

## CUSTOMER REPORT

# 2D CPA for predicting sudden cardiac death – The more you see, the more you save?



Dr. Rebecca Perry  
Sonographer and researcher at Flinders

**Heart attacks may cause scars and the presence of scar tissue raises the risk for dangerously fast heart rhythms and sudden cardiac death. This seems to be a simple enough chain of events, but it presents a tricky problem in routine clinical assessment. Scarring is often difficult to see in conventional ultrasound images, thus it is almost impossible to identify all patients at risk. Doctors and researchers at Flinders University in Adelaide, Australia, are addressing this difficulty with the TOMTEC 2D CPA (Cardiac Performance Analysis) software. And they have achieved excellent results so far, as Flinders-sonographer and researcher Dr. Rebecca Perry, reports.**

"Thanks to improvements in 2D speckle tracking algorithms, strain technology has improved to a point where we can analyze strain in over 90 percent of cases," said Dr. Perry, who has extensive experience in advanced echocardiography. She pointed out more details of 2D CPA\*: "Studies have shown that using left ventricular ejection fraction has limitations for selecting patients who will benefit from an implantable cardioverter-defibrillator, a device that can shock patients out of a dangerously fast heart rhythm. Using 2D CPA we can look at differences in the timing of peak strain in each region of the left ventricle which we believe can demonstrate scar burden." The findings of the Australian research team could revolutionize the treatment of heart failure patients and the prevention of sudden cardiac death: Today, current guidelines for cardioverter-defibrillator implantation exclude most patients with mild or moderate left ventricular dysfunction. Using this technology may identify patients at higher risk of sudden cardiac death which could lead to new treatment paths for those patients that currently miss out on defibrillator therapy.

### 2D CPA in clinical settings

At Flinders University, though, 2D CPA is not only used for highly relevant research. At the Medical Center cardiologists and sonographers like Rebecca Perry use TOMTEC technology to assess the heart of patients undergoing chemotherapy. The institution – like more or less all tertiary care hospitals – is working with a multi-vendor fleet of medical technologies. The limiting step in strain reproducibility has been shown to be in the speckle tracking analysis software rather than the ultrasound equipment itself. Most companies offer their own, vendor-specific packages for speckle tracking strain analysis but for reproducible follow-up studies

### INSTITUTION

- Established in 1966
- Pioneering research and excellence in teaching
- Strong network of external links
- More than 25,000 students
- Around 2,500 employees
- State-of-the-art facilities
- Their teaching footprint extends from South Australia, Western Victoria to the Northern Territory

the patient must be scanned using the same machine, logistically extremely difficult in most busy centers. In addition to the unique analysis options the TOMTEC 2D CPA package offers, its vendor-independent architecture is essential for the work of the sonographers, researchers and cardiologists. "Due to this vendor-neutrality we can perform accurate and reproducible analyses on images obtained on any platform using a single software package. We can then trust that any change in the strain detected is pathological rather than from differences in analysis software," Dr. Perry stresses.

Another important key feature: TOMTEC can perform strain analysis on standard 2D DICOM rather than large raw data images. That means much less storage capacity is needed and analysis can be performed retrospectively. The analyzed images can then be imported/exported from and back to the PACS for permanent storage.

In order to verify that DICOM images originally acquired by systems from different vendors can be successfully analyzed with a single software package, the Flinders team performed a small in-house study with 60 patients. Half of them were scanned on a machine from one vendor, the other half with that of a different vendor. First, the images of both groups were analyzed with the vendor-specific software and in a second step all images were analyzed firstly in raw data and then DICOM format with TOMTEC. "The reproducibility was fantastic. We were extremely happy with the comparison between the raw data and the DICOM image analysis," Dr. Perry reports.

The vendor-neutral, DICOM-based process reveals another advantage: Doctors can work from wherever they are and are not 'chained' to a specific workstation. Images can even be displayed bedside on a mobile device and discussed with the patient thus enhancing patient-physician communication.

### Promising prospects

For the Australian research team the potential of the TOMTEC software has not even been fully explored yet. Dr. Perry: "I think that we are just starting to open up the potential of left ventricular strain and then of course there is right ventricular and left atrial strain – what do they mean and how can they be predictive? We are now eager to find answers to questions such as "How can we manage patients better? How can we intervene right now in patients who show reduced strain but normal function? Will it be possible to treat those patients for heart failure before they actually show symptoms?"

Finding answers to those questions can potentially save lives. However, and this is crucial for any healthcare system around the globe, they can also save money, for example by avoiding re-hospitalizations. Reason enough for the Flinders researchers to continue their studies which might be game changers for the prospects of cardiac patients and the efficiency of healthcare systems.

### KEY FOCUS AND MODULES IN USE

- Strain technology has improved to a point where strain can be analyzed in over 90 percent of cases
- Identify patients at higher risk of sudden cardiac death which could lead to new treatment paths for those patients that currently miss out on defibrillator therapy.

### 2D CARDIAC PERFORMANCE ANALYSIS

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Dr. Rebecca Perry

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