

ESC Congress 2020, the digital experience: a report from the ESC Scientists of Tomorrow

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The year 2020 has been nothing but unique from many perspectives. We have been seriously challenged to cope with a worldwide pandemic and re-arrange our private lives and workstyles. It has been—and still is—the year of ‘physical distancing’ as a general rule to avoid being infected with the SARS-CoV-2 virus, the aetiological cause of COVID-19. Nevertheless, this measure does not necessarily rely on ‘social distancing’. Indeed, the entire scientific community has come together to turn such a challenge into an excellent opportunity to foster digital interactions, improve networking and communication by gathering in webinars and online meetings. In this scenario, the ESC 2020 Congress has provided an exceptional experience by reaching out to all attendees via a new virtual yet very engaging format. This year’s meeting doubled total registrations and increased female participants with about 116 000 registered online attendees among healthcare professionals and cardiovascular scientists from 211 countries. Notably, 55% of registrants were <40 years old. Compared to the previous ESC 2019 meeting, this digital platform delivered cutting edge cardiovascular science straight to the connecting devices of physicians and scientist from across the world through 37 recorded live sessions, 347 channels by topic, and more than 3000 on-demand contents.

The basic science sessions offered a comprehensive and critical overview of the most advanced technological progress in cardiovascular research, including three-dimensional bioprinting for human heart engineering, immortalization of human cardiomyocyte cell lines, light-sheet microscopy to investigate cell action potential, and genome-editing strategies with the exploitation of induced pluripotent cell biology for disease modelling in precision medicine. Useful insights in nanotechnology for cardiovascular therapy was provided focusing on innovative methods to treat arrhythmias by photodynamic therapy and nanoparticles quench inhibiting the immune response in cardiac disease. The role of gene-guided approaches for the treatment of hereditary cardiomyopathies was also discussed with an update of the current challenges and barriers in the development of gene therapy for arrhythmia. Possible therapeutic applications of non-coding RNAs for the treatment of cardiovascular diseases, modulation of endogenous cardiac microRNAs and targeting antisense RNAs in cardiomyopathies were explored.

The 2020 ESC William Harvey Lecture on Basic Science entitled ‘Modifiable risk factors and cardiovascular disease’ was provided by Prof. Filip Swirski, from Massachusetts General Hospital and Harvard Medical School, USA. Prof. Swirski is internationally acknowledged as a major

expert in cardio-immunology, who substantially contributed to the understanding of monocyte and macrophage functions in atherosclerosis, inflammatory mechanisms in the heart and the influence of sleep and exercise on immune cell behaviour.

His inspiring presentation included a critical discussion on the main lifestyle factors (including sleep, stress, and diet) affecting atherosclerosis, systemic inflammatory networks, haematopoiesis, and gut metabolism.

The ESC Gold Medals were awarded to exceptional researchers who have made an extraordinary contribution to cardiovascular medicine and science. This year, three gold medals were granted in the fields of clinical cardiology, population science and, for the first time, in basic science. The gold medal in clinical cardiology was awarded to Prof. John McMurray from the University of Glasgow (UK), an internationally distinguished leader in the field of heart failure (HF) treatment, co-ordinator of large clinical trials and author of healthcare guidelines for HF management. Prof. Kari Stefansson, founder and CEO of the Reykjavik-based deCODE genetics company in Iceland, was awarded the ESC Gold Medal in population science for his pioneering work on population-scale genetics of cardiological diseases such as atrial fibrillation (AF), hypertension and HFHe significantly contributed to characterizing genomic diversity of genes serving as drug targets. Finally, the ESC gold medal in basic science was awarded to Prof. Stefanie Dimmeler, director of the Institute of Cardiovascular Regeneration at the University of Frankfurt (Germany), in light of her remarkable contribution to research on cardiovascular regeneration and identifying non-coding RNAs as potential therapeutic tools for personalized medicine.

The ESC 2020 Congress also showcased highly awaited clinical trial results from the EMPEROR-Reduced-Study, EAST-AFNET-4-Study, EXPLORER-HCM-Study, ATPCI-Study, POPULAR-TAVI-Study, PARALLAX, LoDoCo2, and BRACE-CORONA.^{1–8} The EMPEROR-Reduced-Study demonstrated an extraordinary therapeutic benefit of the SGLT2 inhibitor empagliflozin in HF and reduced ejection fraction (HFrEF) patients with a significant reduction of cardiovascular deaths and hospitalization. Similarly, this was shown last year by the DAPA-HF study, that revealed an impressive benefit of the SGLT2 inhibitor dapagliflozin in patients with HFrEF, regardless of whether or not they had type 2 diabetes.¹ The status of SGLT2 inhibitors as a new genuine HF therapy should thus probably be further strengthened. The randomized EAST-AFNET-4 study (Early treatment of AF for stroke prevention trial) that was carried out across Europe by the Competence Network for Atrial Fibrillation (AFNET) in cooperation with the European Heart Rhythm Association

addresses the benefit from early rhythm-maintaining therapy as a strategy to prevent death and stroke in AF.² The study showed that rhythm control therapy initiated early during pathogenesis of AF was associated with a lower risk of cardiovascular outcomes than usual care. The study investigators concluded that rhythm control therapy should be started already in the early stage of AF development. The **EXPLORER-HCM** study demonstrated the success of Mavacamten, a small-molecule modulator of cardiac myosin, in the treatment of obstructive hypertrophic cardiomyopathy (HCM).³ In the **ATPCI-study**, it was investigated whether the anti-ischaemic drug trimetazidine reduces clinical events in chronic heart disease (CHD) patients who recently underwent a coronary intervention (PCI).⁴ Around 6000 patients after previous elective or urgent PCI were enrolled in the study. The results demonstrated that trimetazidine did not result in improved outcomes or reduced symptoms following successful PCI in patients with acute or chronic coronary syndromes. The **POPULAR-TAVI** study investigated the benefit of antithrombotic therapy after transcatheter aortic valve implantation (TAVI).⁵

