

## Clinical Physiology Meeting at the ICS a success

Feedback on the Clinical Physiology meeting held at the Irish Cardiac Society has been positive with people enjoying the meeting. As happened last year an

electroanatomical mapping images from the Carto system. Those with experience of EP remarked that the talk

Session II saw two interventional Cardiologists inform us of moves into an area traditionally the domain of the surgeon. Dr Ganesh Manorharan, from RVH Trust Belfast, spoke to us about Percutaneous Aortic Valve Replacement. This is a new technique where a porcine valve on a nitinol meshwork is placed into the aortic root. The self-expanding valve is deployed from a 23F catheter and pushes the leaflets of the native aortic valve against the wall of the aorta. This procedure is reserved for selected patients who have significant comorbidities for surgery. Dr Manorharan outlined how he like to keep the same team together for the initial number of procedures to ensure full familiarity with what is appears to be a technically demanding procedure which requires two Cardiologists.

Dr Gordon Pate, from the Galway Clinic, outlined the percutaneous options

### Inside this issue:

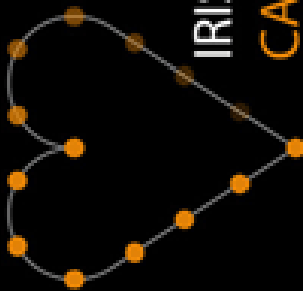
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attempt was made to pair talks on a similar theme in each session.

was very informative, for the rest of us it certainly gave us a glimpse into the world of the dark art of EP.

Registration was efficient, particularly due to the help of Orlagh Harrington and Lorraine McMahon and the meeting got underway with Session I. Dr Gerry Fahy, Consultant Electrophysiologist from South Infirmity University Hospital in Cork, started the day off with a detailed look at what the ECG can tell us when planning ablation procedures. He detailed how important it is to remember how the orientation of the ECG leads relate to the anatomy of the heart and how this can help in locating the origin of the tachycardia. EP people love their toys though and Dr Fahy could not resist bamboozling us with 3D

Dr Ben Glover, Specialist Registrar from the RVH Trust in Belfast, took us through the management strategies of Atrial Fibrillation. This highly informative talks managed to summarise evidence from many trials looking at rate versus rhythm control, anti-coagulation issues, newer pharmacological therapies such as Dronedaron and of course ablation procedures such as Pulmonary Vein ablation.



## Clinical Physiology Meeting at the ICS (Contd from page 1)

that are available for the repair of Paravalvular regurgitation. In a highly illustrated talk he showed some lovely examples of how ASD closure devices for example can be used to seal these leaks and how important echocardiography is in these procedures

Echocardiography was the focus of Session III, with Lynn Anderson from RVH Trust in Belfast taking us clearly through the techniques used to diagnose Diastolic Dysfunction on echo. From transmitral flow to tissue

*Almost 100 technicians from North and South attended the Scientific Sessions. Many of the presentations are available on [www.isct.ie](http://www.isct.ie)*

doppler to the slope of propagation on colour m mode, this talk took us through all the techniques currently in use.

Mr Mark da Costa, Cardiothoracic Surgeon from University Hospital Galway, told us how important echocardiography is for him in planning surgery and

what particular things he looks at, which may be different to that of the Cardiologist. He also outlined the role of echo in the post-operative period particularly to outrule effusions and to assess to competence of valves post repair and replacement.

Accounts of the some of the talks are reported in this edition of NewsPulse.

If you have any feedback on the Physiologists Meeting at the ICS either positive or negative, or have ideas for next year, please contact us [editor@isct.ie](mailto:editor@isct.ie)

## CT Angiography - changing Cardiology Practice

The first attempts to image the heart were in the very early days of computed tomography in the 1970's. However due to rapid motion of the heart and long acquisition times of equipment, only large tumours along the surface of the heart were detected. In the 80's it became possible to visualise the coronary arteries but not with reliability to blockages. Rapid advancements in the 90's allowed the development of multi-row CT scanners and in the present day, with the introduction of 64-slice CT scanners, CTA is now considered an additional tool in the management of cardiac patients.

Cardiac CT is gated to the ECG signal. Because the coronary arteries and other cardiac structures move rapidly during the

*Best Overall Oral Case or Research Presentation Winner 2008*

cardiac cycle, data are acquired during cardiac ECG monitoring which allows the computer to then retrospectively reconstruct slices at different small segments of the cardiac cycle and thereby reduce motion artifact in the coronary arteries as well as movies of the beating heart and valve motion.

This three dimensional imaging can give accurate and unique information of the coronary arteries including narrowing, type and degree of plaque. This may allow more accurate diagnosis and better treatment planning.

Cardiac CT can also simultaneously visualize the pulmonary and systemic arteries of the chest, thereby excluding other dangerous causes of chest pain including pulmonary embolism and aortic dissection.

CT angiography has the advantage of being an essentially non-invasive test requiring simply IV cannulation for injection of contrast. Also because CT angiography is gated to the ECG, hear rate must be kept below 80bpm, therefore a  $\beta$ -blocker must often be administered. However being non-invasive the inherent risks of the more invasive traditional angiography may be avoided in certain patients.

This study, by Ainla Reilly from St. Vincent's Hospital,

## CT angiography (contd from page 3)

Dublin, retrospectively investigated patients who underwent CT angiography and in particular patients who subsequently went on to have traditional Coronary Angiography.

The aim of the study was to investigate the number that proceeded to Cardiac Catheterisation and also to compare the results from the two modalities.

