

EUROECHO 9

From research tools to clinical practice

Dragos VINEREANU, MD, PhD, FESC
University of Medicine and Pharmacy Carol Davila, Romania

The 9th Congress of the European Association of Echocardiography (EUROECHO 9, <http://www.esccardio.org/congresses/EE/EE9/>) was held in the beautiful city of Florence, Italy, in an old fortress transformed in a meeting hall. Four days, six meeting rooms, and more than 2500 participants from all over the world made a very successful meeting.

From a scientific point a view, this meeting highlighted the role of the new echocardiografic modalities in routine clinical practice. Therefore, some techniques, used only as research tools so far, are already available on commercially echo machines. The most important of these are:



1. TISSUE DOPPLER

This method applies the Doppler principle to the movement of myocardium, instead of the blood flow. It allows measurement of velocities of contraction and relaxation of different myocardial segments, and therefore it assesses the function of the heart muscle. This method can be used now in routine clinical practice for:

- Assessment of regional function of the heart, at rest and during stress echocardiography, for the diagnosis of myocardial ischaemia and viability. Thus, by measuring the systolic and diastolic velocities of different left ventricular myocar-

dial segments, this method introduces a quantitative approach for the stress echocardiography, which might increase the accuracy of the method.

- Assessment of the subendocardial function of the heart muscle, which is the most sensitive myocardial layer to chronic ischaemia and fibrosis. This is based on the functional anatomy of the left ventricular myocardial fibers, which are disposed longitudinally for the internal, subendocardial layers, and mainly in a radial, concentric direction for the external, subepicardial layers. Therefore, subendocardial myocardial layers are res-

possible for the longitudinal, piston-like function of the heart, whereas subepicardial layers contribute mainly to the radial function of the heart. Tissue Doppler allows separate measurement of longitudinal and radial velocities. By assessing subendocardial left ventricular dysfunction, tissue Doppler is now the method of choice for the diagnosis of subclinical, still asymptomatic, heart failure in different clinical conditions, such as hypertension, diabetes, valvar regurgitations, different cardiomyopathies, etc. Future guidelines for the diagnosis of heart failure should include this method for its early diagnosis.

- Assessment of timing of the myocardial segments. Tissue Doppler can measure the mechanical activation time of different myocardial segments, and therefore can assess the intra- left ventricular and inter-ventricular asynchrony of contraction and relaxation in patients with heart failure. Asynchrony is a major cause of heart failure, since a ventricle which contracts in the same time has a good function, whereas an asynchronous ventricle, in which some segments are still relaxing when the others contracts, has an impaired global function. Asynchrony can now be treated successfully by implanting special types of biventricular pacemakers, during the so-called cardiac resynchronization therapy; tissue Doppler seems to be the method of choice for the best selection of patients that might benefit from this new therapy, but this should be proved now in future, on-going, prospective studies. □

2. REAL TIME 3-DIMENSIONAL ECHOCARDIOGRAPHY

This method is very important for the surgical anatomy of the heart and for the guidance of different heart surgery procedures. It allows

also the measurement of regional ejection fraction of different myocardial segments, contributing to the quantification of regional left ventricular function. □

3. ASSESSMENT OF ENDOTHELIAL FUNCTION AND LARGE ARTERY STIFFNESS

It is well known that cardiac function is closely related to the arterial stiffness. Indeed, when the arteries are stiffer, the afterload is augmented and the heart function declines. A major determinant of the arterial stiffness is the endothelial dysfunction, which makes the vessel less able to relax to different agents. A nice research tool for many years, assessment of endothelial function is now ready for clinical practice since the technique (measurement of flow mediated dilatation at the level of brachial artery) is available on different echo machines. Moreover, assessment of large arteries stiffness is also clinically available. This should be used now in routine clinical practice for the optimization of treatment of hypertension, since it is proved that the best drugs are the ones which are able to decrease not only the blood pressure but also the arterial stiffness.

Another major issue discussed during this meeting was the integration of different imaging modalities, in order to get the best information regarding an individual patient. Therefore, powerful computer software is developed in order to combine information provided by different techniques, such as echocardiography, magnetic resonance imaging, nuclear scan, etc. □

All the abovementioned methods will be now tested extensively in long-term therapeutic studies in order to explore their role for the selection of best therapeutic modality and for monitoring treatment.