Carolina Balbi, PhD

Personal Information:

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Short Summary:

I am a senior Post Doctoral researcher with a PhD in Translational Medicine. I am currently working in the cardiovascular biology field. My research agenda include different projects aimed to understand the role of circulating Extracellular Vesicles (EVs) in the pathogenesis of Cardiovascular Disease and aging. I started working on EVs since my PhD in University of Genoa, Italy. I than moved for my first post doctoral fellowship at Istituto Cardiocentro Ticino, joining one of the most recognised lab for EVs research in the cardiovascular field. Here I strength my knowledge on the field, gaining independence and becoming project leader and supervisor of 2 PhD students. With the acquired knowledge I will now move to continue my research journey to the **Platelet Research Lab, directed by Prof. Hans Jürg Beer, University of Zurich.** Since Prof. Beer is a professor in Medicine and Hematology, in his lab **I plan to apply my knowledge on circulating EVs to understand their role in cardiac vascular biology** to further investigate new therapeutic strategy to prevent and treat cardiac endothelial conditions.

Education:

PhD in Translational Medicine
Supervisor: Prof. Sveva Bollini
PhD School of Biotechnology for Translational Medicine; University of Genoa.
Genoa, Italy – 23.03.18

Master Degree in Pharmaceutical and Medical Biotechnology
Faculty of Medicine; University of Genoa; Mark: 110/110 Cum Laude, Dignità di Stampa & Medaglia.
Genoa, Italy – 25.09.13

Bachelor Degree in Biotechnology
Faculty of Medicine, University of Genoa; Mark: 110/110.
Genoa, Italy – 23.09.11

Current research experience:

Research Assistant at Platelet Research lab, Center for Molecular Cardiology, University of Zurich, Zurich, Switzerland.
Lab head: Prof. Hans Jürg Beer- Zurich, Switzerland - From 01.02.2024

Previous research experience:

Lab coordinator at Laboratories for Translational Research, Cellular and Molecular Cardiology, Cardiocentro Ticino Institute-EOC, Bellinzona, Switzerland.
Lab head: Prof. Giuseppe Vassalli - Lugano, Switzerland - From 01.01.2021 to 31.12.2023

Scientific collaborator at Center for Molecular Cardiology, University of Zurich, Zurich, Switzerland.
Lab Head: Prof. Giovanni G. Camici - Zurich, Switzerland - From 01.01.2021 to 31.12.2023

Post-Doctoral Researcher at Cellular and Molecular Cardiology lab, Cardiocentro Ticino Foundation, Lugano, Switzerland.
Supervisor: Prof. Giuseppe Vassalli - Lugano, Switzerland - From 01.01.2018 to 31.12.2020

Visiting Student at LUMC – Leiden University Medical Center – Department of Molecular Cell Biology, Leiden, The Netherlands.
Supervisor: Prof. Marie Josè Goumans - Leiden, The Netherlands - From 09.07.2017 to 31.12.2017

PhD Student at University of Genoa; Regenerative Medicine Lab, Department of Experimental Medicine, Genoa, Italy.
Supervisor: Prof. Sveva Bollini - Genoa, Italy. From 01.01.2015 to 31.12.2017

Leonardo Student Fellowship at Institut Curie - Génétique et biologie du développement, Paris, France.
Supervisor: Dr. Alena Shkumatava - Paris, France - From 15.07.2014 to 27.12.2014

Research Fellowship at IIT, Italian Institute of Technology, Genoa, Italy
Supervisor: Dr. Lorenzo Cingolani - Genoa, Italy. From 04.11.2013 to 04.05.2014

Training and Courses:

LTK Module 2 – Training for person responsible for directing animal experiments - Zurich (Switzerland) 15-19 March 2021

ISEV Workshop: EV imaging in vivo – Virtual. 10-11 September 2020

ESC Basic Science Summer School - Sophia Antipolis (France). 16-20 June 2019

LTK Module 1 - Introductory course in laboratory animal science. SPECIES: MICE AND RATS – Zurich (Switzerland) 18-27 June 2018

EMBL Course: Extracellular Vesicles: from Biology to Biomedical Applications – Heidelberg (Germany). 19-24 September 2016

BD Multicolor Training - Milano (Italy). 28 January 2016

Non-Coding Genome 4th Course – Institut Curie in partnership with UPMC – Paris (France). 9-13 February 2015

XVIII School of Pure and Applied Biophysics - Nanomechanics of biomolecular adhesion – SIBPA – Venice (Italy). 27-31 January 2014.