416 pts underwent CT angiography, 55% were male and 45% were female with average ages of 55 and 60 respectively. 59% of referrals were from the Cardiology team.

45 pts were subsequently referred for Cardiac Catheterisation, 62% of these were male and 38% were female.

Lesions were classified both on CT and conventional angiogra-

phy as normal, mild, moderate, significant or occluded.

When examining the Left Main Stem CT overestimated disease severity classifying 7 of 34 angiographically normal left main stems as having mild disease.

In the LAD (3 of 11) and LCX (1 of 15), CT again classified some normal arteries as having mild disease, whereas in the RCA (2 of 3 patients), CT classified some moderate lesions as significant.

Overall however the sensitivity and specificity of CTA was good as shown below

Artery	Sensitivity	Specificity
LM	81%	92%
LAD	93%	80%
LCX	97%	94%
RCA	96%	95%

It was acknowledged that the study was limited by the small numbers of patients who subsequently went on to have traditional angiography and the fact that it was a single centre study with a retrospective analysis.

Ainla concluded that CT angiography is a rapidly developing area whose rightful place in the Cardiology arena may not be quite delineated. She questioned whether it may in time cause a change in the way we investigate chest pain. Could CTA replace exercise stress testing? May it even replace Coronary Angiography in the diagnosis of coronary artery disease.

*Ainla Reilly is a Basic Grade Technician in St Vincent's University Hospital, Dublin*

## Our Future Job Title - Have your say!

As a move towards State Registration the Irish Institute of Clinical Measurement Science along with ourselves are working towards developing a Voluntary Register.

As part of this process it must be decided what each discipline will be called. The degree program in DIT confers a Bachelor of Science in Clinical Measurement Scientist, therefore many of the disciplines have agreed that they will be referred to as Clinical Measurement Scientist as a general body and specifically as Clinical Respiratory Scientist, Clinical Neurophysiology Scientist, Clinical Vascular Scientist, Gastrointestinal Scientist

As a committee we would not be happy about agreeing a name change without referring to members of our profession. There would appear to be a problem with referring to ourselves as Clinical Physiologists (the majority choice last time), because we do not have a degree in Physiology.

We would strongly urge you and all the colleagues in your department to fill out the survey opposite and return it before **December 10th** so that the voice of the majority of those working in Cardiology will be heard and taken into consideration before this, ultimately final decision, is made.

Any other feedback or comments can be emailed to [editor@isct.ie](mailto:editor@isct.ie)

**We have already had over 60 responses - make sure your voice is heard!!!**

# What would be your preferred title in the future? - Simply print this page and return before December 10th



## Profession Name Survey

Please rate ALL of the following suggested names

*1-Would strongly disapprove, 2-disapprove, 3-undecided, 4-approve, 5-strongly approve*

Cardiac Clinical Physiologist	1	2	3	4	5
Cardiac Measurement Physiologist	1	2	3	4	5
Cardiac Physiology Scientist	1	2	3	4	5
Clinical Cardiac Scientist	1	2	3	4	5
Cardiac Clinical Scientist	1	2	3	4	5
Cardiac Measurement Scientist	1	2	3	4	5
Cardiac Technologist	1	2	3	4	5
Cardiac Technician	1	2	3	4	5

Please return to  
Paul Nolan  
Cardiac Investigations  
University Hospital Galway  
Newcastle Road  
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The form can also be downloaded from the website, [www.isct.ie](http://www.isct.ie)

# National Centre for Cardiac Risk in Young opens

The Centre for Cardiovascular Risk in Younger Persons (CRYP), which aims to screen a minimum of 1,600 young patients annually, has been officially opened onsite in the Adelaide and Meath Hospital (AMNCH), Tallaght, Dublin.

This innovative new Centre is supported by the charity CRY (Cardiac Risk in the Young) that provides information, education, and counselling services. CRY is actively engaged in fundraising to support the running of the Centre.

CRY was established in 2002 by parents who had experienced the sudden death of a child and were troubled by the lack of systematic medical and emotional support. Funding is also being provided by individual benefactors and the Patches Trust.

Over 5,000 people suffer sudden cardiac death in Ireland each year, of which 60 to 80 are under the age of 35 years. Cardiac disease in young people is mostly due to inherited heart disease or birth defects. Awareness of sudden cardiac death has increased in the last few years due to the sudden deaths of high-profile athletes. While the facilities to diagnose coronary heart disease are available in most hospitals, up to now, services for screening and supporting relatives of those who died suddenly have not been readily available.

In response to this need a dedicated new treatment centre, The Centre for Cardiovascular Risk in Younger Persons (CRYP), was developed by Dr David Mulcahy and Professor Ian Graham and their colleagues in the Adelaide and Meath Hospital, Tallaght (AMNCH) and St James's Hospital to provide a medical facility for evaluating at-risk individuals and families, particularly young people. The Centre currently operates from AMNCH Tallaght, with a clinic in St James' Hospital, and there are plans to develop a clinic in St Vincent's University Hospital also.

Dedicated accommodation is now on the AMNCH site which



*International rugby player Leo Cullen watches while his brother Owen, who plays rugby for Blackrock, is assessed for potential heart defects at the new centre in Tallaght Hospital*

will allow rapid access to full non-invasive cardiac evaluation for individuals and families from November 2008. The Medical Committee also comprises senior Consultants from

St Vincent's Hospital, Beaumont Hospital and the Royal Victoria Hospital, Belfast in addition to those from Tallaght and St James.

