



North West London Cardiac Network

**NORTH WEST LONDON CARDIAC NETWORK  
SUMMARY PAPER:  
STRESS FUNCTIONAL IMAGING ANALYSIS  
& RECOMMENDATIONS**

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<b>Author:</b>	<b>Jinty Wilson, Assistant Director North West London Cardiac Network</b>
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### EXECUTIVE SUMMARY

The North West London Cardiac Network brings together clinicians, other professionals and managers from NHS organisations across North West London to work together to ensure equal access to services and the overall improved outcomes for cardiac patients. The Network spans 8 Primary Care Trusts and 8 Acute Hospital Trusts, serving an ethnically and culturally diverse total population estimated at 4.2 million, of which the resident population of NW London is approximately 1.9 million.

Coronary artery disease (CAD) including angina and myocardial infarction, is an increasing health problem: it may be associated with a reduced quality of life and adverse prognosis. CAD patients are major consumers of NHS services and efficient processes in the diagnosis of CAD is important.

In 2006 the Network Imaging task-group undertook a retrospective study of elective diagnostic imaging activity across NW London. Data for the period (2005-6 activity) was collected and analysed. Overall the study scoped activity by centre and compared non-invasive stress functional imaging activity against angiography and revascularisation rates. Key priorities initially identified by the study included: data quality and coding issues; low adherence to existing guidelines recommending the use of stress functional imaging techniques; and lengthy waits for diagnostic tests. On a positive note, the study revealed higher than expected access to stress functional imaging facilities for patients.

Further analyses in the report, considers the cost- and clinical benefits of increased use of existing stress functional imaging capacity within NW London, in line with current guidance. Details of the study undertaken, findings and conclusions follow, together with recommendations for commissioners.

Recommendations arising from the study endorse an increased use of existing stress functional imaging services available within NW London, based on:

- Implementation of robust methods of auditing the use of imaging tests.
- Adherence to current guidelines on the use of stress functional imaging tests, which are supported by evidence of clinical- and cost-effectiveness.
- Integration of quality into all aspects of stress functional imaging, including implementation of local quality assurance schemes.
- Maintenance of short waiting times for cardiac diagnostic tests.
- Ensured fairness of commissioning arrangements i.e. that do not penalise appropriate use.

## 1. BACKGROUND

The North West London Cardiac Network (NWLCN) brings together clinicians, other professionals and managers from NHS organisations across North West London (NWL) to work together to ensure equal access to services and the overall improved outcomes for cardiac patients. The network serves an ethnically and culturally diverse resident population of approximately 1.9 million, spanning 8 Primary Care Trusts (PCTs) and 8 Acute Hospital Trusts providing cardiac services across 11 hospital sites. Out of sector populations also being referred to NWL tertiary cardiac centres of approximately 2.4 million brings the total population served to 4.2 million.

In 2006 a task-group of the Cardiac Network was established to assess current provision and to recommend a preferred model for providing diagnostic stress functional imaging as both a clinical- and cost-effective mechanism for the prompt diagnosis of coronary artery disease (CAD). CAD including angina and myocardial infarction, is an increasing health problem: it may be associated with a reduced quality of life and adverse prognosis, and CAD patients are major consumers of health service resources.

This paper sets out the results of a retrospective assessment undertaken by the Imaging task group, of elective diagnostic imaging activity undertaken in NW London hospitals over a year (2005-6), together with a cost/clinical-benefit analysis and recommendations.

## 2. INTRODUCTION

By way of introduction, details of a number of CAD diagnostic imaging options in use within NW London hospitals, follow.

**Coronary Angiography (CAG)** is considered the 'gold standard' for defining the site and severity of coronary artery lesions in the diagnosis of coronary artery disease. It involves manipulation of a cardiac catheter into the heart from a vein or artery in a limb and, using a contrast medium injected through the catheter, is monitored by a rapid series of x-rays. CAG measures the degree of stenosis (blockages restricting blood flow) and provides mainly anatomical information. CAG findings are not always a reliable indicator of the functional significance of a coronary stenosis<sup>1</sup>. A national tariff applies for CAG activity.

Patients with suspected CAD could benefit from some form of non-invasive imaging prior to or in place of coronary angiography. Non-invasive techniques recommended by NICE (National Institute of Clinical Excellence) include myocardial perfusion scintigraphy (MPS) and echocardiography, among others.

**Stress Echocardiography (sEcho)** Recent advances in image acquisition, digital display and development of harmonic and contrast imaging has resulted in sEcho becoming a robust and reliable technique in the diagnosis of suspected CAD, as well as providing accurate risk stratification of patients with suspected and established CAD<sup>2</sup>.

The stress Echo test combines an echocardiogram (cardiac ultrasound) with a stress test (commonly using Dobutamine - an agent similar to adrenaline) to assess left ventricular function at rest and under stress. Stress induced abnormalities indicate the presence of a coronary narrowing. sEcho allows simultaneous assessment of myocardial function and perfusion. The cost of sEcho activity currently falls within nationally set Health Resource Group (HRG) tariffs for a 1<sup>st</sup> outpatient appointment.

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<sup>1</sup> NICE Technology Appraisal Guidance 73, Myocardial perfusion scintigraphy for the diagnosis and management of angina and myocardial infarction, Issue date: November 2003, Review date: November 2006.

<sup>2</sup> Senior R, Stress Echocardiography Today: current application. North West London Hospitals NHS Trust: 2007

**Coronary Computed Tomography (CT)** scanning is an evolving non-invasive technique used to detect calcification of the coronary arteries and to image the lumen of the coronary arteries. As calcification is usually present in patients who have CAD, this scan allows a quick and precise way to detect disease (over 95% certainty)<sup>3</sup> through negative predictive value. As this technique is still evolving, expertise is not widespread and indications for its use are still developing.

