follow up in the 'abnormal' group [46.8 mm³ (37.1 – 64.6) vs. 44.6 mm³ (35.0 – 57.7), $P < 0.001$]

Conclusion There was a differential response in plaque lipid reduction between normal and abnormal carotid arteries. Additionally, there was a significant degree of inconsistency in individual response to statin at the level of atherosclerotic plaque lipid content compared with LDL-c. Although LDL-c has a casual role in development of atherosclerosis, other lipid and non-lipid biomarkers have significant impact in determining reduction in atherosclerotic plaque lipid content. Therefore, LDL-c cannot be used, on its own, as a surrogate of plaque lipid reduction. Quantification of plaque lipid content may contribute to the identification of patients at greatest risk of atherosclerosis complications and to the targeting of this group with aggressive lipid lowering drugs.

Conflict of Interest None

6 CURRENT UTILITY OF FFRCT IN THE UNITED KINGDOM

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Background In 2016 NICE produced Medical Technology Guidance approving the use of HeartFlow FFRCT for the investigation of patients presenting chest pain of new onset in the UK. The extent to which this technology has been adopted within the NHS in the UK is not yet known

Objectives Primarily we aimed to identify which centres in the UK are currently using CTCA with FFRCT technology and the total number of FFRCT scans compared to the total number of CTCAs in the 2016–17 financial year. Secondly we aimed to identify which centres had capability for use of FFRCT technology in the coming years.

Methods A Freedom of Information request was submitted to all NHS trusts asking the following questions:

1. Does the trust have a 64-slice (or above) CT scanner?
2. Does the trust perform Coronary CT angiography?
3. How many Coronary CT Angiography scans were performed in the financial year 2016–2017?
4. Does your Trust have access to Coronary CT Angiography with non-invasive FFR analysis or HeartFlow FFRCT technology?

5. If so how many FFRCT scans have been performed in the financial year 2016–2017?

Results We achieved a 99% response rate of all acute NHS trusts (159/161). 74% of all trusts reported providing a CTCA service. 70,928 CTCA scans were reported by these trusts. 12 trusts (8%) reported having access to FFRCT technology although only half of these had performed FFRCT analysis in 2016–17. 11/12 trusts were located in England and 1/12 in Scotland. Overall 210 FFRCT scans were performed in these 6 trusts. FFRCT analysis was used in just 0.3% of all the CTCAs in the UK in 2016–17. All trusts performing FFRCT scans performed at least 600 CTCAs per year. All FFRCT scans were requested in England in this period. A further 139/161 trusts (86%) have potential to set up a future FFRCT service based on this data.

Conclusion FFRCT technology remains limited to a handful of high volume centres. Only a small number of scans are being performed nationally but there is scope for significant expansion in years to come. There is marked geographical variation in availability of FFRCT currently.

Conflict of Interest Nil

7 NON-INVASIVE IMAGING OF ACUTE THROMBOSIS; DEVELOPMENT OF A NOVEL FACTOR XIIIa RADIOTRACER

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Background Cardiovascular thrombosis is responsible for one quarter of all deaths annually worldwide. Current imaging methods focus on anatomical identification of thrombus but cannot determine thrombus age or activity. Molecular imaging techniques hold promise for identifying and quantifying active thrombosis in vivo. Our objective was to assess a novel optical and positron-emitting probe targeting Factor XIIIa (ENC2015) as biomarker of active thrombus formation.

Methods Optical and positron emitting ENC2015 probes were assessed ex vivo using blood drawn directly from human volunteers and passed through perfusion chambers containing denuded porcine aorta as a model of deep arterial injury.

Abstract 7 Figure 1

Specificity of ENC2015 was established with co-infusion of the Factor XIIIa inhibitor, iodoacetamide. 18F-ENC2015 biodistribution, kinetics, radiometabolism and ability to bind to an acutely thrombosed artery in vivo were characterised in rats.

Results Both Cy5 and fluorine-18 labelled ENC2015 rapidly and specifically bound to both low and high shear thrombi. Both thrombus fluorescence and PET radioactivity was inhibited by a factor XIIIa inhibitor. There was no metabolism of 18F-ENC2015 for over 8 hours when incubated ex vivo in whole human blood. In vivo, approximately 42.0% of parent radiotracer remained in the blood 60 min post-administration. Biodistribution studies demonstrated low uptake and rapid clearance from tissues with elimination via the urinary system. In an in vivo rat model of arterial thrombosis, 18F-ENC2015 uptake was markedly increased in the thrombosed carotid artery compared to the contralateral patent artery (mean standard uptake value ratio of 2.40 versus 0.74, $p < 0.0001$).