The two Co-Directors of the new Centre for Cardiovascular Risk are Dr Deirdre Ward in Tallaght and Dr Ross Murphy in St James' Hospital. Both these cardiologists have a special interest in the area of inherited cardiac disease and spent several years with Professor Bill McKenna and his team in London who are world-recognised experts in this field. In addition to the medical staff, from November 2008 there will be a Clinical Nurse Specialist, an Administrator and two Cardiac Technicians working full-time at the Centre.

Today, now that the full-time service is open, it is anticipated that a minimum of 1600 patients can be seen annually, with expansion to up to 3000 annually by end phase 3. Funds have been raised so far to purchase the necessary equipment to run the Centre, and to fund recruitment of the non-physician staff.

Access to the Centre is by referral from a GP or local Consultant. Patients can be referred from anywhere in the country. There is no charge made to the patient regardless of their financial or insurance basis.

**The Organising Committee of the Clinical Physiology Meeting would like to thank all the speakers who contributed to such an interesting meeting at this years Irish Cardiac Society Meeting. We are already thinking about 2009 in Dublin - email us your thoughts [editor@isct.ie](mailto:editor@isct.ie)**

# Can we trust our Doppler Echo Measurements?

A presentation by Dr Lynn Gaynor from the Medical Physics Department of the Mater Misericordiae University Hospital, Dublin raised this particular question and provoked some thought and debate during the "Hot Topics" Section of the Clinical Physiology Meeting.

Previous small studies in the literature had documented significant errors in peak velocity estimations using doppler. This study investigated the performance of 15 Ultrasound machines with 28 different transducers across a range of disciplines including vascular, radiology and cardiology.

Measurements of both peak and mean velocities, from 15 to 300cm/s were recorded from a calibrated string phantom



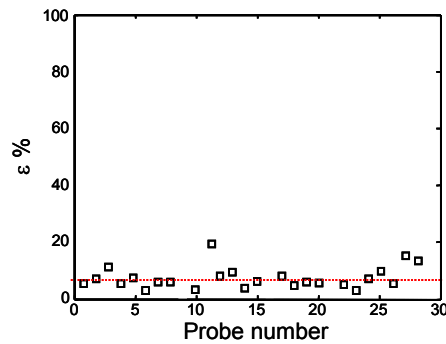
(pictured below)

This phantom allows the machine to measure the velocities created by the spinning of a thin loop of material.

Velocities were measured using the transducers at an angle of incidence of 60 degrees.

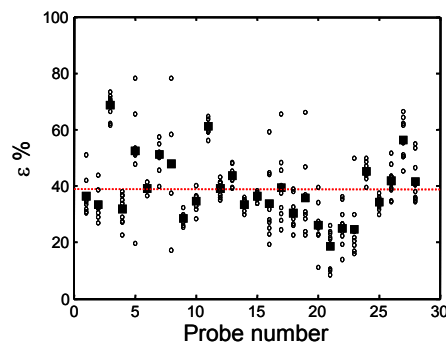
Mean velocities were typically overestimated by 5% with some variation amongst the machines (Fig 1).

When an average of four peak



**Fig 1** Mean velocity measured by 28 transducers expressed as a % of the true velocity

velocity measurements were taken for each of the 28 transducers the peak velocity was typi-



**Fig 2** Peak velocity measured by 28 transducers expressed as a % of the true velocity

cally overestimated by over 40% (Fig 2).

Velocity measurements varies both from machine to machine but also from transducer to transducer. The speaker asked whether this may have issues with regard to reproducibility of measurements in a patient and whether it may be cause for concern in patients who undergo repeat measurements, for example yearly surveillance of aortic stenosis.

Dr Gaynor questioned whether there was a possibility of misclassification of a patient and also highlighted the variance of measurements across machines

and transducers.

The talk produced quite a few questions and comments from the floor. One person questioned the choice of an angle of incidence of 60 degrees when echocardiographers are trained to minimise the angle of incidence and typically would not take a doppler measurement where there was such an angle and also asked whether other angles were tested. Unfortunately due to the fact that the phantom was on loan from DIT, examining other angles was not possible due to time constraints.

In response to a question from the floor Dr Gaynor pointed out that the age of a machine did not predict its accuracy and in fact the machine which demonstrated greatest accuracy was one of the oldest.

Dr Gaynor informed us that Clinicians and sonographers need to be aware of these sources of error and asked whether such testing should be performed routinely.

## References

- B. M. Eicke et al. J. Neuromag. 5:115-121, 1995
- R. J. Daigle et al. J. Vasc. Tech. 14(5):206:213, 1990
- P. R. Hoskins et al. Ultrasound in Med. & Biol. 25(3):391-404, 1999

***Dr Lynn Gaynor works in the Medical Physics Department of Mater Misericordiae University Hospital in Dublin***

## Wrong Patient - Wrong Test?

Stroke is the third leading cause of mortality worldwide with approximately 700,000 strokes occur yearly of which the vast majority are ischaemic in nature (88%). No identifiable cause can be found in 40% of ischaemic strokes and are termed cryptogenic strokes. Approximately 10,000 people admitted to hospital in Ireland each year with stroke as the primary diagnosis.

Cardiogenic source of thrombi accounts for 20-25% of all ischaemic strokes and whilst echocardiography is the investigation of choice in the diagnosis of thrombi, but the type of and indications for echocardiography are controversial. Some investigators debate the diagnostic usefulness of Transthoracic echocardiography vs transoesophageal echocardiography in this clinical situation.

