

Editorial

- 85 **SCCT Presidents Page—Moving Forward in 2019**
Suhny Abbara

Original Research Articles

- 86 **Quantified dual energy computed tomography perfusion imaging using myocardial iodine concentration: Validation using CT derived myocardial blood flow and invasive fractional flow reserve in a porcine model**
Rohan Poulter, David A. Wood, Andrew Starovoytov, Stephanie Smith, Mehran Chitsaz, John Mayo
- In this study a porcine model of coronary artery disease invasive fractional flow reserve was used to validate myocardial iodine content derived from dual energy imaging to other measures of myocardial perfusion including dynamic myocardial CT perfusion. FFR correlated strongly to MBF and modestly to myocardial iodine concentration and myocardial CT number. Myocardial iodine content was significantly different in normal and ischemic territories.

- 92 **Reproducibility of aortic valve calcification scoring with computed tomography – An interplatform analysis**
M. Eberhard, R. Hinzpeter, M. Polacin, F. Morsbach, F. Maisano, F. Nietlispach, T.D.L. Nguyen-Kim, F.C. Tanner, H. Alkadhi
- AVC scoring with CT has become important for assessing aortic stenosis severity in low-flow, low-gradient aortic stenosis or in patients with a poor echocardiographic window. On the basis of data sets of 100 consecutive patients undergoing CT prior to transcatheter aortic valve implantation we could show that mere absolute AVC scores between software-platforms differ slightly, however, AVC scores are closely correlated and different workstation platforms produce comparable results for likelihood classification of aortic stenosis according to AVC scores. This suggests software-independence of the method.

- 99 **A cross-sectional survey of coronary plaque composition in individuals on non-statin lipid lowering drug therapies and undergoing coronary computed tomography angiography**
Subhi J. Al'Aref, Amanda Su, Heidi Gransar, Alexander R. van Rosendael, Asim Rizvi, Daniel S. Berman, Tracy Q. Callister, Augustin DeLago, Martin Hadamitzky, Joerg Hausleiter, Mouaz H. Al-Mallah, Matthew J. Budoff, Philipp A. Kaufmann, Gilbert L. Raff, Kavitha Chinnaiyan, Filippo Cademartiri, Erica Maffei, Todd C. Villines, Yong-Jin Kim, Jonathon Leipsic, Gudrun Feuchtner, Gianluca Pontone, Daniele Andreini, Hugo Marques, Pedro de Araújo Gonçalves, Ronen Rubinshtein, Stephan Achenbach, Hyuk-Jae Chang, Benjamin J.W. Chow, Ricardo Cury, Yao Lu, Jeroen J. Bax, Erica C. Jones, Jessica M. Peña, Leslee J. Shaw, James K. Min, Fay Y. Lin

This study sought to evaluate the association of non-statin therapy (NST) with plaque composition, alone or in combination with statins, in patients undergoing coronary computed tomography angiography (coronary CTA). We show that NST was not associated with differences in plaque composition, while there was no evidence of an interaction between NST and statins on plaque composition. Additionally, no survival benefit of NST was observed, in contrast to statins. Differences between statins and non-statin therapies on plaque composition may be related to class-specific effects that result in differential downstream survival benefit.

