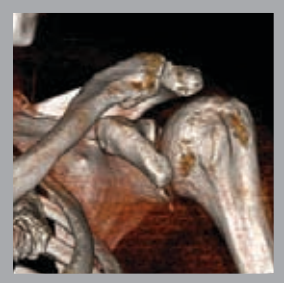


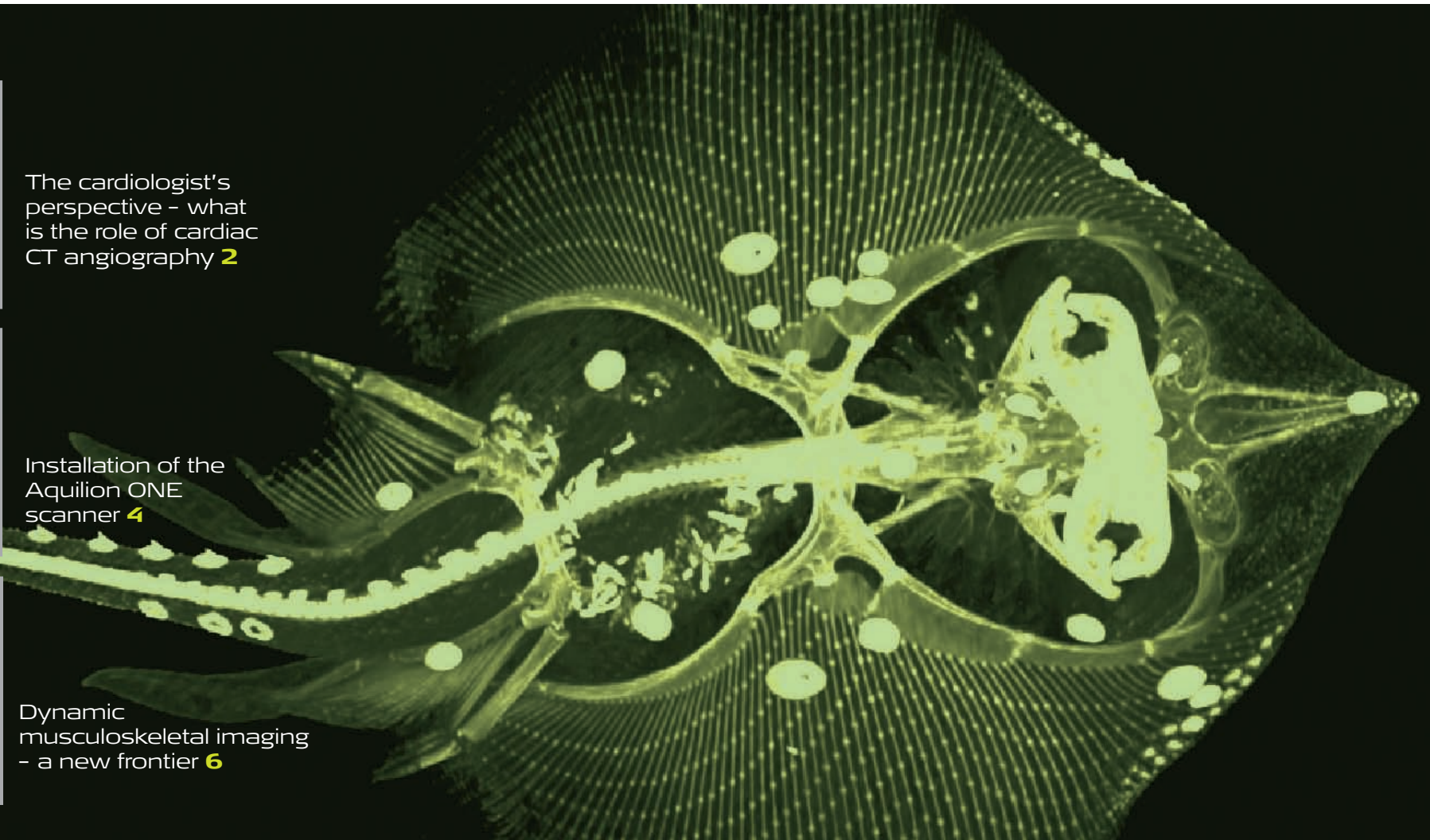
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europaean scanning centre

A NEW ERA IN DISEASE PREVENTION AND DETECTION

VISION

The European Scanning Centre Newsletter

Spring 2011 Edition

Welcome to this latest edition of Vision

It has certainly been a busy and exciting year for us since we installed our 640 slice CT scanner with increasing demand for scans, particularly for cardiac imaging. This has been boosted by the recent NICE guidelines recommending the use of CT angiography as the first line investigation for patients with chest pain and replacing the exercise stress test. In this issue, consultant cardiologist Dr Duncan Dymond gives his views as to the utility of CTA in clinical practice.

We have recently hosted two very successful symposiums: 'Discover Cardiology' and 'Advances in Musculoskeletal Imaging' at the Royal Society of Medicine. A selection of superb speakers gave an overview of topical issues in both fields to a packed house receiving unanimous tremendous positive feedback. All of the talks and further information about any of our services is available from our website www.europeanscanning.com.