This background information, was given by Ms Roisin O'Mahony, from Connolly Hospital, Blanchardstown, as she presented research conducted at her centre which aimed to evaluate the diagnostic yield of echocardiography in the patients who had suffered a stroke.

When echocardiography is performed in this setting, one is looking to find a source of embolus, evidence of occult structural heart disease, patent foramen ovale or intracardiac shunt or a cardiac tumour.

The group at Connolly Hospital performed a retrospective study on patients (n=275) who had a diagnosis of stroke from January 2006 to December 2007.

*How many of us here today have detected the source of embolus from a transthoracic echo, on stroke patients in THE ABSENCE OF AN ABNORMAL ECG?*

173 (66.7%) inpatient echocardiograms were performed which were ordered at the discretion of the attending physician. Mean age was 70(±12) with a range 23-94 years. 58 (33.5%) patients were less than 65 with 115 (66.4%) being older than 65. Echocardiograms were performed in more males (62.4%) than females (36.9%).

Abnormal echocardiograms were seen in 93(53.7%) patients

In patients with abnormal echocardiograms:

-74(79%) had a history of cardiovascular disease

-58(62%) had abnormal clinical findings

-67(72%) had an abnormal ECG

Abnormal ECG findings included

- Atrial fibrillation (47 pts)

- Paced rhythm (2 pts)

-ST changes (18 pts)

80 (46.2%) patients had normal echocardiograms and in these patients only

-8(10%) had a history of cardiovascular disease

-7(8%) had abnormal clinical findings

-11(14%) had an abnormal ECG

In her discussion Roisin felt that there should be systematic ap-

proach to the utilisation of the echocardiography in the setting of stroke. She wondered whether there should be guidelines for younger patients where bubble studies and TOE may be more useful in the diagnosis of subtle abnormalities such as PFO. She felt that TTE in older patients with stroke should be reserved for patients in whom the results would make a significant change to management or where there was evidence of previous cardiovascular disease, the cardiac vascular exam or the ECG was abnormal.

She concluded that according to her findings the routine, non-systematic application of echocardiography was unhelpful in the setting of stroke and in keeping with the "Hot Topics" Session she raised the following thought provokers

- How many of us have a protocol for echocardiography in stroke patients?

- How many of us have detected the source of embolus from a transthoracic echo, on stroke patients in THE ABSENCE OF AN ABNORMAL ECG?

- How many of us feel that we are making best use of our limited resources (and patient time) with current non systematic approach?

*Roisin O'Mahony is Chief Cardiac Technician at Connolly Hospital, Blanchardstown in Dublin.*

# Case Study - Quadricuspid Aortic Valve

## Background

Quadricuspid aortic valve is a very rare congenital abnormality of the aortic valve. Less than 200 cases have been reported since it was first published in 1862<sup>1</sup>

## Case Study

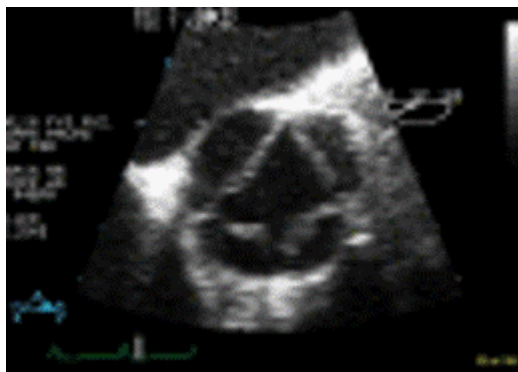
A 64 year old lady was referred to the Emergency Department by her G.P. having experienced an episode of chest pain that was relieved by GTN spray.

The patient had a previous history of chest pain on exertion and had a positive exercise stress test in 2001. Following the stress test a coronary angiogram was performed, this showed a LAD/Bifurcation lesion and a mid RCA Lesion. Stenting was performed on the LAD and RCA lesions. Cardiac Rehabilitation programme was completed in 2002 and no further admissions occurred until 2007. Following an episode of palpitations in 2007 a 24hour holter monitor showed episodes of paroxysmal atrial fibrillation. Transthoracic echo showed mild aortic incompetence with no mention of valvular pathology.

The ECG performed in the Emergency Department showed that the patient was in atrial fibrillation. The patient was admitted and a repeat exercise stress test was performed. The patient remained in atrial fibrillation throughout the test with no significant ischaemic changes. DC

cardioversion was considered and a TOE performed to outrule any thrombus.

TOE findings showed a quadricuspid aortic valve with a mild-moderate central jet of aortic incompetence. The valve displayed two larger and two smaller cusps. There was a mild degree of thickening of the cusps but no stenosis. Aortic incompetence PHT was 1078ms indicating mild AI, colour flow indicating mild-moderate incompetence.



*Fig 1 Short axis transoesophageal view of the aortic valve clearly showing the quadricuspid aortic valve*

Cardioversion was performed under G.A. and rhythm was restored to sinus. A repeat angiogram showed patent stents.

## Discussion

Quadricuspid aortic valve is an extremely rare congenital defect with incidence ranging from 0.008 to 0.048%<sup>2</sup>. First described in 1862 by J. Balington there has been less than 200 reported cases since then. A comprehensive review of all documented cases was carried out in 2005 by Tutarel<sup>3</sup>. The author of that review 186 docu-

mented cases and discovered a slight male predominance in the abnormality. It was also noted that 75% of the cases reviewed showed aortic incompetence. Alfredo et al documented 4 cases in children, they showed that two of these were already experiencing a mild degree of central aortic incompetence<sup>4</sup>.