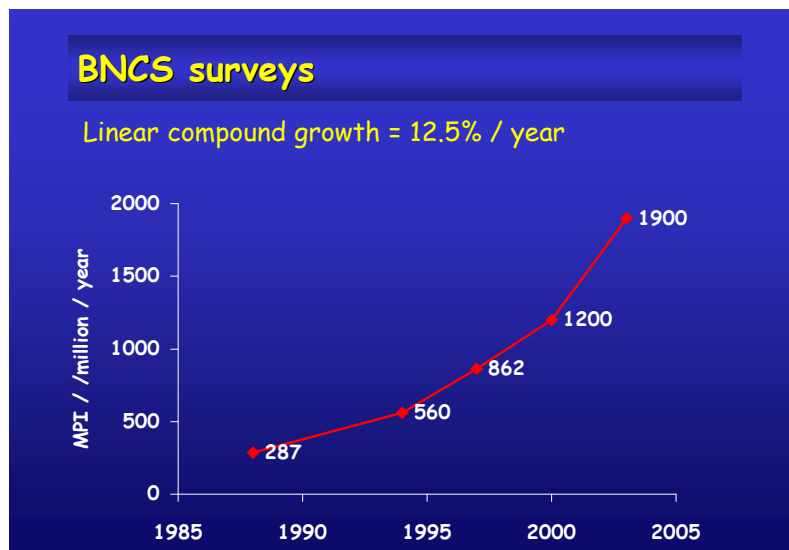
**Cardiac Magnetic Resonance Imaging (CMRi)** is a non-invasive diagnostic test which has been found to be superior to sEcho for the diagnosis of CAD, but only among patients with suboptimal echo imaging<sup>4</sup>. Limitations in image quality have been largely resolved by harmonic imaging. Both CT and CMRi activity is subject to local tariff.

**Myocardial Perfusion Scintigraphy (MPS)** is recommended as an initial diagnostic tool for people with suspected CAD for whom stress electrocardiography poses particular problems of poor sensitivity or difficulties in interpretation. This includes patients with cardiac conduction defects (e.g. left bundle branch block), or who would experience difficulty with treadmill exercise (sECG).

MPS has been used in the investigation of patients with known or suspected CAD for more than two decades<sup>5</sup>. It is a non-invasive method of imaging the myocardium, using a gamma camera and a small amount of radioactive tracer, to assess the coronary function and depict the distribution of nutritional blood flow to the myocardium. MPS also provides anatomical analysis – diagnosing CAD through the presence of critical coronary artery stenosis, providing prognostic information on long-term outcomes, stratifying patient risk<sup>6</sup> and assessing viable and hibernating myocardium after infarction.

A technology appraisal of MPS, reviewed again by NICE in September 2006, had positive findings. NICE recommends single photon emission computed tomography (SPECT) - a nuclear imaging technique, which is similar to conventional nuclear medicine planar imaging but provides true 3D information (typically presented as cross-sectional images). Indicative HRG tariffs for MPS activity have recently been introduced.

Figure 1



<sup>3</sup> Lim E, Lahiri A – Outline Proposal and Cost Analysis for the Assessment of Patients with Chest Pain by Cardiac CT and selective Myocardial Perfusion Imaging (MPI) – confidential draft – 2006.

<sup>4</sup> Senior R, Stress Echocardiography – Current status, European Cardiology – Business briefing (2005) (<http://www.touchbriefings.com/pdf/1231/senior.pdf>)

<sup>5</sup> A D Kelion, *Heart* 2005;91(suppl\_4):iv6-iv14; doi:10.1136/hrt.2005.060178 © 2005 by BMJ Publishing Group Ltd & British Cardiovascular Society

<sup>6</sup> Cerqueira MD. Nuclear Cardiology. Boston: Blackwell Scientific Publications (1994)

Steady growth in uptake of nuclear cardiology has been seen nationally, as outlined by the British Nuclear Cardiology Society (Figure 1). However, an implication of the NICE appraisal is that there ought to be a further twofold increase in the provision of nuclear cardiology in England and Wales, with an estimated overall capital cost of £18 million and an annual revenue cost, once steady state is achieved, of £27 million<sup>7</sup>.

This led the Imaging task-group to undertake a sector-wide study. Among the first of its kind, the study aimed to assess: existing provision of cardiac diagnostic imaging services across NW London (including minimum competence levels in some cases); gatekeeper ratios leading to revascularisation; and to make recommendations on the findings.

### 3. METHOD

In 2006, the NWLCN undertook a retrospective (2005-6) data collection exercise of elective diagnostic and revascularisation activity across NW London. Hospital activity data for the study period was collected within each Trust (manually at times). Diagnostic data collected during the study included:

- exercise tolerance tests (sECG)
- stress Echo (sEcho)
- coronary CT
- cardiac MRI (CMR)
- MPS - using radioactive tracers including *thallium*, *tetrofosmin* and *MIBI*;
- coronary angiography (CAG)

Radionuclide ventriculography (RNV or MUGA) activity was not counted in this study.

Initial analysis of the data compared hospital elective diagnostic activity against revascularisation rates for the period (April 2005 – March 2006 inclusive). A subsequent analysis of 'normal' angiography rates within NW London centres was conducted.

A number of assumptions were made based on the data collected, as follows:

- The study assumed a population base of 4.2million (NWL resident community of 1.9m + 2.3m non-NWL population).
- sECG data is assumed to be underestimated as actual inpatient diagnostic activity is not recorded by all Trusts.
- The split between NW London and non-NWL diagnostic activity is not consistently recorded. All activity for sECG and sEcho is attributed to NW London for this study, on the assumption that it is commonly provided by referring hospitals.
- Elective query-proceed activity is coded as primary angioplasty (PCI). It is assumed that 67% of PCI cases are preceded by a CAG, across all centres except RBH (5%).
- Data for stress functional imaging and CMR is assumed to include research activity.
- All private patient activity is excluded from this analysis.

### 4. FINDINGS

#### 4.1 Data quality

The study has highlighted difficulties with the reliability of the data capture processes in place in some NW London hospitals, and the poor utilisation of electronic data collection mechanisms in some diagnostic centres to capture robust activity data on a regular basis. Under Payment by Results (PbR) commissioning arrangements, it is assumed that each diagnostic centre should record accurate activity data by:

- Elective/Non-elective
- Inpatient/Outpatient
- NW London vs non-NWL activity.

<sup>7</sup> NICE Technology Appraisal Guidance 73. Myocardial perfusion scintigraphy for the diagnosis and management of angina and myocardial infarction, Issue date: November 2003, Review date: November 2006 ([www.NICE.org.uk](http://www.NICE.org.uk))

Poor coding of activity is also highlighted in the study. Whilst it's acknowledged that this is probably the result of general data quality issues, under PbR commissioning arrangements the accurate coding of activity is essential.