The proposed NHS reforms herald one of the greatest shakeups in the history of the NHS. The formation of GP consortia and their ability to commission services from both the NHS and independent sector may usher in a new era of transparent competition with cost and patient satisfaction playing an important role in the delivery of higher quality services. Our innovative cardiac project with Bexley Care Trust offers a model for this, which has won widespread recognition and awards.

I wish you all a healthy and prosperous 2011.

Paul Jenkins, Medical Director

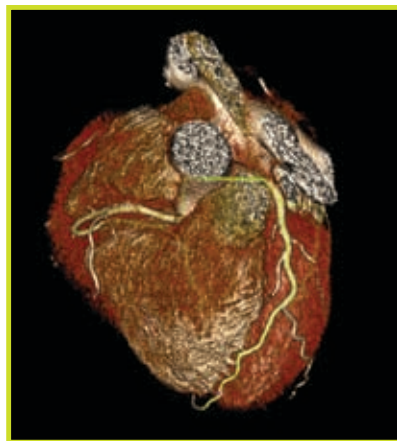
The cardiologist's perspective - what is the role of cardiac CT angiography

**Dr Duncan Dymond, MD FRCP
FACC FESC
Consultant Cardiologist, Barts
& The London NHS Trust
and 84 Harley Street**

The rapid evolution of multi slice CT technology with faster scanners and more slices has 'changed the game' as far as CT coronary angiography (CTA) goes in clinical practice and has been a major and exciting advance in cardiac imaging.

The strength of CTA is its relative ease with 'a walk-in walk-out' test. The test is no more invasive than a venipuncture for a blood test and with the ability to image the heart in one to two heart beats the radiation dose can be less than 1 milliSievert (mSv), equivalent to about 15 chest x-rays.

One of the obvious questions is – do we need a non invasive coronary angiogram? After all there are so many ways of 'excluding' coronary disease from a stress ECG to a nuclear or MRI perfusion scan to a stress echo. However, these



3D Image of heart showing coronary arteries

tests do not actually exclude coronary disease; they exclude myocardial ischaemia to a high level of sensitivity and specificity (apart from perhaps the stress ECG). None of these tests detail the coronary artery tree and, as there is no such thing as the perfect image, many of these conventional imaging tests are open to subjective interpretation. This is not to minimise their clinical utility as they are and will remain established investigations. Further, no matter how good the imaging technology, there is still a high prevalence of 'normal' coronary angiograms passing through most cardiac catheter laboratories, with the incidence varying from 12% up to 30%. This places an economic burden on the system, and where multiple or repeated angiograms are required, vascular access may become increasingly difficult. In addition, vascular tortuosity or anomalous coronary positions may preclude satisfactory imaging of an anomalous right coronary or an internal mammary artery graft for example. Finally, despite other imaging techniques, there is often a 'need to know'.

From the cardiologist's perspective the indications for cardiac CTA are:

- a) to investigate the native coronary circulation
- b) to study coronary bypass grafts and possibly intra coronary stents and
- c) what we rather loosely call 'problem solving'.

There is no doubt that it is relatively easy to recognise normal coronaries on a CT angiogram and the lower the calcium score the easier it is with sensitivity and specificity approaching 100% on the latest 640 slice scanners. It is therefore understandable that one of the main strengths of this technique has been to exclude coronary artery disease, particularly in patients with a low to medium likelihood of coronary obstruction. This would apply to patients with atypical chest pain and, for example those with an abnormal stress test (the bane of cardiologists' lives), but with a low to intermediate likelihood of coronary disease. Conversely, CT angiography would have no role to play in the investigation and treatment of a patient presenting with classical angina pectoris who clearly needs a conventional angiogram with a view to revascularisation.

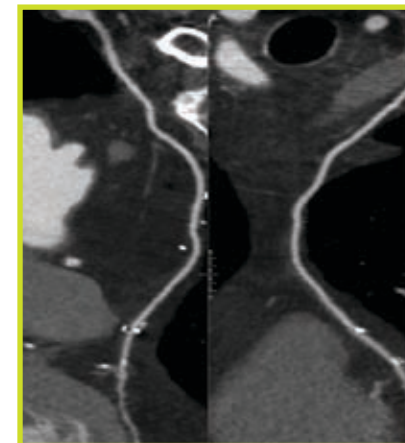
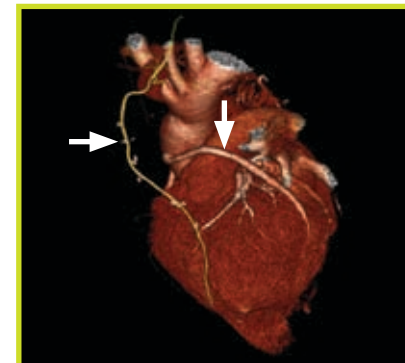
The advantage of the new Aquilion ONE 640 slice scanner over a conventional 64 multi slice CT scanner is the improved spatial resolution down to 0.3mm, the larger field of view that removes the step artefact, which can lead to head scratching about whether a lesion is or is not there, and the ability to image the heart so quickly with a minimal radiation burden.