Hurwitz and Roberts quantified the abnormality into seven different types in 1973<sup>5</sup>.

1. Three equally sized large cusps and one smaller cusp (most common type)
2. Four equally sized cusps
3. Two equal large and two equal small cusps
4. One large, two medium and one small cusp
5. Three equally sized small cusps and one larger cusp
6. Two equally large and two unequal cusps
7. Four unequally sized cusps

There has also been documented cases with endocarditis, anomalies of the coronary arteries and dilated aortic root.

Of note the previous transthoracic study failed to pick up the abnormality, this was due to suboptimal short-axis views.

Other documented congenital malformations of the aortic valve are bicuspid and extremely rare five cusp valve.

## Conclusion

## Quadricuspid Aortic Valve (contd.)

Aortic Quadricuspid valve is a very rare finding. Previous transthoracic echo failed to identify the finding. This poses the question should TOE be considered more often in cases of mild AI and poor acoustic views of the valve cusps. The patient will now have routine follow-up transthoracic echo scans to monitor the aortic incompetence.

### References

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2. Sangalli F, Formica F, Avalli L, Paolini G. Ital Heart J. 2005 Feb;6 (2):157-9.
3. Tutarel O. J Heart Valve Dis. 2004 Jul;13(4):534-7.
4. Alfredo Di Pino, Placido Gitto, Antonio Silva, Innocenzo Bianca. Cardiology in the Young 2008, 18:324-27.

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***Eoin Sheehy is Acting Chief Technician and Dr Santosh David is a Consultant Cardiologist in Letterkenny General Hospital***

## G-Pace launched at Irish Cardiac Society

G-Pace, a pacemaker database solution, designed by recent degree graduate Gene Kelly was launched at the Irish Cardiac Society.

In the past number of years it has been evident that the statistics gathered by HRUK (BPEG) in relation to implant rates of pacemakers and ICDs in Ireland has been somewhat inaccurate. Our annual implant rate is often quoted as zero.

With this in mind, it was decided that an Irish database should be set up in order to accurately monitor Irish implant rates. This presented an opportunity to re-engineer the current model of data collection and as a cardiac technician, Gene decided to develop a system that

incorporates common practices and provides a number of additional features to cardiac de-

partments. With the concept in place, the next step was to develop a working system.

In order to develop the system he enrolled the help of his brother, Robert and together they founded the G-Pace company. Following market research they discovered common desires from users:

*New ID cards, Easy access to accurate statistics, Comprehensive search-ability, The ability to generate reports, A scheduling module.*

They have now created a working model which addresses all of the above requirements as well as a few additional ones. Our data collection sets are fully compatible with CARDS (The Cardiology Audit and Registration Data Standards.) They found that a lot of time was being wasted in chasing device data from other hospitals, To overcome this inefficiency, we decided to develop the system in a web based interface, this allows for hospitals to be interconnected through the database,

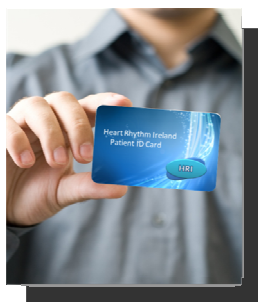
and allows easy access to the entire history of a patients device from any of the connected hospitals.

They developed a new plastic credit card sized ID card containing a barcode that allows immediate access to the patients device information from any connected hospital.

The system has been trialed the Mater Private Hospital, Dublin for the past two months and is being rolled out to pilot hospitals nationwide. They are currently aiming for a national "Go-Live" in Jan 2009. If the system proves to be beneficial in Ireland the next step will be to try and launch the system on an international scale with the overall goal being to allow patients to travel anywhere and have their device and follow-up information travel with them.

If you are interested in finding out more about G-Pace contact [gene@heartrhythmireland.com](mailto:gene@heartrhythmireland.com)

***Gene Kelly is a Cardiac Technician in the Mater Private Hospital***



## Fancy a Diet Coke and an AED?

The placing of automatic external defibrillators in vending machines in Japan is one of the innovative ways in which AED use is being increased in the country.

AED use in Japan has been slow as a law was only introduced in 1991 which allowed paramedics to defibrillate patients. However this approach proved to not significantly improve survival as the mean time to defibrillation was 11.5 minutes after the emergency call was made. As the chance of survival in an out-of-hospital arrest decreases by 7-10% for each minute that passes it was clear that a new approach was needed.

Getting a change in the law which would allow the use of AED's by lay people was only passed in 2004. Previously AEDs could only be used by doctors.

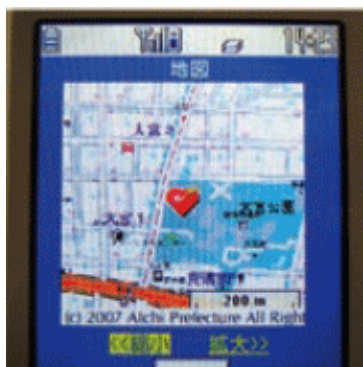
Since 2004 the number of AED's has increased from just over 3000 to well over 35000 in 2006. According to an interim report from the Japanese Fire and Disaster Management Agency, 18,320 people suffered a witnessed out-of-hospital cardiac arrest in 2006. Lay rescuers used AEDs in 140 individuals, of whom 45 (32.1%) were still alive at 1 month, indicating that public use of AEDs could potentially save the life of one in three patients with out-of-hospital sudden cardiac arrest. By contrast, there were 18,180 individuals with sudden cardiac arrest who did not receive defi-



brillation from a member of the public, of whom 1,509 (8.3%) survived. Public use of AEDs could, therefore, achieve a four-fold increase in survival.