Supervision of junior researchers at graduate and postgraduate level

Giorgia Senesi; PhD Student, Università della Svizzera Italiana; 03.2022-present

Veronica Lisi; visiting PhD Student, Università del Foro Italico; 03.2022-03.2023

Federico Buccino; Master Thesis supervision at Cardiocentro Ticino Institute; 06.2020-03.2021

Ambra Costa; Master Thesis supervision at University of Genoa; 09.2016-12.2017

Edoardo Foscoli; Bachelor Thesis supervision at University of Genoa; 09.2015-06.2016

Teaching activity:

University of Genoa – Progetto IANUA aa 2022/2023

Università della Svizzera italiana – "Extracellular vesicles and intercellular communication" 2021 and 2023 - PhD in Biomedical Sciences

University of Genoa teaching tutor of Faculty of Medicine - 2016/2017

Other professional activities and membership:

2022 - present: **Junior Editor Member for "Extracellular Vesicles and Circulating Nucleic Acid"**

2021 - 2022: **SNEV Executive Committee member**

2020 - present: **MC Member of the COST Action "International Network for Translating Research on Perinatal Derivatives into Therapeutic Approaches (SPRINT) CA17116"** (https://www.sprint-cost.org), Working Group 2: Preclinical Studies and Models

2020 - present: **Guest-Editor for "Biology"** Collection "Extracellular Vesicles: From Biomarkers to Therapeutic Tools"

2018 - present: **ESC member of WG on Cellular Biology of the Heart**

2018 - present: **Reviewer for:** European Heart Journal; International Journal of Cardiology, Cells, Biology, Journal of Cellular and Molecular Medicine; Frontiers in Physiology; Frontiers in Biotecnology.

2016 - present: **ISEV Member**

Organization of international conference:

2nd Lugano ExoDay – April 13, 2022 Lugano, Switzerland

SNEV2021 Virtual conference – 14-16 June 2021 – Virtual

1st Lugano ExoDay: Technical challenge in Exosome Research – Friday, October 25, 2019 Lugano, Switzerland

Invited speaker:

ESC 2022 – 26th – 29th August 2022, Barcelona, Spain - Plenary session: Paracrine communication: exosomes and beyond

Cardiovascular Research Meeting 2022 – LS^2 Life Sciences Switzerland – 4th-5th July 2022, Bern, Switzerland

Stem Cell Research Italy 2022 – 8th-10th June 2022, Genova, Italy

Awards:

Best Oral Presentation - Cardiovascular research meeting 2021

EVIta travel Grant – Free registration to ISEV2020

ESC 2019 Educational Grant – ESC 2019 -Paris (France)

Premio Giovane Ricercatore 2017 Oral Presentation – SIRC (Società Italiana Ricerche Cardiovascolari) Italy XXI National Congress 2017, Imola 16-18 November 2017

Paolo Bianco Award for Best Oral Presentation – SCR Italy (Stem Cell Research Italy) Annual meeting 2017, Chieti 25-27 May 2017

Young Investigator Award for Best Poster Presentation – GISM (Gruppo Italiano cellule Staminali Mesenchimali, Italian Mesenchymal Stem Cell Group) Annual Meeting 2015, Brescia, 8-9 October 2015

Funding:

Swiss Heart Foundation (Bern, Switzerland) Grant_number: FF22021 – Main Applicant; Call 2022

Swiss Heart Foundation (Bern, Switzerland) Grant_number: FF21017 – Main Applicant; Call 2021

Fellowship Life Learning Program – Leonardo Da Vinci Project – Unipharma Graduates

Pubblication in peer reviewrs journal – Last 5 years:

1. W Huang, Z Zhang, M Colucci, L Deng, M Yang, X Huang, X Zhou, Y Jin, E Lazzarini, **C Balbi**, JJ Oriol, A Valdata, S Bressan, Y Zhan, F Qi, Q Wei, L Yang, X Zou, S Qiu. *The mixed effect of Endocrine-Disrupting chemicals on biological age Acceleration: Unveiling the mechanism and potential intervention target.* **Environ Int** 2024 Jan 17:184:108447. doi: 10.1016/j.envint.2024.108447.
2. **Balbi C**, Smart N. *Epicardioids: a novel tool for cardiac regeneration research?* **Cardiovasc Res** 2023 Dec 30;119(17):e164-e166. doi: 10.1093/cvr/cvad172.
3. **Balbi C**, Parisse P, Vondracek H, Lazzarini E, Bolis S, Fertig TE, Gherghiceanu M, Barile L, Vassalli G. *Impact of Isolation Methods on Extracellular Vesicle Functionality In Vitro and In Vivo.* **Adv Biol** 2023 Oct 26:e2300185. doi: 10.1002/adbi.202300185
4. M.Y. Emmert, J. Burrello, P. Wolint, Monika Hilbe, G. Andriolo, **C. Balbi**, E. Provasi, L. Turchetto, M. Radrizzani, T. Z. Nazari-Shafti, N. Cesarovic, S. Neuber, V. Falk, S. P. Hoerstrup, R. Hemetsberger, M. Gyöngyösi, L. Barile, G. Vassalli *Intracoronary delivery of extracellular vesicles from human cardiac-derived progenitor cells reduces infarct size in porcine acute myocardial infarction.* **European Heart Journal** 2023 Oct 3:ehad636. doi: 10.1093/eurheartj/ehad636.
5. Kraler S, **Balbi C**, Vdovenko D, Lapikova-Bryhinska T, Camici GG, Liberale L, Bonetti N, Canestro CD, Burger F, Roth A, Carbone F, Vassalli G, Mach F, Bhasin S, Wenzl FA, Muller O, Räber L, Matter CM, Montecucco F, Lüscher TF, Akhmedov A. *Circulating GDF11 exacerbates myocardial injury in mice and associates with increased infarct size in humans.* **Cardiovascular Research** 2023 Sep 23;cvad153. doi: 10.1093/cvr/cvad153.

