Past, Present and Future of the ESC Working Group Cellular Biology of the Heart: Dealing with New Endeavors Before, During and after the Pandemic

Cinzia Perrino MD PhD[1], Maurizio Pesce[2], Sean M Davidson PhD[3]

[1]Department of Advanced Biomedical Sciences, Federico II University, Naples, Italy.

[2]Unità di Ingegneria Tissutale Cardiovascolare, Centro cardiologico Monzino, IRCCS. Milan, Italy.

[3]The Hatter Cardiovascular Institute, University College London, London, United Kingdom.

Address correspondence to:

Cinzia Perrino MD PhD
Chairperson
ESC Working Group Cellular Biology of the Heart
Federico II University
Department of Advanced Biomedical Science
Via Pansini 5
80131 Naples
Italy
Tel: +39 081 746 2234
Fax: +39 081 746 2223
Email: perrino@unina.it

Working Groups (WG) are powerful driving forces within the European Society of Cardiology (ESC) community, bringing together experts in specific fields, providing education, sharing expertise, and facilitating exchange of the latest advancements in cardiology. Within the general ESC "machine", the WG Cellular Biology of the Heart (WGCBH) represents one of the gears bringing together basic, clinical and translational cardiovascular science (Figure 1). The founding core of its mission is, from the beginning, to deliver knowledge and raise awareness on the basic cellular mechanisms regulating normal heart function, structure and disease, with a strong translational perspective and the ultimate aim at reducing the burden of cardiovascular disease. Consistent with this scope, internationally recognized basic scientists as well as clinicians have been traditionally involved in WGCBH activities and elected as nucleus members, leading to a highly interactive and stimulating scientific environment. This composition, and the engagement of scientific collaborations with other ESC WGs, Councils or Associations with stronger clinical orientation, has led to several publications with a solid basic science background and remarkable clinical implications [1-3]. Since education has always been a key task for the WGCBH, a special focus has always been made on trainees, including undergraduate and graduate students, post-doctoral fellows and residents in Cardiology, with dedicated ESC meetings, summer schools, online webinars and web talks. In addition, nucleus members have been pleased to be highly engaged in promoting and supporting several ESC activities, including annual congresses, by proposing and grading symposia and abstracts, and participating in the ESC Congress Program Committee, producing and reviewing ESC scientific documents, contributing to the ESC Basic Science summer school, and co-organizing a biennial meeting in collaboration with the Myocardial Function Working Group.

The past

Although the scope of the WG today might seem quite broad, it was initially relatively focused with key scientific interests being related to ischemic heart disease, the response of the heart to ischemia/reperfusion injury, and potential treatments such as cell therapy. With time and the turnover of nucleus members, the WGCBH has broadened its focus to encompass several other aspects of cardiovascular cellular biology and pathophysiology. In support of this wider landscape of the WG, recent review articles, opinion and position papers/scientific statements have been published that have been endorsed and prioritized for publication by the ESC Clinical Practice Guidelines Committee and are consistently well cited [4-7]. Increasingly, these documents are highly collaborative endeavors involving multiple working groups or councils – a process that reflects the increasingly collaborative nature of research and the adoption of a wider interdisciplinary approach.
The COVID-19 outbreak strongly affected the WGCBH and its members, as it did the entire scientific community worldwide, posing unprecedented challenges. Not only was basic research delayed or temporarily disrupted in several countries due to sanitary restrictions, but also many physician-scientists had to shift efforts from research to patient care. In addition to the effects on research activity, our WG interactions were forced to become more physically separated than ever before. The pandemic took center stage in shaping WG activities, including cancellation or postponement of all in-person scientific meetings, and re-organization of scientific priorities. This nevertheless inspired the discussion, writing and publication of two COVID-19-related projects, to respond to pressing scientific questions raised by the scientific community regarding the basic cellular mechanisms underlying cardiac complications of COVID-19 [8], and the mechanisms of long COVID-19 in the cardiovascular system [9]. The hurdles encountered during this difficult time and the resulting changes as well as accomplishments, while strengthening our WG nucleus in terms of

engagement and collaboration online, have highlighted the upsides of virtual format, and also the importance and value of direct human interaction in science.