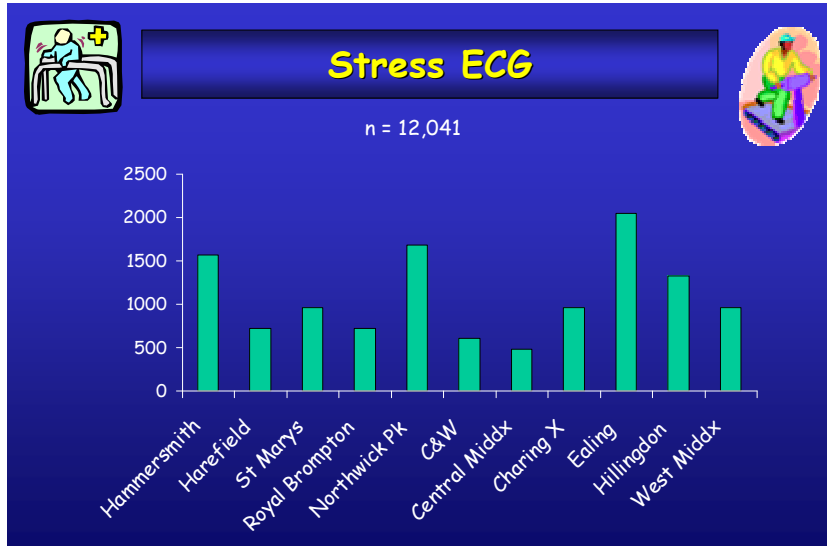
#### 4.2 Scope of service provision across NW London

Results of the scope of service provision across the sector are shown as follows:

##### Exercise Tolerance Tests (sECG)

sECG is used in all NW London hospitals. An inexpensive test, sECG is usually the first step in the diagnostic process. Total sECG activity during the study period amounts to **12,041**. (This is assumed to be an underestimate of true activity.)

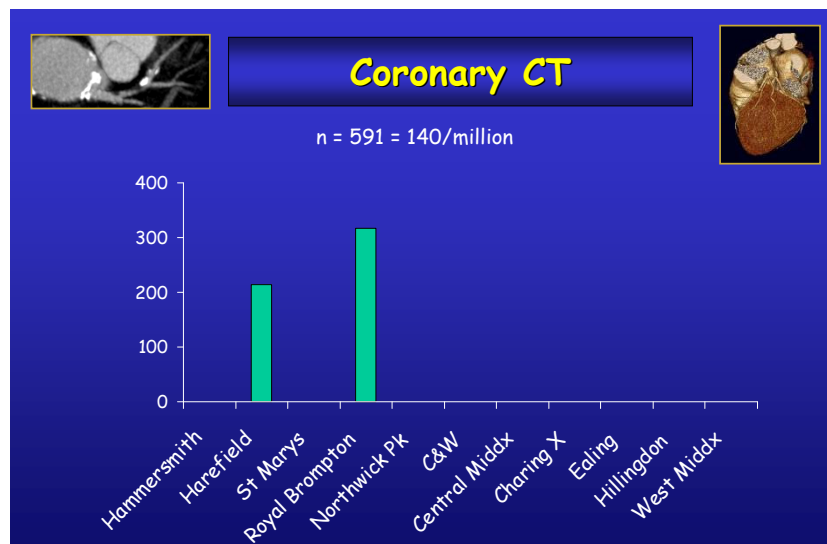
Figure 2



##### Coronary CT Scanning

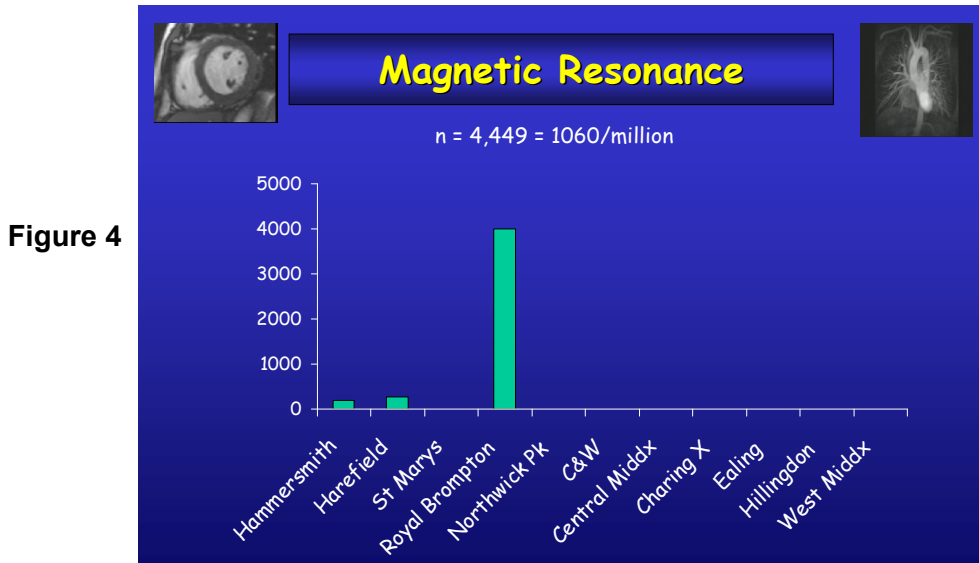
Within the sector, coronary CT scans are offered at two specialist centres within one Trust. The total activity for the year is **591**. (Subsequent to this study, new 64-channel CT scanning equipment has been installed at Royal Brompton & Harefield and St Mary's NHS Trusts, and is anticipated to have significantly increased CT activity.)

Figure 3



### Cardiac Magnetic Resonance Imaging (CMRi)

CMRi is offered at three centres across NW London with total activity of **4,449**, including research activity. Nagel et al found CMRi to be superior to sEcho for the diagnosis of CAD, but only among patients with suboptimal echo imaging<sup>8</sup>.



### Stress Echocardiography (sEcho)

Stress echo is offered in nine hospitals, with a total activity of **1,961** for the study period (understood to be significantly underestimated, due to inaccurate coding).



