics*, 21(6), 1703-1710. doi: 10.1109/JBHI.2017.2653849.
- [P12] M. Lavanga, G. Baselli, F. Fumagalli, G. Ristagno, M. Ferrario (2016) “The possible role of the vagal nervous system in the recovery of the blood pressure control after cardiac arrest: a porcine model study”, *Physiological Measurement*, 38 (1), pp 63-76
- [P13] A. Cambiaghi, M. Ferrario, M. Masseroli (2016), “Analysis of metabolomic data: tools, current strategies and future challenges for omics data integration”, *Briefings in Bioinformatics*, 18(3), 1 May 2017, pp: 498-510.

- [P14] N. Gambarotta, G. Baselli, F. Aletti, M. Ferrario (2016), "A review of methods for the signal quality assessment to improve reliability of heart rate and blood pressures derived parameters", *Medical & Biological Engineering & Computing*, 54(7): pp. 1025-1035, doi: 10.1007/s11517-016-1453-5
- [P15] M. Ferrario, A. Cambiaghi, L. Brunelli, S. Giordano, P. Caironi, L. Guatteri, F. Raimondi, L. Gattinoni, R. Latini, S. Masson, G. Ristagno, R. Pastorelli (2016) "Mortality prediction in patients with severe septic shock: a pilot study using a target metabolomics approach", *Scientific Reports*, 6: 20391. doi:10.1038/srep20391.
- [P16] F. Aletti, C. Conti, M. Ferrario, et al. (2016), "ShockOmics: multiscale approach to the identification of molecular biomarkers in acute heart failure induced by shock", *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 24:9.
- [P17] F. Aletti, N. Gambarotta, A. H Penn, M. Ferrario, Geert W Schmid-Schönbein (2015), Heart period and blood pressure characteristics in splanchnic arterial occlusion shock-induced collapse, *J Clin Monit Comput.* 2017 Feb;31(1):167-175, doi: 10.1007/s10877-015-9813-5
- [P18] M. Carrara, G. Baselli, M. Ferrario (2015), Mortality prediction model of septic shock patients based on routinely recorded data, *Computational and Mathematical Methods in Medicine*, vol. 2015, Article ID 761435.
- [P19] M. Carrara, L. Carozzi, TJ Moss, M. De Pasquale, S. Cerutti, D. E. Lake, J. R. Moorman, M. Ferrario (2015), Classification of cardiac rhythm using heart rate dynamical measures: validation in MIT-BIH databases, *Journal of Electrocardiology*, 48(6), 943-946 (ISCE Symposium Article).
- [P20] M. Carrara, L. Carozzi, TJ Moss, M. De Pasquale, S. Cerutti, M. Ferrario, D. E. Lake and J. R. Moorman, (2015) Heart rate dynamics distinguish among atrial fibrillation, normal sinus rhythm and sinus rhythm with frequent ectopy, *Physiol. Meas.*, 36(9), 1873.
- [P21] M. Ferrario, U. Moissl, F. Garzotto, DN Cruz, C. Tetta, MG Signorini, C. Ronco, A. Grassman, S. Cerutti, S. Guzzetti (2015) The Forgotten Role of Central Volume in Low Frequency Oscillations of Heart Rate Variability, *PLoS ONE* 10(3), e0120167.
- [P22] M. Ferrario, J.G. Raimann, B. Larive, A. Pierratos, S. Thijssen, S. Rajagopalan, T. Greene, S. Cerutti, G. Beck, C. Chan, P. Kotanko (2015). Non-Linear Heart Rate Variability Indices in the Frequent Hemodialysis Network Trials of Chronic Hemodialysis Patients. *Blood purification*, 40(1), 99-108.
- [P23] M. Ferrario, U. Moissl, F. Garzotto, D. Cruz, A. Clementi, A. Brendolan, C. Tetta, E. Gatti, M.G. Signorini, S. Cerutti, C. Ronco (2014), Effects of fluid overload on heart rate variability in chronic kidney disease patients on hemodialysis, *BMC Nephrology*, 15:26.
- [P24] M. Ferrario, S Pala, F Aletti, N Toschi, A Canichella, M Guerrisi, F. Coniglione, G. Baselli, M. Dauri (2014), Fluid responsiveness in liver surgery: comparisons of different indices and approaches, *Journal of Computational Surgery* 1 (1), 6.
- [P25] R. Trimer, R. G. Mendes, F. S. M. Costa, L. M. M. Sampaio, A. Delfino Jr, R. Arena, F. Aletti, M. Ferrario, A. Borghi-Silva (2013). Is there a chronic sleep stage-dependent linear and nonlinear cardiac autonomic impairment in obstructive sleep apnea, *Sleep and Breathing*, 1-7.
- [P26] J. Ion Titapiccolo, M. Ferrario, S. Cerutti, C. Barbieri, F. Mari, E. Gatti, M.G. Signorini (2013), "Artificial intelligence models to stratify cardiovascular risk in incident hemodialysis patients", *Expert Systems with Applications*, 40(11): 4679-4686.
- [P27] Dorantes Mendez G, Aletti F, Toschi N, Canichella A, Dauri M, Coniglione F, Guerrisi M, Signorini MG, Cerutti S, Ferrario M. (2013), "Baroreflex sensitivity variations in response to propofol anesthesia: comparison between normotensive and hypertensive patients", *J Clin Monit Comput.*, 27 (4), 417-426
- [P28] F.Aletti, M.Ferrario, D. Xu, D. Greaves, K. Shoemaker, P. Arbeille, G. Baselli, R. Hughson, (2012) "Short-term variability of blood pressure: effects of lower body negative pressure before and long-duration bed rest", *Am J Physiol Regul Integr Comp Physiol.* 303(1):R77-85.
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