The present

The current nucleus of the WGCBH is wholeheartedly focused on continuing and, if possible, enhancing the efforts to deliver and maintain knowledge of basic science applied to the clinical setting, integrating different expertise, as shown by the current involvement in our ongoing projects and activities of other ESC WGs, Councils and Associations, such as WG of Myocardial Function, Cardiovascular Surgery, European Association of Percutaneous Cardiovascular Interventions (EAPCI), Scientists of Tomorrow (SoT), Council of Basic Cardiovascular Science (CBCS) and Heart Failure Association (HFA). Our current WG nucleus members (Figure 2) have exceptional expertise in several research areas including cellular and molecular mechanisms of cardiac remodeling and mechano-transduction, cardiometabolic stress, mitochondria signaling, endothelial dysfunction, atherosclerosis, ischaemia and reperfusion, extracellular vesicles, cardiac arrhythmias, heart failure and tissue engineering. The ongoing projects and activities reflect the multidisciplinary and translational perspective of current nucleus, as well as the strong educational purposes.
One highlight of the WGCBH is a small, focused and highly interactive biennial meeting organized jointly with the ESC WG Myocardial Function, that was originally held in the memorable lake-side Italian location of Varenna until 2015, then moved to the much livelier location of Naples for 2017 and 2019. Unfortunately, COVID-19 restrictions prevented this meeting from being organized in 2021, and it will be re-organized in late 2023. We believe that restoring this tradition, presenting cutting-edge scientific results in cardiovascular basic and translational science, and attracting the most talented and promising early career researchers, will again provide young researchers unique opportunities to interact, share and exchange their scientific outcomes with international experts in the field and peers from around Europe.

The future

There is no doubt that basic and translational cardiovascular science, combined with clinical research, are required to ensure continued substantial progress in understanding disease processes and developing new and more effective treatments for heart disease [10,11]. However, full integration of these different perspectives and expertise is still often an unfulfilled aim. Although translational research benefits from researchers trained in both clinical medicine and basic science, ever fewer physicians undergoing clinical training in cardiology seek this dual career for various reasons [12]. Furthermore, significant differences exist across Europe and worldwide in the extent to which basic science is integrated into cardiology education and training [13]. In this context, we envision that WBCBH might function as one of multiple ESC education/research hubs, creating research networks, integrating basic science in academic cardiology training and research programs, illustrating different career options and sub-specialty possibilities, enhancing projects and collaborations building capabilities, facilitating grant applications and human resources exchange across Europe. In addition, we anticipate that the WGCBH will be always more active on promotion of basic and translational science initiatives that will be dedicated not only to dissemination of knowledge or to opinion-making, but also to organization of effective joint research endeavors involving experts in engineering, nanotechnologies, material sciences and artificial intelligence research areas, as well as representatives of Institutions that can be of advice on promotion of quality, safety and economic sustainability of new treatments and therapies emerging from research.

Conclusions

The WGCBH is now old but still gold, continuously transforming and evolving, adapting its aims to new scientific, technological, and environmental challenges, and always ready to engage into new scientific adventures and collaborations, fulfilling the ultimate ESC scope of fighting heart disease.