Conclusion ENC2015 rapidly and selectively binds to acute thrombus in both an ex vivo human translational model and an in vivo rodent model of arterial thrombosis. This probe holds promise for the non-invasive identification of thrombus formation in cardiovascular disease.

Figure 1. Biodistribution and thrombus binding of 18F-ENC2015 in rats. Panel A shows images of the time averaged uptake within the thrombus and skin incision compared with the contralateral vessel. Panel B is a decay corrected time activity curve showing 18F-ENC2015 kinetics (mean SUV, $n=3$) within our in vivo thrombosis model. Note the rapid blood pool clearance of 18F-ENC2015 with early uptake in the skin incision which tails off to equilibrate with the arterial thrombus between 60 and 90 mins. Panel C demonstrates the mean change in SUV ratio of the thrombosed vessel compared with contralateral vessel and LV blood pool over time ($n=3$). Thrombus vs contralateral vessel SUV from 35 to 180 minutes p value < 0.0001 (paired t -test).

Conflict of Interest None

8 AN ANALYSIS OF EXTRA CARDIAC FINDINGS GENERATED BY THE EXPANSION OF CT CORONARY ANGIOGRAPHY AT A DISTRICT GENERAL HOSPITAL

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Introduction The updated 2016 NICE guidelines for stable chest pain recommend CT coronary angiography (CTCA) as the first line investigation for all patients presenting with stable chest pain. The implementation of these guidelines has led to the expansion of CTCA services. The CT scanning field of view extends beyond the heart resulting in extra-cardiac findings, which can require further investigation. Our aim was to assess the impact of the expansion of CTCA on the volume of extra cardiac findings, and to quantify the frequency and cost of the downstream tests generated.

Methods We undertook a retrospective audit of all CTCAs performed between January 2017 and June 2018 at a district general hospital. Extra-cardiac findings in the CTCA report were classified according to whether they were clinically

significant or insignificant. We analysed which scans required downstream investigation and follow up, and the financial implications using standardized NHS England tariffs.

Results A total of 652 scans were performed with a total of 202 (26.2%) individual incidental extra-cardiac findings, 106 (16.3%) were deemed to be clinically significant requiring further investigation or referral to a specialist clinic. The extra-cardiac findings were abdominal (45), thoracic (42), cardiac (14), and involving breast tissue (5). The most common specific extra-cardiac findings were liver cysts (36) and pulmonary nodules (22). Two lung malignancies was identified.

There were a total of 122 further investigations or referrals generated by extra-cardiac findings. The most common downstream investigations required were abdominal ultrasound (40), CT thorax (21), and echocardiogram (12). Referral to a specialist clinic for further assessment was required in 31 patients including 5 to a triple assessment breast clinic.

The total additional cost of imaging investigations or onwards referral to a specialist clinic was £12,464. Broken down by category, thoracic findings required £7,828, abdominal findings £1,710, cardiac findings £2,226, and breast findings £700. The added cost on average per patient for investigating and referring on extra-cardiac findings was £19.

Conclusion Our data suggests that CTCA generates a significant number of clinically relevant extra-cardiac findings that require further investigation. These have additional costs and generate significant workload for the rapid access chest pain clinic. Importantly, we identified significant delays in the downstream investigations in the absence of robust referral pathways. The expansion of CTCA to even older patients will increase the extra-cardiac findings and will require hospitals to develop referral pathways and to clearly delineate responsibility for further investigation, follow up and onwards referral of important findings. Although somewhat controversial due to ethical considerations of missing potentially pre-malignant and malignant conditions, limiting the scanning field of view to scan just the heart, may reduce the number of incidental findings and limit radiation exposure¹.

REFERENCE

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Conflict of Interest None

9 EFFECT OF COFFEE CONSUMPTION ON ARTERIAL STIFFNESS FROM UK BIOBANK IMAGING STUDY

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Introduction Coffee is widely reported to be the world's most popular drink and previous studies revealed acute increases in arterial stiffness with its consumption. But, the reported