6. Lisi V, Senesi G, **Balbi C** *Converging protective pathways: Exploring the linkage between physical exercise, extracellular vesicles and oxidative stress.* **Free Radic Biol Med** 2023 Sep 20;208:718-727. doi: 10.1016/j.freeradbiomed.2023.09.021.
7. Lisi V, Senesi G, Bertola N, Pecoraro M, Bolis S, Gualerzi A, Picciolini S, Raimondi A, Fantini C, Moretti E, Parisi A, Sgrò P, Di Luigi L, Geiger R, Ravera S, Vassalli G, Caporossi D, **Balbi C** *Plasma-derived extracellular vesicles released after endurance exercise exert cardioprotective activity through the activation of antioxidant pathways.* **Redox Biol** 2023 May 18;63:102737. doi: 10.1016/j.redox.2023.102737.
8. AS Pires, S Bollini, MF Botelho, I Lang-Olip, P Ponsaerts, **C Balbi**, A Lange-Consiglio, M Fénelon, S Mojsilović, E Berishvili, F Cremonesi, M Gazouli, D Bugarski, A Gellhaus, H Kerdjoudj, A Schoeberlein. *Guidelines to Analyze Preclinical Studies Using Perinatal Derivatives* **Methods Protoc** 2023 Apr 25;6(3):45. doi: 10.3390/mps6030045.
9. Schiano C.*, **Balbi C.*,** de Nigris F, Napoli C. *Basic Pathogenic Mechanisms and Epigenetic Players Promoted by Extracellular Vesicles in Vascular Damage* **Int J Mol Sci**. 2023 Apr 19;24(8):7509. doi: 10.3390/ijms24087509. .**First Joint Authorship*
10. Altomare C, Bartolucci C, Sala L, **Balbi C**, Burrello J, Pietrogiovanna N, Burrello A, Bolis S, Panella S, Arici M, Krause R, Rocchetti M, Severi S, Barile L. *A dynamic clamping approach using in silico IK1 current for discrimination of chamber-specific hiPSC-derived cardiomyocytes.* **Commun Biol.** 2023 Mar 18;6(1):291. doi: 10.1038/s42003-023-04674-9.
11. Schiano C.*, **Balbi C.*,** Burrello J., Ruocco A., Infante T., Fiorito C., Panella S., Barile L., Mauro C., Vassalli G.,Napoli C. *De novo DNA methylation induced by circulating extracellular vesicles from acute coronary syndrome patients.* **Atherosclerosis** 2022. Aug;354:41-52. doi: 10.1016/j.atherosclerosis.2022.06.1026.**First and Last Joint Authorship*
12. A Costa, **C Balbi**, P Garbati, MEF Palamà, D Reverberi, A De Palma, R Rossi, D Paladini, D Coviello, P De Biasio, D Ceresa, P Malatesta, P Mauri, R Quarto, C Gentili, L Barile, S Bollini. *Investigating the Paracrine Role of Perinatal Derivatives: Human Amniotic Fluid Stem Cell-Extracellular Vesicles Show Promising Transient Potential for Cardiomyocyte Renewal*. **Front Bioeng Biotechnol**. 2022 Jun 8:10:902038. doi: 10.3389/fbioe.2022.902038.
13. J Burrello, E Caporali, L Grazioli Gauthier, E Pianezzi, **C Balbi**, E Rigamonti, S Bolis, E Lazzarini, V Biemmi, A Burrello, R Frigerio, G Martinetti, T Fusi-Schmidhauser, G Vassalli, E Ferrari, T Moccetti, A Gori, M Cretich, G Melli, S Monticone, L Barile *Risk stratification of patients with SARS-CoV-2 by tissue factor expression in circulating extracellular vesicles* **Vascul Pharmacol**. 2022 Aug:145:106999. doi: 10.1016/j.vph.2022.106999.
14. D. Vdovenko, **C. Balbi**, D. Di Silvestre, G. Passignani, Y.M. Puspitasari, M. Zarak-Crnkovic, P. Mauri, G. G. Camici, T. F. Lüscher, U. Eriksson, G. Vassalli *Microvesicles released from activated CD4+ T cells alter microvascular endothelial cell function.* **Eur J Clin Invest.** 2022 Mar 22:e13769. doi: 10.1111/eci.13769
15. **Balbi. C**. *Editorial: Transverse aortic constriction-induced heart failure leads to increased levels of circulating microparticles.* **Int J Cardiol.** 2022 Feb 1;348:109-110 doi: 10.1016/j.ijcard.2021.12.003.
16. V. Balducci; P. Faris; **C. Balbi**; A. Costa; S. Negri; V. Rosti; S. Bollini; F. Moccia *The human amniotic fluid stem cell secretome triggers intracellular Ca2+ oscillations, NF-κB nuclear translocation, and tube formation in human ECFCs.* **J Cell Mol Med.** 2021 Aug;25(16):8074-8086. doi: 10.1111/jcmm.16739.
17. **Balbi C**, Burrello J, Bolis S, Lazzarini E, Biemmi V, Pianezzi E, Burrello A, Caporali E, Grazioli LG, Martinetti G, Fusi-Schmidhauser T, Vassalli G, Melli G, Barile L. *Circulating extracellular vesicles*

are endowed with enhanced procoagulant activity in SARS-CoV-2 infection. **EBioMedicine** 2021 May;67:103369. doi: 10.1016/j.ebiom.2021.103369.