Figure Legends

Figure 1

Gears representing current and future aims of the WG Cellular Biology of the Heart within the ESC machinery

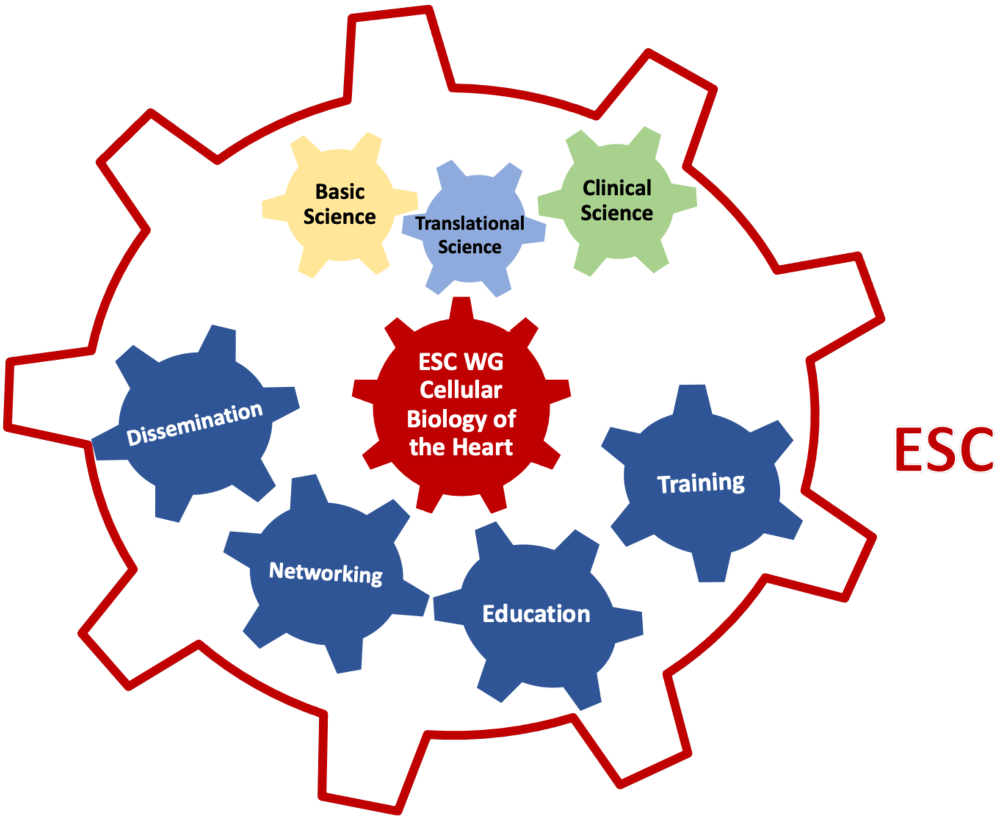
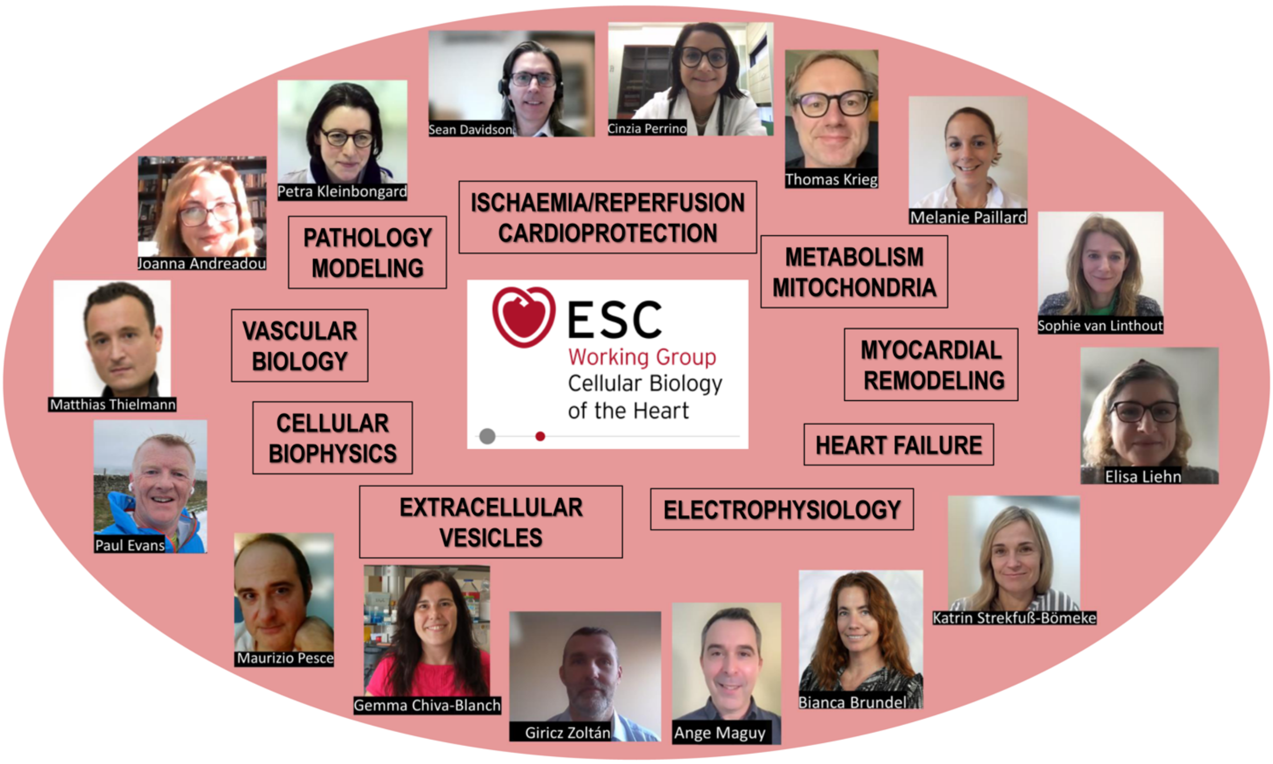