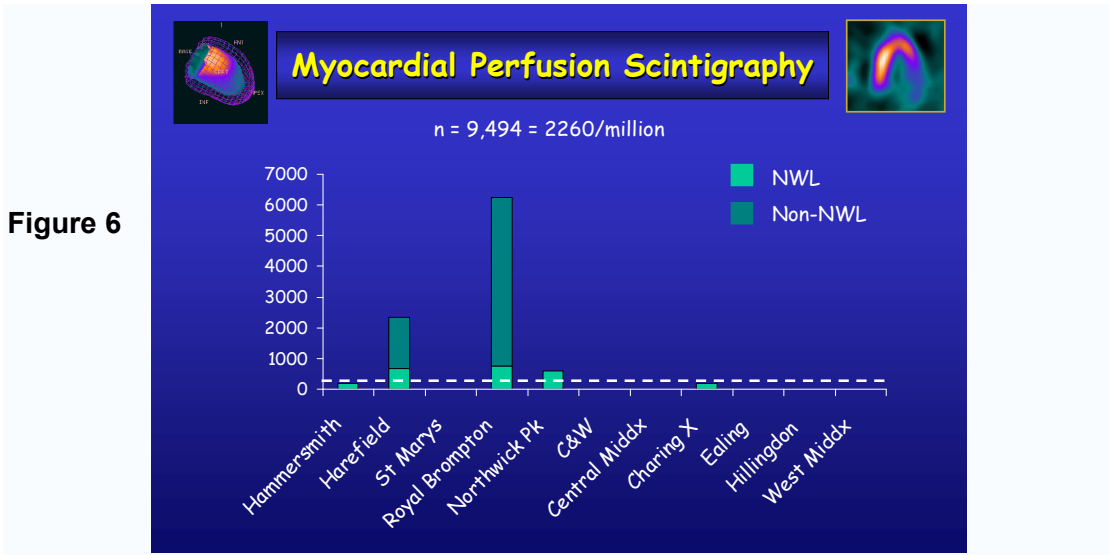
Note: The dotted line depicts minimum competence targets per operator (100 studies/annum)<sup>9</sup>.

<sup>8</sup> Senior R, Stress Echocardiography – Current status, European Cardiology – Business briefing (2005) (<http://www.touchbriefings.com/pdf/1231/senior.pdf>)

<sup>9</sup> British Society of Echocardiography: Department accreditation (section 5.1.5), [2007] [www.bsecho.org](http://www.bsecho.org)

Myocardial Perfusion Scintigraphy (MPS)

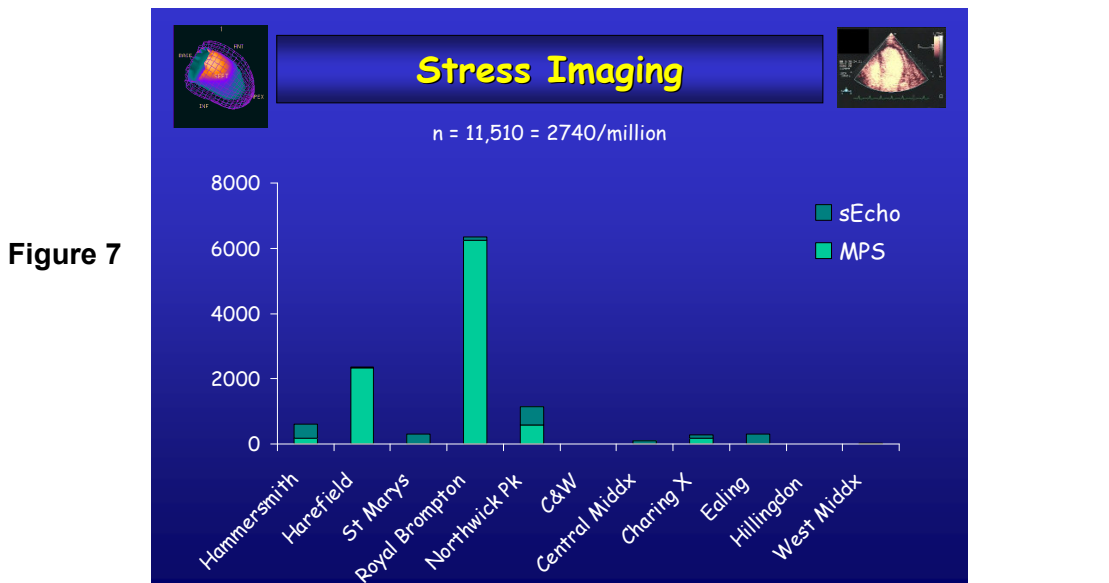
MPS is offered in five centres across NWL, with activity totalling **9,494** (including research activity). Non-NW London activity is significantly greater. MPS offers greater sensitivity and specificity when compared to sECG in the detection of CAD<sup>10</sup>.



Note: The dotted line depicts minimum annual competence targets of 250 studies per operator.

Distribution of stress functional imaging

The frequency and scope of sEcho and MPS services led the study to focus on these imaging techniques, using an umbrella term 'stress functional imaging'. No distinction is made between the tests and complication rates are comparable. The study found that distribution of stress functional imaging activity is relatively centralised, with proportionately more activity undertaken within the NW London tertiary care centres.