18. Pedrioli G, Piovesana E, Vacchi E, **Balbi C** *Extracellular Vesicles as Promising Carriers in Drug Delivery: Considerations from a Cell Biologist's Perspective.* **Biology** 2021 Apr 27;10(5):376. doi: 10.3390/biology10050376.
19. Costa A, Ceresa D, De Palma A, Rossi R, Turturo S, Santamaria S, **Balbi C**, Villa F, Reverberi D, Cortese K, De Biasio P, Paladini D, Coviello D, Ravera S, Malatesta P, Mauri P, Quarto R, Bollini S. *Comprehensive Profiling of Secretome Formulations from Fetal- and Perinatal Human Amniotic Fluid Stem Cells.* **Int J Mol Sci** 2021 Apr 2;22(7):3713. doi: 10.3390/ijms22073713.
20. **Balbi C**, Milano G, Fertig TE, Lazzarini E, Bolis S, Taniyama Y, Sanada F, Di Silvestre D, Mauri P, Gherghiceanu M, Lüscher TF, Barile L, Vassalli G. *An exosomal-carried short periostin isoform induces cardiomyocyte proliferation.* **Theranostics** *2021 Mar 23;11(12):5634-5649. doi: 10.7150/thno.57243*
21. Gorgun C, Ceresa D, Lesage R, Villa F, Reverberi D, **Balbi C**, Santamaria S, Cortese K, Malatesta P, Geris L, Quarto R, Tasso R. *Dissecting the effects of preconditioning with inflammatory cytokines and hypoxia on the angiogenic potential of mesenchymal stromal cell (MSC)-derived soluble proteins and extracellular vesicles (EVs).* **Biomaterials** 2021 Feb;269:120633. doi: 10.1016/j.biomaterials.2020.120633.
22. S. Bernardi and **C. Balbi** *Extracellular Vesicles: From Biomarkers to Therapeutic Tools.* **Biology** 2020, 9(9), 258; doi: 10.3390/biology9090258
23. **C. Balbi** and G. Vassalli *Exosomes - Beyond Stem Cells for Cardiac Protection and Repair.* **Stem Cells.** 2020 Aug 5. doi: 10.1002/stem.3261.
24. J. Burrello, S. Bolis, **C. Balbi**, A. Burrello, E. Provasi, E. Caporali, L. Grazioli Gauthier, A. Peirone, F. D'Ascenzo, S. Monticone, L. Barile, G. Vassalli *An extracellular vesicle epitope profile is associated with acute myocardial infarction* **J Cell Mol Med.** 2020 Jul 14. doi: 10.1111/jcmm.15594
25. **C. Balbi,** A. Costa, L. Barile, S. Bollini, *Message in a Bottle: Upgrading Cardiac Repair into Rejuvenation.* **Cells.**2020 Mar 15;9(3):724. doi: 10.3390/cells903072
26. Pianezzi E, Altomare C, Bolis S, **Balbi C**, Torre T, Rinaldi A, Camici GG, Barile L, Vassalli G. *Role of somatic cell sources in the maturation degree of human induced pluripotent stem cell-derived cardiomyocytes.* **Biochim Biophys Acta Mol Cell Res**. 2019 Aug 28:118538. doi: 10.1016/j.bbamcr.2019.118538.
27. **C. Balbi,** K. Lodder, A. Costa, S. Moimas, F. Moccia, T. van Herwaarden, V. Rosti, F. Campagnoli, A. Palmeri, P. De Biasio, F. Santini, M. Giacca, MJ. Goumans, L. Barile, A. Smits, S. Bollini *Supporting data on in vitro cardioprotective and proliferative paracrine effects by the human amniotic fluid stem cell secretome.* **Data Brief**. 2019 Jul 30;25:104324. doi: 10.1016/j.dib.2019.104324.
28. **C. Balbi.** K. Lodder, A. Costa, S. Moimas, F. Moccia, T. van Herwaarden, V. Rosti, F .Campagnoli, A. Palmeri, P. De Biasio, F. Santini, M. Giacca, MJ. Goumans, L. Barile, A. Smits, S. Bollini *Reactivating endogenous mechanisms of cardiac regeneration via paracrine boosting using the human amniotic fluid stem cell secretome.* **International Journal of Cardiology,**2019 Jul 15;287:87-95. doi: 10.1016/j.ijcard.2019.04.011
29. G.Milano; V.Biemmi; E.Lazzarini; **C.Balbi**; A.Ciullo; S.Bolis; P.Ameri; D.Di Silvestre; P.Mauri; L.Barile; G.Vassalli *Intravenous administration of cardiac progenitor cell-derived exosomes protects against doxorubicin/trastuzumab-induced cardiac toxicity*. **Cardiovascular Research**, 2019 Apr 30. pii: cvz108. doi: 10.1093/cvr/cvz108.

30. **C.Balbi*,** S.Bolis*, G. Vassalli and L. Barile. *Flow Cytometric Analysis of Extracellular Vesicles from Cell-Conditioned Media.* **JoVe,** 2019, Feb 12 doi: 10.3791/59128.

Zurich, 22/01/2024

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