It must be remembered however that patients with high coronary artery calcium scores will have less good images and it is true that heavily calcified coronaries significantly impair the sensitivity of the CT angiogram, although this is less of an issue with the Aquilion ONE.

NICE Guidelines

The National Institute for Clinical Excellence (NICE) has recently published guidelines on the management of chest pain. These recommendations are based on cost effectiveness (and this is not necessarily the same as clinical effectiveness), but they state quite sensibly that in patients with a typical history of angina, the need for any other test is not cost effective and similarly in patients who clearly do not have a history of ischaemic cardiac pain, the guidelines recommend that one trust one's clinical judgement and do not order diagnostic tests. The guidelines also state that in patients with a likelihood of coronary artery disease of less than 30%, calcium scoring and CT angiography should be carried out with the caveat that if the calcium score is more than 400, then the patient should have an invasive angiogram. For patients with an estimated prevalence of coronary disease between 30-60% they recommend functional imaging and confirmatory invasive angiography.

Although many practising cardiologists will disagree with these guidelines (do we really believe that a patient with a likelihood of less than 30% of clinical coronary disease but with a calcium score of more than 400 should have an invasive angiogram?), we can see how CT angiography is now finding its way into strategies designed to be cost effective in the management of chest pain. My own view is that in patients with a 30-60% likelihood of having



CTCA of a patient with grafts (arrows) showing no atheroma

ischaemic heart disease, CT angiography should be used more logically. For the investigation of coronary artery bypass grafts, including the left internal mammary, CT angiography is peerless among its imaging rivals. Because the bypass grafts do not move, it is nearly always possible to produce high quality images of the grafts and to assess their

patency as well as run off in many cases. There is an increasing body of evidence that early intervention on diseased grafts, even in the absence of symptoms, may lead to improved graft patency.

Although this has not been conclusively proven, it is still a strategy adopted by many interventionalists. CT angiography should be an excellent way of assessing this strategy and to add to the scientific literature on this topic. In cases where the vein grafts cannot be found in the catheter labs, or where the left internal mammary cannot be reached selectively because of very tortuous neck vessels, CT angiography can be performed to answer the question about patency.

Can intra-coronary stents be assessed with CT angiography as well? The answer currently is possibly, but although it is often clear when a stent is completely patent, because one can see the contrast flowing through and beyond the stent, I am not yet confident that we can assess in-stent re-stenosis sufficiently accurately and caution must be used here. However if a stent is completely



CTCA of a young diabetic with a calcium score of only 35 who had serious triple vessel coronary disease with significant soft plaque

occluded with no contrast flowing through, this is usually obvious on the images.

CT angiography is very useful where conventional angiography has failed to answer the question. This may be the case where coronary anomalies are present, where there is a coronary fistula or coronary aneurysm, or where the aortic root is very dilated when the coronary arteries can be difficult to find with conventional catheters. Of course in cases where there is a suspected aortic dissection or pulmonary embolism, CT angiography can prove or rule out the presence of a dissection or emboli.

Risk Stratification

Much has been written about the mass prescribing of statins for primary prevention and on the highly prevalent but unsatisfactory use of the treadmill test to 'rule out coronary disease'. There are no randomised trial data to support the use of treadmill testing in asymptomatic subjects whether it be for insurance medicals or well person screens. In fact the American Heart Association/American College of Cardiology Guidelines have actively discouraged the use of exercise testing as a screening modality for routine use simply because it will only detect coronary disease at an advanced stage and gives no information on the atheromatous process or the patient's risk.

The high prevalence of false positive stress tests has led to more patients than necessary being referred from rapid access chest pain clinics to have a coronary angiogram and generated more normal angiograms than there were before. The NICE

guidelines will hopefully lead to the increased use of CT angiography, the limitations of these guidelines notwithstanding. If one could remove most if not all normal coronary angiograms from the cardiac catheter labs, this would free up time for patients with high risk coronary syndromes to be investigated and be a more cost effective use of catheter lab time. CT angiography can certainly help achieve this.

However good invasive angiography may be for assessing stable or unstable advanced coronary disease, it is poor for detecting vulnerable minimally stenotic disease and CT angiography is the first non-invasive technique to allow a valuation, not only of the lumen but also of the vessel wall and allow for plaque characterisation. We have known from studies of intravascular ultrasound that a large number of arteries that appear normal on the invasive angiography actually have significant plaque burden, which one can see on intravascular ultrasound. It is now possible to do this non-invasively with CT angiography. Soft plaque, fibrous plaque and fibro-calcific plaque all have different radiological characteristics on CT.

Soft plaque appears as radiolucent non-calcified areas and fibro-calcific plaque appears as hot spots of calcification. Many plaques have mixed morphology and with the Aquilion ONE scanner it is now possible in many cases to see plaques with or without calcification and to say whether the plaque is predominantly soft (and therefore potentially vulnerable) or whether it is hard and calcified.