Figure 2

Current nucleus members (2022-2024) of the ESC Working Group Cellular Biology of the Heart



From middle top (in clockwise order): ***Prof. Cinzia Perrino MD PhD*** (Chairperson), Federico II University, Naples, Italy; ***Prof. Thomas Krieg MA MD PhD***, University of Cambridge, Cambridge, UK; ***Dr. Melanie Paillard PhD***, CarMeN Laboratory, IRIS team, Lyon, France; ***Prof. Sophie Van Linthout PhD***, Universitätmedizin Berlin, Berlin, Germany, Board member and representative of Heart Failure Association - Basic Science Section - and Chair of the Committee on Basic and Translational Research; ***Prof. Elisa Anamaria Liehn, MD PhD***, University of Southern Denmark, Odense, Denmark; ***Prof. Katrin K Streckfuß-Bömeke PhD***, University of Göttingen, Göttingen, Universität Würzburg, Würzburg, Germany; ***Prof. Bianca J.J.M. Brundel PhD***, Amsterdam UMC Location Vrije Universiteit, Amsterdam, the Netherlands; ***Prof. Ange Maguy MSc PhD PD***, University of Bern, Bern, Switzerland; ***Prof. Zoltán Giricz PharmD PhD***, Semmelweis University, Budapest, Hungary; ***Dr. Gemma Chiva-Blanc PhD***, Universitat Oberta de Catalunya, Barcelona, Spain and CIBEROBN, Instituto de Salud Carlos III, Madrid, Spain, member and representative of ESC Scientists of Tomorrow (SoT); ***Prof. Maurizio Pesce MSc PhD*** (Chairperson-Elect), Centro Cardiologico Monzino, IRCCS, Milan, Italy; ***Prof. Paul Evans PhD***, Queen Mary University of London, UK member and representative of ESC Council of Basic Cardiovascular Science; ***Prof. Matthias Thielmann MD PhD***, University Duisburg-Essen, Essen, Germany, member and representative of ESC WG Cardiovascular Surgery; ***Prof. Joanna Andreadou PhD***, National and Kapodistrian University of Athens, Athens, Greece; ***Prof. Petra Kleinbongard PhD***, University of Duisburg-Essen, Germany; ***Prof. Sean Davidson PhD*** (Past-Chairperson), University College London, London, UK.

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