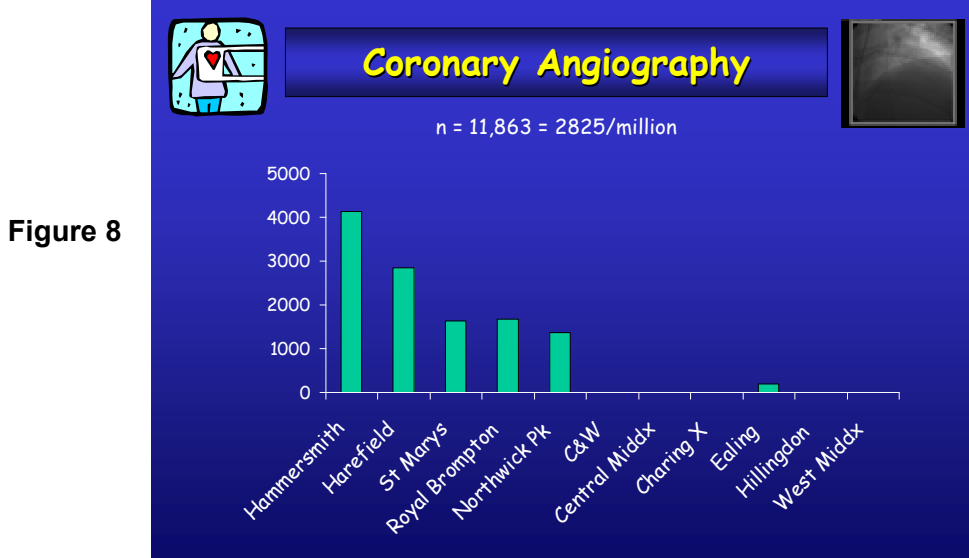
<sup>10</sup> Sabharwal NK, Stoykova B, Dowie R, Lahiri A. Dept of Cardiac Research, Northwick Park Hospital. Health, Economics Research Group, Brunel University Myocardial Perfusion Imaging - the Primary Test in the Chest Pain Clinic? BNCS Abstracts (2003) [www.bnsc.org.uk](http://www.bnsc.org.uk)

*Note: Sensitivity is the proportion of true-positives that are correctly identified by the test. Specificity is the proportion of true-negatives that are correctly identified by the test.*

### Coronary Angiography (CAG)

Six centres across NWL provide CAG services. Total activity for the year is **11,863** including estimated levels of elective query-proceed activity – assumed to be 67% of total PCIs in all centres except Royal Brompton Hospital where its approximately 5%.

The ratio of NW London~ to non-NW London activity is **1.2 : 1**.

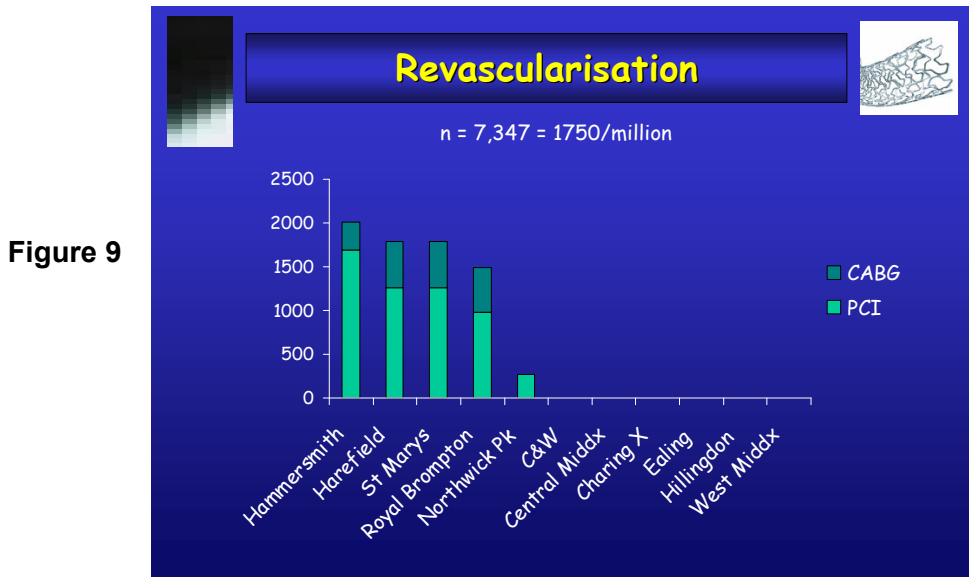


Note: Ealing Hospital activity reflects a part-year effect following the opening of their catheter lab in early 2006.

### Revascularisation

Five NWL hospitals provide elective revascularisation services - Coronary Artery Bypass Graft (CABG) and/or Angioplasty (PCI) procedures. For the purposes of the study revascularisation activity for each centre is shown in Figure 9. The total activity for the year is **7,347**.

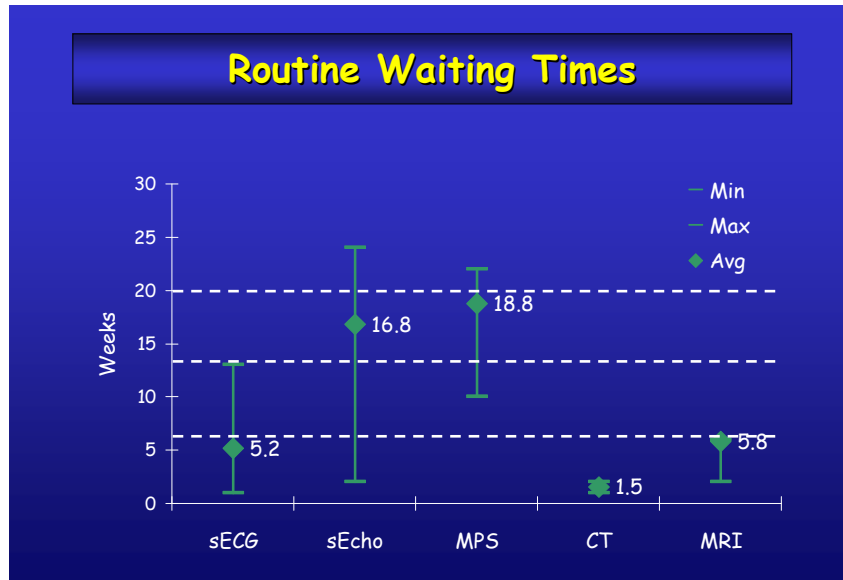
The ratio of NW London~ to non-NWL activity is **1 : 1.4**.



### 4.3 Waiting times

Figure 10 shows routine waiting times for diagnostic imaging tests across NW London. By comparison, national targets have been in place since March 2005 for waits of <12 weeks for angiography and revascularisation.