It is therefore true to say that CT angiography allows detection of atheroma earlier than conventional angiography and even if there is no obstruction, it offers the opportunity to intervene earlier in the course of disease with proven preventative measures such as statins. Extending from this is the challenge of sudden coronary death. Despite a continuing fall in coronary mortality (and recently published data from the Office of National Statistics confirm the dramatic fall), unheralded sudden coronary death remains a huge problem. 40% of deaths from acute myocardial infarction occur in the pre hospital phase and by definition most of these patients have not been identified as at risk either because they have never been assessed or they may have been misclassified by the current risk stratification criteria.

The identification of the vulnerable plaque in vivo is a true holy grail in cardiology. Vulnerable plaques

are soft, lipid rich and may be non obstructive and non calcified and may not be seen on a conventional angiogram. It has also been known for many years that most myocardial infarctions occur on the basis of non flow limiting unstable lesions, and not on the basis of tight calcified stenoses. This is an enormous and as yet untapped field for cardiovascular research. The challenges would be enormous. Would it really be possible to profile asymptomatic young people and look for soft plaque in enough numbers to make an impact on sudden coronary death? Future generations of cardiologists will have to at some stage face up to this challenge and try and identify those particularly young to middle aged males who have the highest risk of sudden cardiac death from coronary disease.

Coronary calcium scoring, which has now become such an established risk stratification tool, has certainly enabled us to refine statin therapy, but coronary artery calcification does have its limitations, particularly in the younger patient and even more so in the younger diabetic. In these patients a low calcium score can on its own can lead to a false sense of security.

It should be possible over coming years to draw up some guidelines for the appropriate use of both calcium scoring and CT angiography in asymptomatic patients to try and identify those who might be at risk from sudden death or myocardial infarction.

Other future developments for CT angiography include wall motion studies to identify areas of left ventricular damage and scarring, and one of the most exciting areas is the possibility of assessing myocardial perfusion as the contrast passes through the left ventricular myocardium. The ability to look at coronary anatomy and myocardial perfusion with one injection of contrast would be a major advance in CT angiography.

Conclusions

Cardiac CT has now moved well away from merely being a research tool to a clinically invaluable application. It is highly likely to become the non-invasive investigation of choice in many cases and the indications for high resolution CT coronary angiography are likely to snowball in years to come. Its role will be further enhanced by the promise of plaque characterisation and myocardial perfusion using high resolution, low radiation scanners such as the Aquilion ONE scanner.

'Cardiac CT has now moved well away from merely being a research tool to a clinically invaluable application'



CTCA of stent within left anterior descending coronary artery demonstrating almost complete occlusion (arrow)

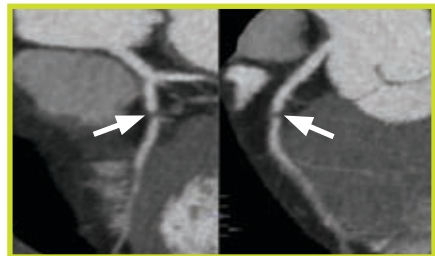


Image of soft plaque

Installation of the Aquilion ONE scanner

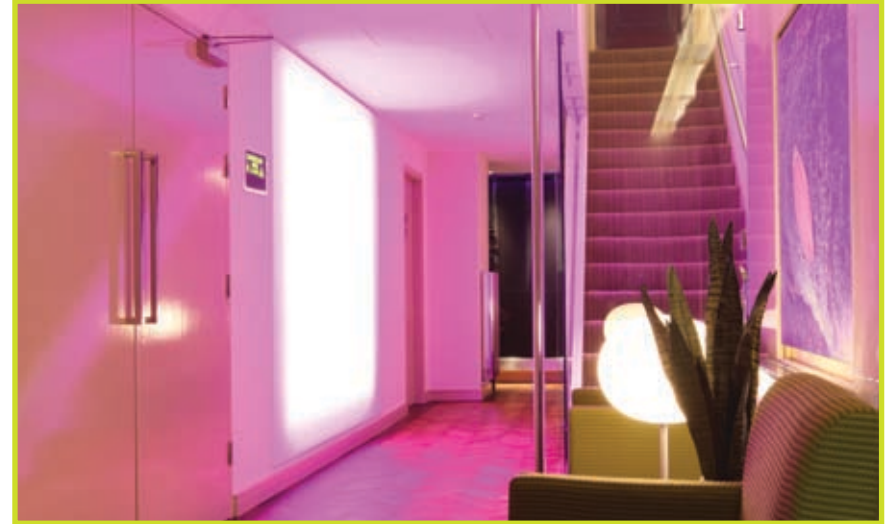
'it is regarded by Toshiba as their most advanced installation worldwide'

Installing a bulky 4 tonne scanner into the rear basement of a Georgian five story terraced building creates considerable logistical issues. Having been allotted just two possible Sundays by Westminster Council when we could close down Harley Street for the giant crane, we looked anxiously at the weather forecasts.