Innovative approaches to AED dissemination have included the placing of AED's in drink vending machines as people will tend to congregate at them. The cost of the AED is primarily defrayed by revenue from the drinks machine, by sponsorship on the machine etc.

Another recent innovation has helped increase public access to AEDs; internet-based maps showing the location of AEDs have been produced for several cities in Japan. The maps can be magnified to display AED locations more precisely, and



even where the devices are situated inside buildings. Moreover, this information can be

accessed using a cellular phone, which if equipped with a global positioning system function, is able to guide the individual to the closest AED in the area.

Despite these innovations the use of AED's in witnessed cardiac arrests has still been low. There are still challenges such as lack of availability, especially in rural areas, lack of awareness of the use of AED's in the general community.

Issues of reluctance to perform CPR have attempted to be addressed by legislation which limits any liability, no matter what the outcome of the attempt. Training classes are run by local fire stations or the Red Cross but an important change to Japanese legislation means that training agencies have no liability.

Although Japan came late to AED's some of the innovative approaches could be used in the Western world

*This article was adapted from Public Access Defibrillation: Advances From Japan*

*Nat Clin Pract Cardiovasc Med. 2008;5(11):690-692 which was published in full on [www.medscape.com](http://www.medscape.com)*

## Sept/Oct edition Competition Answer

Congratulations to Anne Marie Galligan from South Infirmery Victoria University Hospital in Cork who submitted the answer which most came closest to that of our judges. She wins a copy of Ellenbogen's textbook, Cardiac Pacing and ICD's, courtesy of PEI agents for St Jude Medical Pacemakers and ICD's, EP systems and Angioseal arterial closure devices. Her solution to the tracing is below, if you have any comments or an alternative explanation do not hesitate to email us editor@isct.ie. Don't forget to enter the Christmas Crossword on the back page.



### The Solution

The patient has an ectopic atrial rhythm with a cycle length of 720mSec, it conducts 1:1 at first with a gradual increase in PR interval until the 4th beat of tachycardia blocks and conduction to the ventricle is then 2:1 until sinus rhythm resumes on the 6th QRS complex of the top strip.

On the second strip at 21:31, the patient is in sinus bradycardia with first degree AV block for the first 2 complexes, the same atrial ectopic rhythm recommences (p wave morphology and cycle length are the same as the first strip) with 2:1 conduction from the outset, as the first beat of the ectopic rhythm is superimposed on the t wave of the preceding sinus beat.

# Journal Scan

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## Downloadable Algorithm to Reduce Inappropriate Shocks Caused by Fractures of Implantable Cardioverter-Defibrillator Leads

Charles D. Swerdlow, MD; Bruce D. Gunderson, MS; Kevin T. Ousdigian, MS; Athula Abeyratne, PhD; Robert W. Stadler, PhD; Jeffrey M. Gillberg, MS; Amisha S. Patel, MS; Kenneth A. Ellenbogen, MD

**Background**—The primary method for monitoring implantable cardioverter-defibrillator lead integrity is periodic measurement of impedance. Sprint Fidelis leads are prone to pace-sense lead fractures, which commonly present as inappropriate shocks caused by oversensing.

**Methods and Results**—We developed and tested an algorithm to enhance early identification of lead fractures and to reduce inappropriate shocks. This lead-integrity algorithm, which can be downloaded into presently implanted implantable cardioverter-defibrillators, alerts the patient and/or physician when triggered by either oversensing or excessive increases in impedance. To reduce inappropriate shocks, the lead-integrity algorithm increases the number of intervals to detect (NID) ventricular fibrillation when triggered. The lead-integrity algorithm was tested on data from 15 970 patients with Fidelis leads (including 121 with clinically diagnosed fractures) and 95 other fractured leads confirmed by analysis of returned product. The effect of the NID on inappropriate shocks was tested in 92 patients with 927 shocks caused by lead fracture. Increasing the NID reduced inappropriate shocks ( $P < 0.0001$ ). The lead-integrity algorithm provided at least a 3-day warning of inappropriate shocks in 76% (95% CI, 66 to 84) of patients versus 55% (95% CI, 43 to 64) for optimal impedance monitoring ( $P < 0.007$ ). Its positive predictive value was 72% for lead fractures and 81% for lead fractures or header-connector problems requiring surgical intervention. The false-positive rate was 1 per 372 patient-years of monitoring.

**Conclusions**—A lead-integrity algorithm developed for download into existing implantable cardioverter-defibrillators increases short-term warning of inappropriate shocks in patients with lead fractures and reduces the likelihood of inappropriate shocks. It is the first downloadable RAMware to enhance the performance of nominally functioning implantable cardioverter-defibrillators and the first implantable cardioverter-defibrillator monitoring feature that triggers real-time changes in ventricular fibrillation detection parameters to reduce inappropriate shocks. (Circulation. 2008;118:000-000.)