Figure 10

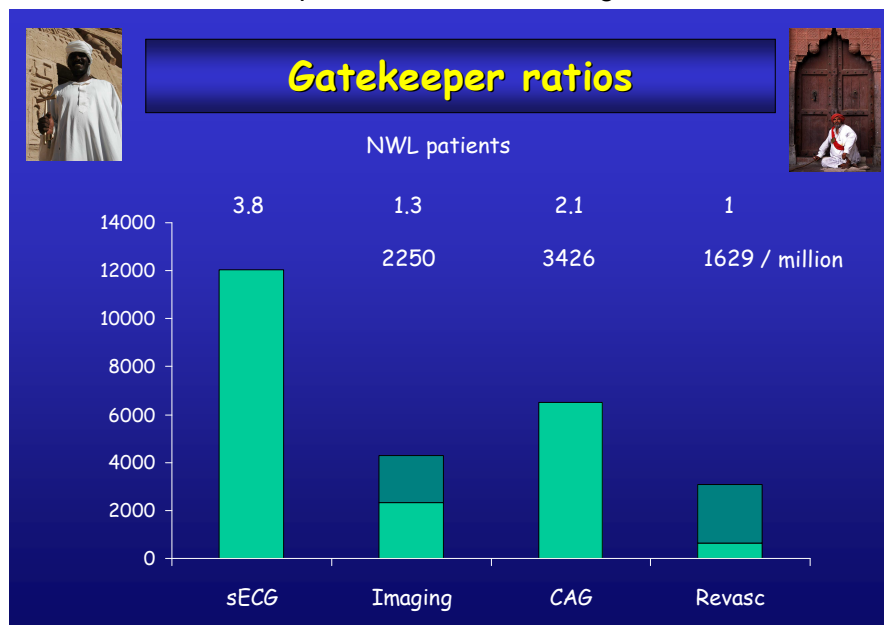


Source: based on snapshot study undertaken by NWLCN, May 2006.

### 4.4 Gatekeeper ratios

Gatekeeper ratios, i.e. cases meeting acceptable criteria for onward referral, were analysed as part of the study. Figure 11 outlines the overall gatekeeper ratios to revascularisation for NW London patients. Further findings are detailed below.

Figure 11



#### 4.4.1 sECG → CAG Referrals

Data from the study indicates that a proportion of referrals to CAG within NW London are based purely on the outcome of sECG. Although sECG is not a primary focus of this study, according to Sabharwal et al, MPS offers greater

sensitivity and specificity than standard sECG for the detection of CAD<sup>11</sup>. Similarly Jeetley et al, report sECG to be less accurate than sEcho for the detection of prognostically significant CAD<sup>12</sup>.

#### 4.4.2 Comparison between sEcho and MPS activity

The study suggests sEcho is performed less frequently compared to MPS, despite the provision of sEcho in more centres across the sector. The activity ratio of sEcho : MPS in NWL patients is roughly **2 : 3** (the ratio of total activity is **1 : 5**).

#### 4.4.3 MPS → Angiography referrals

The study has revealed disproportionate gatekeeper ratios between MPS and angiography for NW London activity. NICE recommend MPS:CAG gatekeeper ratios (intermediate level) of **1.5 : 1**. By comparison, the study shows MPS:CAG gatekeeper ratios (corrected for NW London patients only) of **1 : 3**.

This trend is reflected at a national level too. In a national UK study (2000), MPS activity levels were found to be less than half CAG rates, and on a par with rates of revascularisation. When compared to USA national data, UK MPS activity is also lower – more so than can be explained by the lower CAG rates.

#### **Comparative study (UK-USA) of gatekeeper ratios**

	<b>MPS</b>	<b>CAG</b>	<b>Revascularisation</b>
<b>UK (2000 data)</b>	<b>1</b>	<b>2.2</b>	<b>1</b>
<b>USA (1996 data)</b>	<b>2.5</b>	<b>1.4</b>	<b>1</b>

#### 4.5 **Normal Angiography**

An analysis of 'normal' angiography rates across NW London centres was conducted subsequently to inform the initial study. For this purpose, a 'normal' angiogram constitutes '*an angiogram with no stenosis greater than 50%*'.

Retrospective data was provided by four NW London centres, including some of the recently established CAG centres. This data included patients with existing stents, but excluded L + R heat catheters, and non-reported cases. Using this criteria, the analysis of 'normal' angiography ranged from 13.0% - 45.8%, with a mean of **25.5%**.

#### 4.6 **Overall procedures**

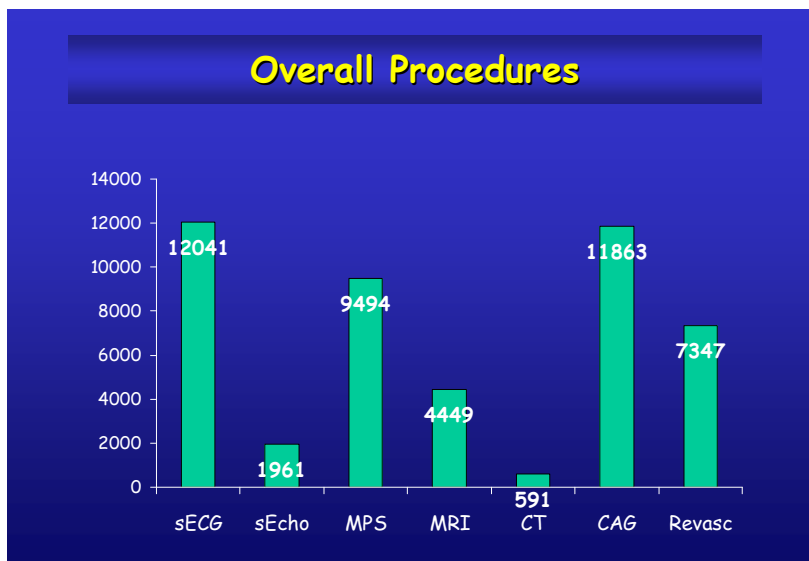
Overall, the study has revealed higher than anticipated stress functional imaging capacity within NW London, but predicted levels of activity. In some tertiary centres a significant proportion of activity arises from out-of-sector referrals.

Total activity by procedure is outlined in Figure 12.