The first weekend was a complete washout and the heavy storms forecast for the next were not promising. Fortunately, a window of calm weather offered the chance to go for it and the massive crane slowly manoeuvred itself into position and lifting commenced. The various component parts of the scanner were strapped up, lifted high over the building and down into a narrow courtyard before being wheeled through a dismantled wall into the scanner room. As the wind got



up and the crane started to sway more and more, it became touch and go as to whether we would complete all of the lifts; our pleas to the crane operator paid off and the last part was lifted just as the storm broke. Once in position the combined skills and experience of our interior designer (Hugh Berry Interiors), architect (Richard Mitzman Architects) and builders (Modus) fulfilled their brief to create a modern but relaxing environment far removed from a typical scan room and indeed it is regarded by Toshiba as their most advanced installation worldwide. Most patients liken it to a spa rather than a medical establishment with the changing LED lights, relaxing music and water features.



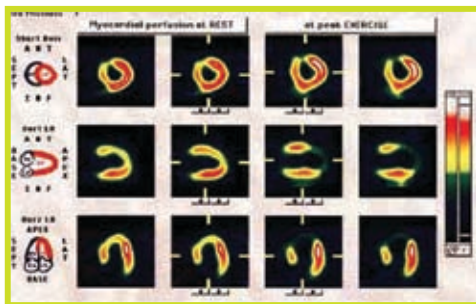
Happy 1st Birthday!

On 13th January this year we hosted a first birthday party for the Aquilion ONE scanner to celebrate one year of scanning on the new machine. The champagne flowed as over 100 guests tucked into a variety of gourmet pies and mash followed by a selection of delicious mini cupcakes in our newly refurbished surroundings. Those who had not yet seen the scanner had the chance to look around and chat with members of our team, as they enjoyed the delicious food and party atmosphere. We are delighted that so many of you were able to join us for the celebrations on what turned out to be a very cold and wet January evening. A great time was had by all and we look forward to seeing you at future events.

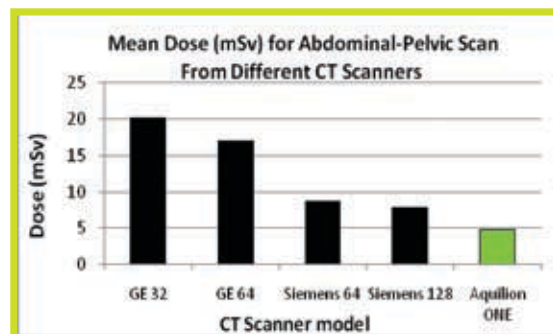


Cardiac perfusion

In keeping with our position as Toshiba's UK reference centre, the ESC is the first centre in England to receive the cardiac CT perfusion software. We are currently optimising this but envisage it will be available for clinical use in the next couple of months. It promises to be a major advance in cardiac imaging and is unique to the Aquilion ONE scanner utilising its 16 cm coverage in one rotation. It offers the possibility of a one-stop centre for the investigation of chest pain as an alternative to nuclear perfusion studies, but with the significant advantages of being much quicker and at a greatly reduced radiation dose.



Aquilion ONE scanner delivers lowest radiation dose



The issue of radiation exposure to patients during routine CT examinations is rightly gaining increasing awareness. Different CT scanner manufacturers all claim their machines deliver low doses but these figures are usually based on patients with ideal body mass or phantoms. We performed an audit of radiation doses for consecutive patients undergoing abdominal-pelvic scans in a number of central London institutions. The doses were obtained from the different scanner consoles and reflect the reality of clinical practice. There was a significant variation in the dose with our Aquilion ONE scanner delivering the lowest dose.

New ESC staff

Due to our expanding business, we are delighted to welcome two new members of staff to the team. **Sarah Maffrett** joins us as a senior radiographer and will complement our existing team. Sarah has recently returned from several years in Australia and will bring a sense of antipodean adventure to the centre, while **Lisa Pointing** joins our reception team, having previously worked in a busy North London GP surgery.

We are also delighted to welcome **Dr George Koulaouzidis** who will be commencing a 3 year PhD research program. George will also be supervised by Prof Michael Henein, Consultant Cardiologist at The Heart Centre of Umea University Hospital, Sweden.