### CLINICAL PERSPECTIVE (also taken from Circulation)

*Fractures of pace-sense electrodes in implantable cardioverter-defibrillator patients are a common cause of inappropriate shocks. These fractures result in high pacing impedance and oversensing of rapid, nonphysiological potentials. Despite automated, daily measurements of impedance to provide advance warning, their most common presentation is inappropriate shocks. We developed and tested an algorithm to enhance early identification of lead fractures and to reduce inappropriate shocks. This lead-integrity algorithm, which can be downloaded into presently implanted implantable cardioverter-defibrillators, alerts the patient and/or physician when triggered by either oversensing or abnormal impedance. Because oversensing associated with lead fracture typically is transient, we hypothesized that increasing the number of intervals to detect ventricular fibrillation reduces inappropriate shocks. Thus, the lead-integrity algorithm also increases the number of intervals to detect ventricular fibrillation when triggered. In a simulated retrospective analysis, the lead-integrity algorithm improved advance warning of lead fractures compared with present impedance monitoring. Its clinical value depends on rapid response to alerts by the patient and physician.*

*This lead-integrity algorithm is the first downloadable RAMware developed to enhance the performance of nominally functioning implantable cardioverter-defibrillators and is the first implantable cardioverter-defibrillator monitoring feature that triggers real-time changes in ventricular fibrillation detection parameters to reduce inappropriate shocks.*

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# Journal Scan

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## Echocardiographic and Clinical Risk Factors for Atrial Fibrillation in Hypertensive Patients With Ischemic Stroke

Jacob I. Haft, MD, Louis E. Teichholz, MD

Atrial fibrillation (AF) is a common cause of ischemic stroke. Because anticoagulation can prevent many of these strokes, identifying patients with occult intermittent AF is important. Hypertension is a common precursor of stroke and AF. Prolonged nonselective electrocardiographic monitoring of patients after ischemic stroke has yielded only a small number of patients with occult intermittent AF.

To determine the importance of AF in nonhemorrhagic stroke, we retrospectively studied 799 patients admitted with ischemic stroke over 31 months.

AF was present on the admitting electrocardiogram in 154 patients (19.3%), diagnosed later during the stroke admission in 58 (7.3%), and found only during another admission before/after the stroke admission in 46 (5.8%). AF was intermittent in 123 patients, 47.7% (95% CI 41.6 to 53.8) of patients with AF, and not present on initial electrocardiogram in 40.3% of patients with AF. In 633 patients with hypertension, AF occurred in 34.9% versus 22.2% without hypertension ( $p < 0.01$ ).

Echocardiogram revealed a left atrium  $\geq 4.0$  cm in 81.3% of patients with AF versus 42.4% of those without AF (odds ratio [OR] 5.85, 95% confidence interval [CI] 3.87 to 8.96,  $p < 0.001$ ); ejection fraction was  $< 50\%$  in 27.7% of patients with AF versus 12.6% of those without AF (OR 2.63, 95% CI 1.65 to 4.22,  $p < 0.001$ ); and the left ventricle was  $\geq 5.6$  cm in 13.8% in patients with AF versus 6.7% in those without AF (OR 2.21, 95% CI 1.61 to 3.04,  $p < 0.01$ ).

Clinically, congestive heart failure (31% vs 10.4%, OR 3.89, 95% CI 2.76 to 5.73) and coronary disease (31% vs 21.4%, OR 1.65, 95% CI 1.15 to 2.37) were present more often in patients with AF ( $p < 0.001$ ). Left ventricular hypertrophy, diastolic dysfunction, and diabetes were common in all hypertensive patients with stroke.

In conclusion, hypertensive patients with these risk factors should undergo prolonged electrocardiographic event monitoring to identify occult intermittent AF so measures can be taken to prevent a second stroke and possibly a first stroke.

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## The Safety of Definity and Optison for Ultrasound Image Enhancement: A Retrospective Analysis of 78,383 Administered Contrast Doses

Kevin Wei, MDa, Sharon L. Mulvagh, MDb, Lisa Carson, MSc, Ravin Davidoff, MDd, Ruvin Gabriel, MB, ChBe, Richard A. Grimm, DOe, Stephanie Wilson, MDf, Lorrie Fane, RDCSg, Charles A. Herzog, MDg, William A. Zoghbi, MD, FASEh, Rhonda Taylor, AS, RDCSi, Michael Farrar, MDi, Farooq A. Chaudhry, MDj, Thomas R. Porter, MDk, Waleed Irani, MD, FASEl, Roberto M. Lang, MD, FASEm

**Background** The purpose of this retrospective analysis was to define the incidence of severe adverse events after exposure to ultrasound contrast agents.

**Methods** Data between January 1, 2001, and September 30, 2007, were collected using invited responses to an on-line web-based questionnaire from 1 general and 12 cardiac ultrasound laboratories. During a period of  $4.5 \pm 2.4$  years, a total of 66,164 doses of Definity (Lantheus Medical Imaging, North Billerica, MA) and 12,219 doses of Optison (GE Healthcare, Buckinghamshire, UK) were administered, reflecting contrast use in 5% of transthoracic and 28% of stress echocardiographic procedures. More than 10,000 doses were given to critically ill patients in intensive care unit settings or to patients with acute chest pain of suspected cardiac origin. The median age of patients who received an ultrasound contrast agent was 60 years, 49% were male, and the mean body mass index was  $32 \pm 1.4$  g/m<sup>2</sup>.

**Results** Severe reactions that were considered “probably” related to an ultrasound contrast agent de-

# Journal Scan

veloped in 8 patients (0.01%), all of whom were outpatients, and 4 (0.006%) of these were consistent with anaphylactoid reactions. There were no deaths reported. All patients recovered with treatment. No serious events were seen in inpatients.