<sup>11</sup> Sabharwal NK, Stoykova B, Dowie R, Lahiri A. Dept of Cardiac Research, Northwick Park Hospital. Health, Economics Research Group, Brunel University Myocardial Perfusion Imaging - the Primary Test in the Chest Pain Clinic? BNCS Abstracts (2003) [www.bnscs.org.uk](http://www.bnscs.org.uk)

<sup>12</sup> Jeetley P, Burden L, Stoykova B, Senior R. Dept of Cardiovascular Medicine, Northwick Park Hospital. Clinical and economic impact of stress echocardiography compared with exercise electrocardiography in patients with suspected acute coronary syndrome but negative troponin: a prospective randomized controlled study (2006)

Figure 12



## 5. ANALYSIS OF FINDINGS

This study is among the first sector-wide analyses of diagnostic imaging services undertaken in NW London, with a number of emerging themes.

### 5.1 Scope of service provision across NWL

Overall, it has revealed predicted levels of stress functional imaging activity in NW London. This is skewed by out-of-sector activity. Crucially, NICE recommended levels of activity are exceeded in some procedures, whilst not being met in others.

### 5.2 Data quality

Data quality has been a long-standing issue within NW London Trusts. Poor utilisation of electronic data collection mechanisms was found in some diagnostic centres making it difficult to capture robust and quantifiable data on a regular basis. It is anticipated that significant improvements have been made to data collection systems since the study, as part of the 18-week wait agenda. Similarly, it is assumed that more accurate data coding systems have also been implemented under the Payment by Results commissioning initiative.

### 5.3 Gatekeeper ratios

#### sECG → CAG referrals

Referenced research studies indicate that there is a role for stress functional testing between sECG and prior to CAG being considered. Evidence from research studies recommend the use of non-invasive stress functional imaging techniques to reduce potential risk to patients.

#### sEcho:MPS activity


Activity ratios of 2 : 3 between sEcho and MPS among NWL patients is highlighted in light of access to sEcho being available in over 80% of NW London hospitals. The British Society of Echocardiography reports 'under-resourced and incompletely developed'<sup>13</sup> services following recent release of their guidance. Lengthy waits for sEcho are thought to result from ineffective booking/information systems. The Cardiac Network has worked with local Trusts in addressing these issues, working towards shorter waits for patients.

<sup>13</sup> British Society of Echocardiography: Echocardiography within the British Isles: A National Survey, 2006

## 5.4 18-week Patient Pathway

Based on the snapshot exercise conducted in May 2006, waiting times for most diagnostic services were lengthy and potentially in breach of the interim milestones set by the Department of Health 18-week Patient Pathway agenda (below).

	<u>December 2005</u>	<u>March/April 2006</u>	<u>March/April 2007</u>	<u>March 2008</u>
Outpatients	13 weeks	13 weeks	11 weeks	5 weeks
Inpatients	6 months (26 weeks)	20 weeks	20 weeks	11 weeks
Diagnostics	-	26 weeks (for Cardiac MRI or Cardiac CT only)	13 weeks	6 weeks
Choice of Scan for Imaging Diagnostics	Phase 1: 26 weeks for MRI or CT or another provider	Phase 2: 20 weeks for ALL imaging diagnostic tests, or another provider	Phase 3: 13 weeks for all imaging diagnostic tests or another provider	6 weeks



'Choice of scan' Phase 3 came into effect from April 2007. As a responsibility of provider trusts, 'Choice of scan' ensures that patients requiring diagnostic imaging scans are given an appointment date within 13 weeks of referral, or will be offered the choice of having their scan at another provider.

A revision of diagnostic pathways enabling the use of stress functional imaging techniques as a pre-cursor or alternative to angiography, could contribute to the overall efficiency of services to meet the 18-week challenge.

## 5.5 Care pathways

Although undetected in this study, it is believed that stress functional imaging sometimes *follows* angiography! It's assumed this is the result of lengthy waits for stress functional imaging tests. In order to achieve a balanced pathway spanning stress functional imaging and angiography, patient flows need to be streamlined. National targets have applied to CAG waits for some time - currently waits for CAG and stress functional imaging tests fall within the 18-week parameters. By March 2008 waits for all diagnostic tests should be less than 6 weeks.

## 5.6 Normal angiography

Analysis of the information provided on 'normal' angiography across the sector indicates higher than recommended levels of 'normal' angiograms (25.5% mean). NW London centres work to varying thresholds and criteria for 'normal' angiography against that used in the study. It's acknowledged that data from newly established centres may skew the analysis, however the recommended range of 'normal' angiograms should fall between 10% and 15%.

## 5.7 Quality and Skills

Maintaining high quality diagnostic services is fundamental. Skill maintenance is a key contributing factor to quality levels – ensuring reporting remains quantitative and accuracy levels are sustained. Improved use of existing stress functional imaging facilities for NWL patients should help to maintain operator competence levels and in turn, ensure high quality services across the sector.

## 6. STRESS FUNCTIONAL IMAGING - CLINICAL BENEFIT

Stress functional imaging offers clinically effective techniques in the diagnosis of CAD, through non-invasive means. Considering each in turn:

- Stress echocardiography is considered a relatively well-tolerated diagnostic modality, effective in the management of patients with known or suspected coronary artery disease. Adverse effects - mostly tachyarrhythmias and arterial hypotension – can occur but in most cases are minor and self limiting. Severe adverse reactions to sEcho can be ischaemia independent – these are unpredictable and are independent of operator experience.
- The primary objective of MPS is to provide an accurate and complete image of the blood flow in the heart for diagnosis and treatment of CAD. Qualitative analysis of MPS techniques indicates a high sensitivity and moderate specificity for detecting coronary artery stenosis<sup>14</sup>. In addition, information relating to lesion severity, previous infarction, myocardial viability and impact of collateral circulation provides accurate diagnosis and effective treatment for patients.

Among the potential risks of MPS, the complication rates for SPECT are usually related to exercise or pharmacological stimulation, given as part of the stress component during the procedure. The associated mortality is low (around 0.01% and morbidity of around 0.02%).

In both techniques, high quality operator maintenance and accurate reporting is essential.

## 7. ECONOMIC BENEFIT APPRAISAL

There are few published studies on cost-effectiveness of stress functional imaging techniques, although computer modelling predicts that routine use of MPS is cost-effective<sup>15</sup>. One NHLI study concluded that 'investigative strategies using myocardial perfusion imaging are cheaper and equally effective when compared with strategies that do not use myocardial perfusion imaging, both for cost of diagnosis and for overall 2 year management costs. 2 year patient outcome is the same.'

