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CARDIOPULSE

The Year in Cardiovascular Medicine 2020: Imaging

Looking back on the Year in Cardiovascular Medicine for 2020 in the field of imaging are Fausto Pinto, José Luis Zamorano and Chiara Bucciarelli-Ducci. Judy Ozkan speaks with them.

Fausto Pinto MD, PhD

Fausto Pinto is currently head of the Cardiovascular Department at University Hospital Santa Maria in Lisbon, the largest hospital in Portugal. He is also the Dean of Lisbon School of Medicine of the University of Lisbon—from which he received his own medical degree.

His interest in imaging goes back to his Fellowship years in the 1990s when he was training in the US at Stanford University with Professor Richard Popp, one of the fathers of echocardiography. He says: 'I was particularly interested in intravascular ultrasound (IVUS) and did my research at Stanford on graft atherosclerosis using IVUS, as the basis of my PhD. After returning to Europe, I got involved in many aspects of cardiology, including cardiovascular imaging and have been promoting the use of different imaging techniques in my department as I believe that all imaging modalities should be available for the best possible diagnosis and patient management'.

Between 2002 and 2004, Pinto served as the first President of the European Association of Echocardiography (EAE), a branch of the ESC which he later helped evolve into the European Association of Cardiovascular Imaging (EACVI). A former ESC President between 2014 and 2016 his roles within the ESC include Chairman of the Congress Program Committee in 2009 and 2010. Alongside this, he has always been a strong supporter of integrating cardiovascular imaging modalities into clinical practice. He is currently the President Elect of the World Heart Federation (WHF) and will take over the presidency in January 2021.

Echocardiography, he says, continues to be one of the most utilized methods to better understand cardiac pathophysiology and different pathological and even normal aspects of cardiac function, and plays a central role in daily patient management. 'In the paper, I highlight the use of echo in Transthyretin amyloidosis cardiomyopathy (ATTR-CM), an increasingly recognized cause of heart failure. With the new treatment strategies underway, some already with important clinical results, its recognition is becoming more vital than ever. The NORRE study provided useful 2DE reference ranges of 2D echocardiographic measurements of left ventricular layer-specific strain from a large group of healthy volunteers of both genders over a wide range of ages'.

Pinto says the importance of developing parameters that may help the clinician to better understand the severity of certain disease conditions, as well as risk stratify the patients, is of utmost clinical relevance. 'That is the case of patients with bicuspid aortic valve (BAV). In another study, it was shown that impaired LVGLS in BAV with preserved LVEF is not infrequent and was independently associated with increased risk of (mainly aortic valve replacement) events'.

He notes that the inclusion of echocardiography in the main ESC guidelines—with many class I recommendations—is the result of an enormous effort by the imaging community to organize and run clinical studies that provide the evidence on which the guidelines committees base their recommendations. 'This is certainly a sharp contrast with what we used to see not so long ago, when imaging, and particularly echocardiography was hardly reflected in any guidelines whatsoever. That panorama has dramatically changed, and it is now clearly reflected in the 2020 ESC Guidelines'.

Some new technological developments in echocardiography such as a method of real-time streaming of 3D transoesophageal echocardiography data into a mixed-reality holographic headset (allowing for touchless control and data sharing within the cath-lab), and a novel fusion pipeline that aligns 3D echocardiography and MRI, then fuses both images to enable combined image segmentation for 3D printing, are also featured.

José Luis Zamorano MD

José Luis Zamorano is Head of Cardiology at the University Hospital Ramon y Cajal, in Madrid, Spain and an acknowledged expert in cardiovascular health and non-invasive diagnosis. His research interests focus on ischaemic heart disease, cardiovascular risk factors, and imaging modalities. In the EHJ review he notes that in spite of the COVID-19 pandemic, 2020 was a fruitful year for research of interest to cardiovascular imaging specialists.

Zamorano has been involved with the ESC for most of his life, at many levels and in many roles but most notably as a former Vice President and a former chairman of the Clinical Practice Guidelines (CPG). He studied medicine in Madrid, Spain and spent time working in Germany with cardiologist Raimund Erbel developing and refining the use of echocardiography. Imaging modalities and their application

to cardiovascular medicine has been a major topic of interest throughout his career. After spending time in Germany with Raimund Erbel, Zamorano returned to Spain and developed the concept of the 3D echo and real-time 3D echo. His work later evolved and encompassed computerized tomography (CT). He was one of the first physicians in Spain to do coronary CT scans and to use magnetic resonance imaging (MRI) for the heart.

