Journal of Cardiovascular Computed Tomography xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Journal of Cardiovascular Computed Tomography

journal homepage: www.elsevier.com/locate/jcct

Review article

Highlights of the Twelfth Annual Scientific Meeting of the Society of Cardiovascular Computed Tomography

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ARTICLE INFO

Keywords:
Coronary CTA
Spectral imaging
Ischaemia
Congenital

ABSTRACT

The 12th Annual Scientific Meeting of the SCCT, held from July 6 to July 9 in Washington, DC, was one of the largest to date with 724 attendants from 34 countries, 130 invited talks, 4 "Read with the Experts" sessions, 42 oral abstracts presented, 20 rapid fire posters and 164 poster presentations with the abstracts of all of these published in the JCCT. This article summarises the many themes and topics of presentation and discussion in this meeting, and the many technical advances that are likely to impact future clinical practice and feature in future meetings.

1. Introduction

"Beavers build houses; but they build them in nowise differently, or better now, than they did, five thousand years ago. Ants, and honey-bees, provide food for winter; but just in the same way they did, when Solomon referred the sluggard to them as patterns of prudence. Man is not the only animal who labors; but he is the only one who improves his workmanship"

Abraham Lincoln

Ten years ago the members of the Society of Cardiovascular Computed Tomography (SCCT) congregated within Washington DC from July 6–8, 2007 to take part in the second Annual Scientific Meeting (ASM). On the backdrop of Apple having just released its first edition of the iPhone and the announcement that Barack Obama was to run for president, 750 registrants made the trip to hear about cutting-edge advances in CT. They heard the announcement that CT-STAT – the first randomized control trial comparing coronary computed tomography angiography (coronary CTA) to myocardial perfusion imaging in patients with acute chest pain in the emergency department – was to begin recruitment; proof of the concept that myocardial perfusion could be measured using changes in myocardial contrast attenuation following the administration of adenosine; that significant dose reduction could be achieved in coronary CTA by using a tube current of 100 kV rather than 120 kV; and that prospective step-and-shoot scan modes could significantly reduce dose compared with retrospective spiral acquisitions.[1]

10 years on we are still competing with the draw of the iPhone (now into its 8th iteration), and people are still talking about the White House Residents. However the scientific evidence supporting cardiac CT could not have changed more. Since CT-STAT first demonstrated that coronary CTA could reduce cost and length of stay in the emergency department in 2011,[2] it has been joined by an ever-growing number of randomized controlled trials, including ROMICAT II, ACRIN-PA, CAPP, CRESCENT, PROMISE and SCOT-HEART, each contributing to the scientific evidence base supporting coronary CTA (See Fig. 1). Based on this wealth of evidence, coronary CTA is now an established part of routine clinical care in many countries and in some countries, most notably the UK following the recent NICE guideline revision,[3] coronary CTA is recommended as the first-line imaging modality in the assessment of patients presenting with new onset stable chest pain.

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https://doi.org/10.1016/j.jcct.2017.11.001
Received 31 August 2017; Received in revised form 31 October 2017; Accepted 2 November 2017
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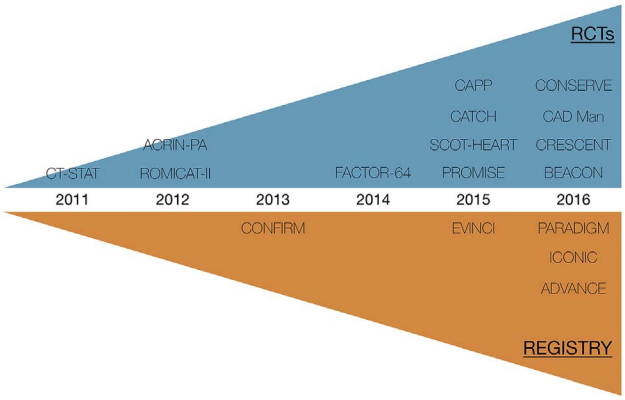

Fig. 1. Diagram of the growth of coronary CTA randomized clinical trials (top, blue) and coronary CTA registries (bottom, orange). (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

Experts" sessions, 42 oral abstracts presented, 20 rapid fire posters and 164 poster presentations with the abstracts of all these published in the JCCT.[4] It also introduced specialty-based hands-on workshops in four separate tracks and a pre-program focusing on coronary CTA in the Emergency Department and Advocacy.