In particular, the effectiveness and safety of a single therapy with acetylsalicylic acid (ASA) compared to dual therapy (ASA plus clopidogrel) after TAVI was assessed. The trial showed that ASA alone should be used in patients undergoing TAVI without oral anticoagulation or recent coronary stenting.

Effectiveness of Entresto (sacubitril/valsartan) in HF with preserved ejection fraction (HFpEF) was the subject of the **PARALLAX study**.⁶ The question was whether Entresto could improve symptoms and exercise capacity of patients with HFpEF (i.e. with ejection fraction >40%) in comparison to other pharmacological treatments of HF. Results showed a significant reduction in NT-pro BNP after 12 weeks treatment but no significant differences between treatment groups regarding the 6-min walk distance or other secondary endpoints. The **LoDoCo2 study** investigated the effectiveness of colchicine for reducing cardiovascular events (cardiovascular death, myocardial infarction, ischaemic stroke, coronary revascularization due to ischaemia) in 5500 patients with chronic coronary disease.⁷ Low-dose colchicine therapy (0.5 mg per day) significantly reduced cardiovascular events compared to placebo, and was not associated with any serious adverse effects. It was concluded that colchicine represents a new option for long-term prevention of cardiovascular events in patients with chronic coronary disease. Antihypertensive treatment of patients with severe COVID-19 was addressed during the ESC hotline session. The **BRACE-CORONA** study assessed whether treatment with ACE inhibitors or AT1 receptor blockers should be continued in COVID-19 patients.⁸ Investigators of the study concluded that there is no clinical benefit from discontinuing these medications in hospitalized patients with mild to moderate COVID-19.

Moreover, this year's ESC conference witnessed the release of four new guidelines related to new recommendations for the management of AF, non-ST elevation myocardial infarction, congenital heart defects (GUCh) in adults, and sports cardiology as well as physical activity in patients with cardiovascular diseases.^{9–12}

The congress closing ceremony also witnessed the presidential address of the newly elected 2020–22 ESC President, Prof. Stephan Achenbach, from the University of Erlangen, Germany. Prof. Achenbach expressed his vision on shaping the near future of the ESC based on supporting the core values of the society by ensuring robust and unbiased science, fostering collaborations across the broad cardiology spectrum and providing unity in diversity via a close partnership with national cardiac societies. Overall, the ESC 2020 Congress has taken the digital experience of an online conference to a new level, becoming a record-breaking event. See you all—hopefully in person—in London in 2021!

Conflict of interest: none declared.

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Authors



Biography: Constanze Schmidt Prof. Dr Constanze Schmidt, FESC, is a clinical and cellular electrophysiologist at the Department of Cardiology of Heidelberg University. In 2010, after receiving her MD degree at Göttingen University, she started her clinical education in internal medicine and cardiology with focus on electrophysiology at Heidelberg University. In 2017, she established her own lab investigating atrial arrhythmopathy and cellular electrophysiology. As part of her scientific work, she characterized the pathophysiological role of K_{2P} channels in the human heart and identified the K_{2P} channel TASK-1 as an important regulator of the atrial action potential in atrial fibrillation and heart failure. In 2016, she was appointed consultant physician in internal medicine. Her scientific work was supported by Rahel Goitein Straus and Olympia-Morata fellowships of Heidelberg University. Amongst numerous awards, she received the Liselotte-Becht research award (2017) and the Oskar-Lapp research award (2016) of the German Cardiac Society, the best moderated poster award of the ESC (2016) and was selected as finalist for the Heart Rhythm Society young investigator award (2014). Since 2018 she has been a nucleus member of the Scientists of Tomorrow of the European Society of Cardiology (ESC).



Biography: Prof. Dr Sveva Bollini is an associate professor in experimental biology at the Department of Experimental Medicine of University of Genova, Genova, Italy. She graduated in Medical Biotechnology and got her PhD from the University of Padova in Italy, where she studied the cardiomyogenic potential of human amniotic fluid stem cells. During her post-doctoral work, she worked on the lineage characterization of reactivated epicardium-derived progenitor cells for cardiac repair at UCL-University College London and at University of Oxford, in UK. In 2014, she was presented with the 'Rita Levi Montalcini' Young Investigator Award from the Italian Ministry of Research and Education (MIUR) and invited back to Italy to study the paracrine potential of the human amniotic fluid stem cell *secretome* (i.e. the whole of cell-secreted soluble factors and extracellular vesicles) to boost endogenous heart repair mechanisms. Currently, her research mainly focuses on the functional characterization of human foetal and perinatal stem cell *secretome* to resurge myocardial renewal, following injury (i.e. myocardial infarction and drug-induced cardiotoxicity). She has been a nucleus member of the Scientists of Tomorrow of the European Society of Cardiology (ESC) since 2019.