He describes the beauty of imaging in terms of its capability to produce valuable information for diagnosis and prognosis. He says: 'We are moving towards more predictive imaging related to the sort of information that comes from a patient in order to detect diseases even before the patient develops symptoms. This is an incredible development for those specializing in cardiovascular health and more crucially, for individual patients'. The development and range of imaging modalities available has led to a growth in cardiovascular imaging centres over recent years with suitably qualified health professionals and specialists working with the latest technology. The important point to bear in mind is however, Zamorano says, not to put the technology centre stage. 'The crucial thing is that you put the patient in the centre, so it's not the MRI, it's not the echo, it's not the CT that really matters it's the patient in the centre and then the professional's job is to select the best imaging modality to answer the question'.

Looking to the future, Zamorano says imaging is going to 'move out of the heart' due to the evolution of technology. 'I am involved in a pilot study looking at facial imaging in terms of changes to skin colour, changes to eye colour and changes to the structure of the face in order to predict cardiac outcomes. The study is currently looking at detecting changes in advanced heart failure patients that may reflect their cardiovascular status'. This, he says, is an indication of how imaging has moved from a single, to a more integrated technology which offers a range of new options to predict risks to the heart. He says: 'We now have moved from the idea of imaging as a diagnostic tool, through to a prognostic tool, to the final step of imaging as a predictive tool. We also know that Artificial Intelligence (AI) is going to have a big impact on cardiovascular imaging in the future, but it's important to remember that technology is not at the centre of things, the patient is at the centre'.

Chiara Bucciarelli-Ducci MD, PhD

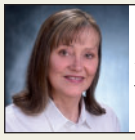
Chiara Bucciarelli-Ducci leads the Cardiac MRI Unit based at Bristol Heart Institute, UK. She is also co-Director of the Clinical Research and Imaging Centre (CRIC) in Bristol. She qualified as a doctor at La Sapienza University, Rome, Italy and undertook training in the US and UK. She is one of the immediate vice-presidents of European Association of Cardiovascular Imaging (EACVI).

Bucciarelli-Ducci has been involved in cardiac MRI since its inception and she remains committed to integrating this 'new' modality into clinical practice to help practitioners and advance patient care. In considering new developments over the year she says three main things really come through as important. 'Cardiac MRI and Covid have been in the news a lot and the results of some studies have been subject to distortion which has created a degree of panic amongst the public. We also look at the latest evidence of cardiac MRI in the ESC guidelines and in particular the release of updated guidelines on the management of non-ST-segment elevation acute coronary syndromes (NSTE-ACS) which came out in August. Cardiac MRI has now been classed IB for myocardial infarction with non-obstructive coronary arteries (MINOCA) and I think this is a very important step forward in improving patient management as we are now able to confirm a final diagnosis in the large majority of these patients. This new recommendation is a testament of many studies over the past few years on the role of cardiac MRI in MINOCA'.

Another point of interest, says Bucciarelli-Ducci, was a paper from German researchers in early summer which found that patients who had been treated for COVID-19 but were completely asymptomatic at the time of having an MRI showed alterations to the heart. 'This was a bit surprising because they were asymptomatic or low symptomatic at the time of observation but 78% subsequently demonstrated subtle changes in the myocardium. The authors did not overstate the results of the study at the time but the media and particularly the US media, picked up on this and tended to sensationalize the results which led people to understand that the heart was more affected by COVID-19 than previously thought. The bottom line of this study is that we should not change management or treat asymptomatic patients as if they had cardiovascular disease as the results were preliminary and should not be over interpreted. We need to wait for the results of ongoing, larger, and multi-centre studies to draw final conclusions'.

The increasing use of AI in clinical cardiovascular imaging is an area with 'huge potential' and several algorithms are being developed and tested. 'With AI, imaging can be analysed much quicker—160 times faster (according to one of the studies)—and potentially more precisely compared to even expert human eyes. That is very important because it empowers colleagues with less expertise and less time to carry out high quality, high precision imaging with the additional advantage that it is low cost. That is the future, in fact it's a future that is already present'. Cardiovascular imaging—of all modalities—is increasingly helping clinicians to customize cardiovascular care from diagnosis, by guiding management through to prognosis. All of which contributes to advancing precision medicine and considers individual variability in each patient.

Conflict of interest: none declared.



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