The volume of work and breadth of applications of cardiac CT discussed and exhibited at the meeting was staggering and a testament to the talent and drive of the international SCCT community. To try and summarize this exciting and varied meeting in a cohesive manner is challenging. Here we summarize Dr Ed Nicol's closing talk at the 2017 ASM and examine the 5 key themes that he, Dr Nieman and Dr Ferencik highlighted:

- Coronary Artery Disease
- Structural Heart Disease
- Congenital Heart Disease
- Disruptive technology
- Radiation
- Advocacy

2. Coronary artery disease

With cardiovascular disease now the single leading cause of death, in not only the developed world, but also in the developing world,[5] as well as being the most common indicator for coronary CTA,[6] it is perhaps unsurprising that CAD assessment formed a central theme throughout the conference. As Professor Leslee Shaw, the now immediate past-president of the SCCT, demonstrated in her opening speech, the evidence base underpinning the use of cardiovascular CT has grown exponentially in the last decade with the number of randomized control trials, multicenter registries and multimodality registries now too numerous to easily reel off. One of the most powerful demonstrations of the value of coronary CTA is the reduction in cardiovascular mortality evidenced in a landmark analysis of SCOT-HEART.[7] These results were echoed in a Danish national registry study - one of the top 10 papers of the year selected by Professor Stephan Achenbach in his opening talk - which demonstrated that, compared with functional testing, coronary CTA increased utilization of statins and aspirin, as well as appropriate invasive catheterisation rates, the combination of which resulted in a downstream reduction of non-fatal acute myocardial infarction in those who underwent coronary CTA as their investigation for chest pain.[8]

CAD-RADs - one of the chief movements towards a standardization of coronary CT reporting developed and pioneered by the SCCT in conjunction with the American College of Radiology and North American Society of Cardiovascular Imaging[9] - was a recurrent theme in presentations. This scoring system seeks to simplify the complex information from coronary CTA into a single number based on the most severe stenosis from CAD-RADs 0 indicating no coronary artery disease through to CAD RADs 5 when obstruction is present with a proposed management strategy based on this score. To examine the utility of this score, multiple groups analyzed existing data such as in the CONFIRM registry and the SCOT-HEART trial, with both showing powerful prognostic discrimination between CAD-RAD groups with publications expected to follow in the next year. As yet unpublished, CAC-RADS was also introduced to the SCCT ASM community by Dr Harvey Hecht, and similar validation of this new proposed model will undoubtedly follow at SCCT's next Annual Scientific Meeting 2018 in Dallas, TX.

One of the most interesting, if counterintuitive, moments came up in the discussion of the recently announced results of the PACIFIC trial.[10] These show that while two heads may indeed be better than one, two tests are not. When analyzing the combination of coronary CTA with single positron emission computed tomography (SPECT) or positron emission tomography (PET) it was shown that combining these tests with coronary CTA simply added noise without improving accuracy. In contrast, Dr Adriaan Coenen et al. demonstrated that combining coronary CTA, point of care CT-derived fractional flow reserve (CT-FFR, See Fig. 2) and CT perfusion (CTP) in a stepwise manner may significantly improve diagnostic accuracy.[11] Further analysis of the CORE-320 multicentre registry data, demonstrated that results from CTA and CTP were similarly predictive of major adverse cardiac events to those of combined invasive coronary angiography and SPECT findings.[12] These studies combined with a recent meta-analysis showing largely equivocal sensitivity and specificities between PET, CMR and CTP, and with all three outperforming SPECT,[13] support a promising future for CTP.

While we embrace the successes of CTA research in the ASM, the "Gladiators Arena: Great debates on imaging" provided an entertaining, but crucial, reminder of the challenges facing the field. Professor Peter WF Wilson - this year's winner of the Arthur S. Agatston Cardiovascular Disease Prevention Award - argued passionately that risk scores were all that were required for cardiovascular prevention. On a related theme,

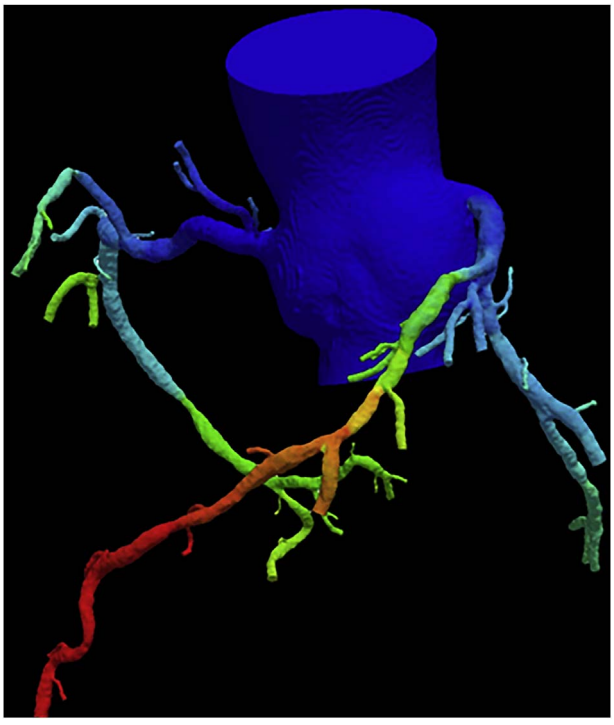

Fig. 2. CT-based fractional flow reserve in a patient with diffuse, hemodynamically significant coronary disease in the LAD, and a hemodynamically non-significant lesion in the RCA.

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