In similar studies, stress Echo is demonstrated to be cost-effective against inexpensive diagnostic tests, due to greater diagnostic accuracy in diagnoses<sup>16</sup>.

Using the study data, a simple cost analysis of NW London corrected activity has been drawn up. This is based on current tariff arrangements and market forces factor, and assumes NICE recommended gatekeeper ratios for MPS : CAG : revascularisation of **2.25 : 1.5 : 1**.

### 2007/08 Published Tariff

- Coronary angiography (without complications) = £1110
- MPS unbundled tariff - Band 3 resting study = £295
- 1<sup>st</sup> Outpatient appointment (currently includes sEcho) = £155
- Market forces factor: NW London average (07/08) = 1.3%

<sup>14</sup> Sensky PR, Nilesh J, Samani NJ, Reek C, Cherryman GR, Magnetic resonance perfusion imaging in patients with coronary artery disease: a qualitative approach, Department of Cardiology, University of Leicester (2004)

<sup>15</sup> Underwood SR, Godman B, Salvani S, Ogle JR, Ell PJ: Economics of myocardial perfusion imaging in Europe – the EMPIRE Study, National Heart and Lung Institute, Imperial College London: [Eur Heart J](#). 1999 Jan;20(2):157-66.

<sup>16</sup> Jeetley P, Burden L, Stoykova B, Senior R. Dept of Cardiovascular Medicine, Northwick Park Hospital. Clinical and economic impact of stress echocardiography compared with exercise electrocardiography in patients with suspected acute coronary syndrome but negative troponin: a prospective randomized controlled study (2006)

A number of assumptions have been made in this calculation:

- A tariff for the stress element of MPS is not banded, therefore assumed to be double (x2) the resting tariff.
- Patients undergo MPS stress study first – as a result 50% of cases are assumed to be normal which negates the need for rest study in this cohort.
- A recent Department of Health directive outlines that sEcho activity costs are included within tariff for a first outpatient appointment. The Network is seeking clarification on this, pending which indicative sector-wide costs for sEcho could be misrepresentative.

£ Impact of NICE recommendations for NW London activity (allowing for MFF)

	<b>Actual activity levels</b>	<b>£</b>	<b>NICE recommended levels</b>	<b>£</b>
<b>MPS</b>	2370	<b>1,770,600</b>	6966	<b>5,204,211</b>
<b>CAG</b>	6510	<b>7,320,040</b>	4644	<b>5,221,853</b>
<b>Total</b>		<b>9,090,640</b>		<b>10,426,064</b>

In summary, the outcome of this simple calculation indicates that a moderate shift in favour of stress functional imaging activity ahead of CAG, in terms of NICE guidance, could be achieved within break-even financial position (variance of £41k).

This would equate to an increase of over **2,700** cases seen per year across NW London (notwithstanding any additional capital expenditure).

## 8. CONCLUSION

Overall, this study demonstrates a credible case for the increased use of existing stress functional imaging facilities for NW London patients. While coronary angiography is still considered the ‘gold standard’ for defining the site and severity of coronary artery lesions, average rates of ‘normal’ angiography across NW London is high.

Stress functional imaging techniques are viewed as effective in the diagnosis of CAD, as well as being a complementary modality to angiography in assessing the significance of given angiographic lesions. Stress functional imaging offers a cost-effective, non-invasive alternative with extensive prognostic data, which is usually sufficient to avoid subsequent diagnostic testing.

A shift in practice towards utilising non-invasive diagnostic testing, among appropriate patient cohorts, is beneficial in the following ways:

- Non-invasive diagnostic testing reduces patient risk.
- Cost-effective practice.
- Improved use of existing facilities available to NW London patients raises competence levels and ensures that high quality testing/reporting is maintained.
- Achievement of the 18-week patient pathway, through improved care pathways.
- Robust activity coding.
- Sector-wide adherence to national guidance (NICE, BSE etc).

## 9. FUTURE DEVELOPMENTS

Within this field of care, improvements in technology are pushing forward development of state-of-the-art care. Leading on from this study, developments in diagnostic cardiology for future consideration include:

- An increasing interest in coronary calcium and CT angiography (but this should not be used uncritically).
- Development of new technologies in echocardiography, PET, CT scanning and Cardiovascular MRI. Again critical assessment of how these new technologies will complement existing services needs to be considered.
- In parallel, multi-slice spiral computed tomography (MSCT) is a promising technique for non-invasive coronary angiography, although clinical application has remained limited to date. Improvements in MSCT technology, combined with heart rate control allow reliable non-invasive detection of obstructive CAD<sup>17</sup>.
- Improvements in technology identify potential to broaden the scope of mobile services. In the changing climate of care provision, there is increasing interest in satellite imaging services facilitated by specialist centres.

## 10. RECOMMENDATION

The Cardiac Network's role in setting good practice is based on clinical evidence, equity, cost effectiveness and where applicable, national guidance. This paper outlines the benefits of an increase in the use of existing stress functional imaging capacity through clinical efficacy, associated cost efficiencies, and improved compliance with national guidance. This could make a significant contribution towards achievement of the 18-week patient pathway by December 2008.

Based on this study, a recommendation is made to influence local commissioning arrangements for the improved use of existing stress functional imaging services available within NW London, based on the following:

- Implementation of robust methods of auditing the use of imaging tests.
- Adherence to current guidelines on the use of stress functional imaging tests, which are supported by evidence of clinical- and cost-effectiveness.
- Integration of quality into all aspects of stress functional imaging, including implementation of local quality assurance schemes.
- Maintenance of short waiting times for cardiac diagnostic tests.
- Ensured fairness of commissioning arrangements i.e. that do not penalise appropriate use.

### **REQUIRED ACTION:**

**NWL Commissioning leads are encouraged to consider and integrate these recommendations into local commissioning intentions, effective from 2008-9.**

**Jinty Wilson**, on behalf of  
**NW London Cardiac Network Imaging task-group**

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<sup>17</sup> Morgan-Hughes GJ, Roobottom CA, Owens PE, Marshall AJ: Highly accurate coronary angiography with submillimetre, 16 slice computed tomography: Heart 2005;91:308-313 © 2005 by [BMJ Publishing Group & British Cardiac Society](#)