**Conclusion** This multicenter, retrospective analysis includes the largest number of doses of ultrasound contrast agents ever published and a large number of patients evaluated in a wide variety of settings, including the critically ill. It shows that these agents have a good safety profile in both cardiac and abdominal ultrasound applications. The incidence of severe adverse reactions to ultrasound contrast agents is no greater, and may be lower, than that reported for contrast agents commonly used in other cardiac imaging tests.

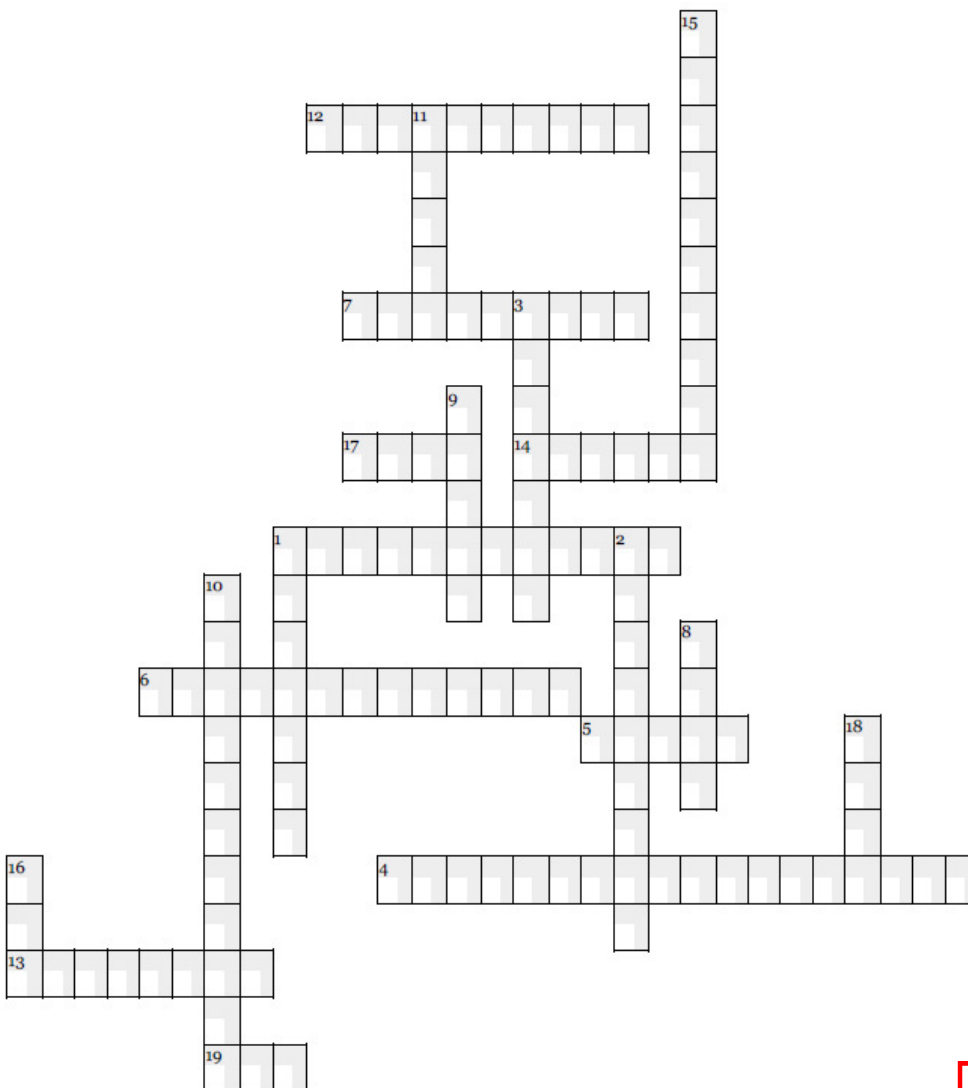
*Journal American Society of Echo*

## Enter the Christmas CrossWord to win Santa's Surprise

Do you or your department have what it takes to accept the challenge of the inaugural NewsPulse Christmas Cross-Word. Remember the answers for all clues relate to the world of cardiology (some answers may be in this edition) but beware of some cryptic mind teasers contained within. You can send your completed crosswords to

NEWSPULSE Christmas Crossword, c/o Paul Nolan, Cardiac Investigations, University Hospital Galway. Closing date for entries is January 15th.

*Happy Christmas to everyone from NewsPulse*



**Across:**

- 1. This inflammation can lead to global ST elevation (12)
- 4. A risk factor for stroke (6,12)
- 5. This stent is sent to tire us out (5)
- 6. Run fast to the truth....your lead may not last (6,7)
- 7. Justin Timberlakes' conduction abnormality? (9)
- 12. It comes before a fall.....and its not pride(10)
- 13. A period of relaxation (8)
- 14. The venue for the Irish Cardiac Society in 2008 (6)
- 17. Can you hear that test...again? (4)
- 19. In short, a tracing of the hearts activity(3)

**Down:**

- 2. Can produce ST depression during an EST(9)
- 3. A familial cause of sudden cardiac death (7)
- 1. Did this stringy ghoul make us question our measurements? (7)
- 8. In short, a way of imaging the coronary arteries (4)
- 9. This rhythm is stuck in the middle (5)
- 10. Could this be replaced percutaneously? (6,5)
- 11. This many types of quadricuspid aortic valve have been described (5)
- 15. The T in CT (10)
- 16. This guy is no empty vessel (3)
- 18. The Bundle branch block most associated with heart failure (4)