Dr George Koulaouzidis



Lisa Pointing



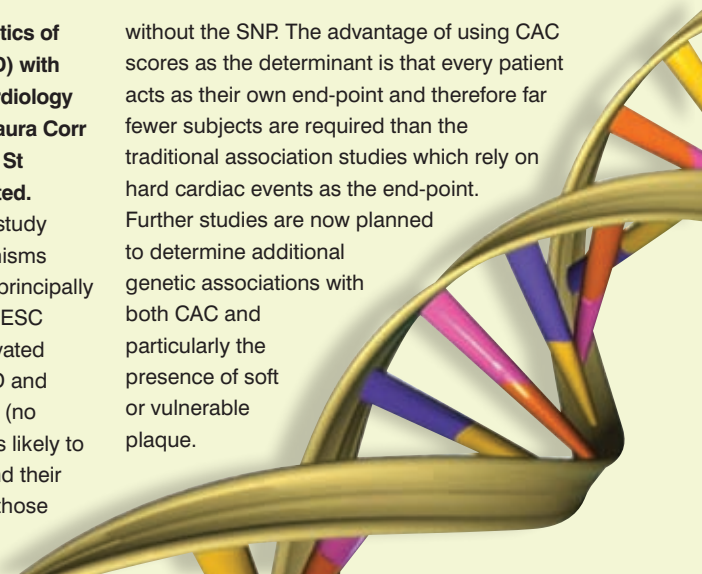
Sarah Maffrett

GENCAD study

Our initial collaboration into the Genetics of Coronary Artery Deposition (GENCAD) with Prof Nilesh Samani, BHF Chair of Cardiology at Leicester Medical School and Dr Laura Corr (Consultant Cardiologist at Guys and St Thomas's) has recently been completed.

Involving more than 500 patients, the study analysed the prevalence of polymorphisms (SNPs) previously implicated in CHD, principally chromosome 9 q3.1, in two groups of ESC patients: younger patients with an elevated calcium (CAC) score indicative of CHD and older patients with a zero or low score (no CHD). Patients with CAC were twice as likely to be homozygous for the 9 q3.1 SNP and their CAC score was over twice as high as those

without the SNP. The advantage of using CAC scores as the determinant is that every patient acts as their own end-point and therefore far fewer subjects are required than the traditional association studies which rely on hard cardiac events as the end-point. Further studies are now planned to determine additional genetic associations with both CAC and particularly the presence of soft or vulnerable plaque.



NICE guidelines for chest pain

The recently published NICE guidelines for the investigation of patients with stable chest pain have given significant impetus to the routine use of CT coronary angiography (CTA).

The committee, chaired by Professor Adam Timmis from The London Chest Hospital, has recommended that after 50 years of use and the bane of many an SHO, the exercise stress test be constrained to the scrap heap. Instead, more emphasis should be placed on clinical suspicion and for patients with a low-intermediate probability of CHD the first line investigation should be a calcium score measurement and CT angiogram.



Speaking at the ESC sponsored 'Discover Cardiology' symposium at the Royal Society of Medicine Professor Timmis admitted that the guidelines were a work in progress partly due to the current paucity of CT scanners capable of performing high quality CTAs, but he hoped that the situation would gradually improve.

Full details of his talk are available at www.europeanscanning.com

Dynamic musculoskeletal imaging - a new frontier

Tony McArthur

Superintendent Radiographer,
European Scanning Centre

'The fact is that the capabilities of this scanner are so new and far-reaching that a complete reassessment of imaging strategies for musculoskeletal and spinal pathology is required'

Computed Tomography (or CT scanning) was one of the most significant medical advances of the last century. For the first time it allowed an insight into internal disease processes and was a powerful engine behind many advances in medical care.

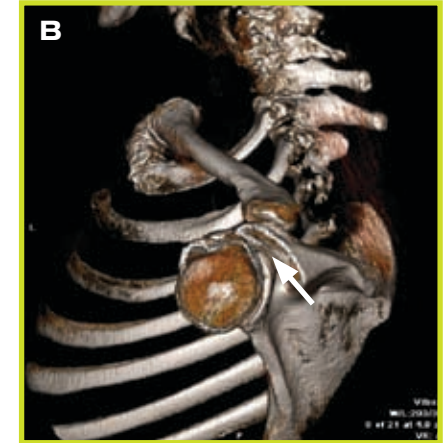
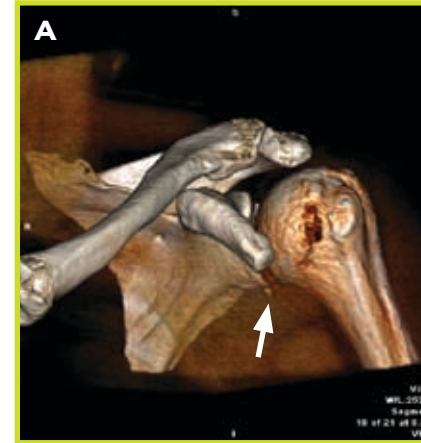
Since its introduction in the 1970's, the development of CT scanning has been a fairly predictable linear process mainly dictated by increasing the amount of computing power. The main advance came from the introduction of helical or spiral scanning where the patient table motored through a continually rotating CT tube to produce a 'spiral' of data rather than consecutive slices. However, 2 years ago Toshiba introduced a radical new detector technology that has resulted in a significant jump in the development profile of CT. The Aquilion One CT scanner collects not just 32 or 64 slices at a time but a complete volume equivalent to 640 slices distributed across a 16 cm section of the body. There are many

advantages to this arrangement but in the context of musculoskeletal (MSK) imaging, the most important one is the ability to scan a significant volume of the patient in real time WITHOUT table movement. The practical upshot of this is that the patient can move an affected part within the imaging volume to create a real time 3D CT

Advantages of dynamic CT musculoskeletal imaging

- Allows real time visualisation of complex interaction between activators and stabilisers
- Painful movements and/or specific position can be recreated
- Gravity and/or load can be added
- Advanced workstation allows complex interrogation of data

'fluoroscopic' image that can be interrogated on a workstation. The ability to image painful joint movements in 3D real time has been a holy grail of MSK imaging in the continuing search to be relevant to real time clinical examination of the patient. The addition of intravenous contrast allows for unrivalled detection of vascular supply of soft tissue and bone tumours, work that is being developed by another Aquilion group



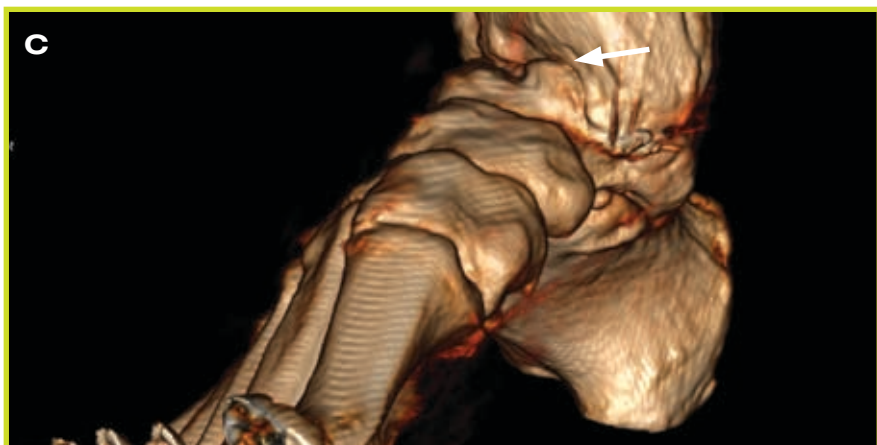
Still image from volume rendered dynamic CT scan through the shoulder of a 56 year old man with shoulder pain after an ice skating injury. X-ray and MRI had been negative. [A]: small bone fragment from inferior glenoid, probably secondary to tear of inferior labrum. [B] lateral view at 90° abduction showing impingement of humeral head on inferior surface of acromion process.

MSK conditions suitable for dynamic CT imaging

- Atlanto-axial instability
- Cervical facet motion
- Subacromial shoulder impingement
- Glenohumeral instability
- Sternoclavicular joint motion
- Pars defect movement
- Lumbar fusion stability
- Femoroacetabular impingement
- Carpal instability patterns
- Scaphoid fracture healing
- Fracture stability
- Sacroiliac stability
- Patellar tracking
- Meniscal stability
- Tibio-fibular and ankle stability

in Nancy, France. The fact is that the capabilities of this scanner are so new and far-reaching that a complete reassessment of imaging strategies for musculoskeletal

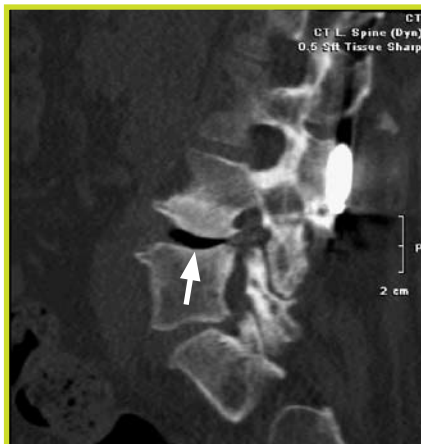
and spinal pathology is required. Further, because the scanning capability is real time, it is truly representative of the physiological situation. This also means that a much



Sagittal CT of the right ankle of 44 year old man with chronic ankle pain after a previous skiing fracture demonstrating [A] on extension views, a small spur on superior surface of talus, which [B] and [C] dynamic flexion imaging demonstrated to impinge on inferior aspect of distal tibia.



A 48 year old man with chronic back pain despite vertebral fusion. Previous static X-rays and MRI had shown no abnormality. CT scan in the neutral position [A] demonstrates a pars fracture of L5 but with good alignment. However, full flexion views [B], which replicated the pain, demonstrated posterior movement of the pars fracture.



Dynamic CT spine of a 42 year old lady with 30 year history of Harrington Rod fusion of T/L spine but with chronic lower back pain. Dynamic flexion and extension views confirmed stability of fused vertebrae from L3 upwards but hypermobility of L4/5 and L5/S1 with significant rocking on anterior border of the degenerate disc spaces resulting in a hollered out appearance and vacuum phenomenon of disc space.

closer clinical correlation is required as the scanner can replicate clinical tests.

For example, it would be possible to perform tests like the McMurray's test with intra-articular contrast in the knee to evaluate the nature of abnormal meniscal movement. The possibilities are endless and potential referrers are encouraged to come and see the scanner for themselves so that the best use of it for patients can be developed in a collaborative atmosphere.

StreamRad partners with ESC



StreamRad is a rising player in the field of teleradiology. The product it uses is called InstaRad, which enables secure and quick remote viewing of patients' images.

We are delighted to partner with StreamRad, to offer our referring clinicians and radiologists the opportunity to remotely view their patients' scans, with full diagnostic quality, on their own computers. Images can be viewed without the need for large bandwidths and even on laptops with dongles or I pads.

It promises to abolish the need for cumbersome CDs and eventually paper reports, allowing clinicians to demonstrate images to the patients quickly and easily. For those interested in learning more about this, please contact our IT manager Chris Salek, christopher.salek@europeanscanning.com who will be able to set up your computer system and issue you with the necessary password.



ESC wins top prize at Health Service Journal Awards and singled out for top award by Secretary of State

It was our partnership with Bexley Care Trust, which put in place a scheme allowing patients referred to Bexley's community based Rapid Access Chest Pain Clinic (RACPC) to travel to the ESC to undergo a CT coronary angiogram with the Aquilion ONE CT scanner as their sole investigation. This non-invasive investigation costs less than half of that for the usual battery of tests RACPC patients undergo, and takes a fraction of the time. Patients not only benefit from a far shorter waiting time, but their diagnosis is swift and more accurate than ever before meaning that their treatment can start weeks earlier than they can expect with the 'normal' service.

The project scooped three awards at the recent Health Service Journal (HSJ) awards: Acute and Primary Care Innovation of the Year, the Patient-Centred Care Award and finally, the Secretary of State for Health's Award for Excellence in Healthcare Management. Consultant cardiologist Dr David Brennand-Roper who leads the service said: "These awards are a fantastic recognition of the benefits of this project, which presents an innovative way of assessing patients with chest pain. This system means we have a much greater chance of getting the



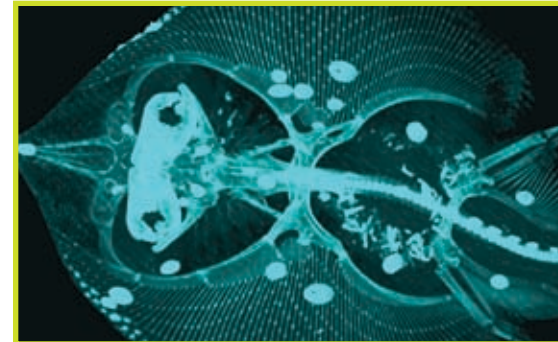
Left to right: Dr David Brennand-Roper (Consultant Cardiologist), Dr Kosta Manis (lead Cardiology GP in Bexley), Dr Jo Medhurst (Director of Clinical Redesign & Governance), Jon Hanlon (Communications Manager), Andrew Honeyman (Physiological Measurements Ltd), Dr Paul Jenkins (ESC), David Parkins (Chair of Professional Executive Committee) Clare Ross (Assistant Director of Community Transformations) and Jeremy Vine (Awards presenter).

diagnosis right first time and avoiding unnecessary invasive angiograms and other less accurate tests."

With the focus on delivering innovative healthcare services now shifting firmly to GPs, the partnership between the ESC and Bexley clearly demonstrates the huge opportunities to deliver first class services at a local level, and cost-efficiently, particularly where private and public health organisations work closely together.

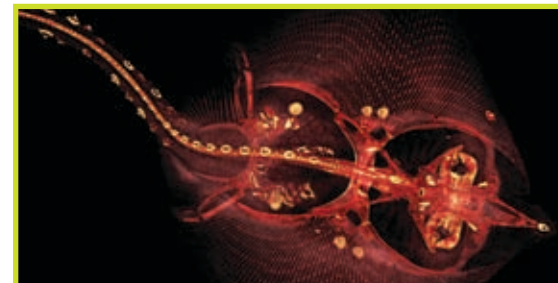
The project also recently won the prestigious National Association of Primary Care 'Vision' 2010 Award for best service redesign in the NHS.

Radiology College Artist works with ESC



Transforming CT images into art is not something that is our usual practice. However, that is exactly what Hugh Tovey, the official artist in residence at the Royal College of Radiology has started to do.

Having heard of the unique capabilities of our Aquilion ONE scanner and having access to specimens from The London Aquarium, Hugh is collaborating with us to bring a new dimension to some of our images. His first studies of a ray and a shark produced interesting challenges in scanning protocol, not least in fitting them into the scanner. However, the results are dramatic and we look forward to his further studies.



Aquilion ONE 640 slice CT scans

- Abdominal
- Angiography (abdominal, carotid artery, cerebral, coronary, peripheral, pulmonary & renal)
- Brian
- Chest
- Dynamic musculoskeletal imaging
- Pelvis
- Renal tract
- Sinuses
- Spine
- Virtual colonoscopy

Electron Beam Computed Tomography (EBCT)

- Bone mineral density
- Heart scan (coronary artery calcium score)

Ultrasound

- Abdomen & Pelvis
- Abdominal aorta
- Breast
- Carotid Doppler
- Chest wall
- Echocardiography
- Female reproductive
- Finger
- Gallbladder (static & dynamic)
- Leg veins
- Neck
- Penile Doppler
- Post micturition bladder
- Prostate (trans-abdominal & trans-rectal)
- Renal artery
- Renal tract
- Urinary flow rate measurement
- Testes
- Thyroid Gland

We offer a complete MRI and X-ray service