- 105 Impact of anatomical features of the left atrial appendage on outcomes after cryoablation for atrial fibrillation**
Duygu Kocyigit, Muhammed Ulvi Yalcin, Kadri Murat Gurses, Gamze Turk, Selin Ardali, Ugur Canpolat, Banu Evranos, Hikmet Yorgun, Tuncay Hazirolan, Kudret Aytemir
- Despite advances in catheter-based technologies, some patients still experience atrial fibrillation (AF) recurrence. We aimed to compare left atrial appendage (LAA) morphology in AF patients and subjects with sinus rhythm and also investigate the association between LAA morphology and success of PVI using cryoballoon in subjects with AF. Among anatomical characteristics of the LA and LAA, multivariate Cox-regression analysis showed that only longitudinal-axis left atrial diameter on CT and cauliflower-type LAA morphology (compared to windsock) were independent predictors of AF recurrence after blanking period following cryoballoon-based PVI for AF.
- 113 Diagnostic performance of free-breathing coronary computed tomography angiography without heart rate control using 16-cm z-coverage CT with motion-correction algorithm**
Zhuo Liu, Zhuolu Zhang, Nan Hong, Lei Chen, Chengfu Cao, Jian Liu, Ye Sun
- In this work, we evaluated the feasibility of free-breathing CCTA. Results indicated that based on the 16-cm z-axis coverage and motion correction algorithm, the free-breathing CCTA protocol in this study enabled us to evaluate coronary arteries with excellent image quality, and remarkable diagnostic accuracy despite high heart rate. Image quality, radiation dose, and diagnostic accuracy in patients with free-breathing were comparable with those with breath-holding. For patients with difficulties in holding their breath, free-breathing CCTA during a single cardiac cycle using scanners with 16-cm z-axis coverage and motion correction algorithm can be an alternative solution for coronary artery evaluation.
- 118 Analysis of the anatomical features of pulmonary veins on pre-procedural cardiac CT images resulting in incomplete cryoballoon ablation for atrial fibrillation**
Yoriaki Matsumoto, Yuji Muraoka, Yoshinori Funama, Shinji Mito, Takanori Masuda, Tomoyasu Sato, Tomoyuki Akita, Kazuo Awai
- We investigated the anatomical features associated with incomplete cryoballoon (CB) ablation for atrial fibrillation on pre-procedural cardiac CT images. The rate of incomplete CB ablation was significantly higher for right- than left-sided pulmonary veins (PVs). The anatomical feature significantly associated with incomplete CB ablation was the PV angle. In the receiver-operating characteristic analysis, the optimal cut-off value for right inferior PV (RIPV) and right superior PV (RSPV) angle to discriminate an incomplete CB ablation were 40.1° and 79.7°, respectively. Anatomical information obtained on cardiac CT scans is useful for selecting CB ablation strategies and for predicting the treatment outcome.
- 128 Quantitative CT assessment identifies more heart transplanted patients with progressive coronary wall thickening than standard clinical read**
Mihály Károlyi, Márton Kolossváry, Andrea Bartykowszki, Ildikó Kocsmár, Bálint Szilveszter, Júlia Karády, Béla Merkely, Pál Maurovich-Horvat
- This study reports the feasibility of quantitative coronary vessel wall assessment follow-up in heart transplanted patients using CT angiography and semi-automated software. Quantitative analysis identifies more patients with progressive wall thickening than standard clinical read within the first two years after heart transplantation, which might be an early sign of cardiac allograft vasculopathy.

134 Optimized interpretation of fractional flow reserve derived from computed tomography: Comparison of three interpretation methods

Hidenobu Takagi, Yu Ishikawa, Makoto Orii, Hideki Ota, Masanobu Niiyama, Ryoichi Tanaka, Yoshihiro Morino, Kunihiro Yoshioka

A standardized system for interpreting FFR_{CT} values for ischemia detection is necessary in clinical settings. Adding ΔFFR_{CT} , lesion-specific FFR_{CT} , and the lowest FFR_{CT} to the diameter stenosis showed improvements in discriminating and effectively reclassifying ischemia, with ΔFFR_{CT} being superior among the three measurements in ischemia detection. In contrast, the lowest FFR_{CT} was of limited value, suggesting that positional difference between FFR_{CT} and invasive FFR may have a potential harm; thus, FFR_{CT} values should be interpreted clinically with caution.

142 Longitudinal assessment of coronary plaque volume change related to glycemic status using serial coronary computed tomography angiography: A PARADIGM (Progression of Atherosclerotic Plaque Determined by Computed Tomographic Angiography Imaging) substudy

Ki-Bum Won, Sang-Eun Lee, Byoung Kwon Lee, Hyung-Bok Park, Ran Heo, Asim Rizvi, Fay Y. Lin, Amit Kumar, Martin Hadamitzky, Yong-Jin Kim, Ji Min Sung, Edoardo Conte, Daniele Andreini, Gianluca Pontone, Matthew J. Budoff, Ilan Gottlieb, Eun Ju Chun, Filippo Cademartiri, Erica Maffei, Hugo Marques, Jonathon A. Leipsic, Sanghoon Shin, Jung Hyun Choi, Renu Virmani, Habib Samady, Kavitha Chinnaiyan, Gilbert L. Raff, Peter H. Stone, Daniel S. Berman, Jagat Narula, Leslee J. Shaw, Jeroen J. Bax, James K. Min, Hyuk-Jae Chang

This study evaluated the impact of glycemic status on the change of coronary plaque volume using serial coronary computed tomography angiography. The median inter-scan period was 3.2 (2.6 to 4.4) years. Compared with normal individuals, diabetic individuals had higher risk of plaque progression (PP) (odds ratio [OR] 1.635, 95% confidence interval [CI] 1.126–2.375; $p = 0.010$) but pre-diabetic individuals had no significant differences in the risk of PP (OR 1.338, 95% CI 0.967–1.853; $p = 0.079$) after adjusting for confounding factors. Unlike diabetes, pre-diabetes appeared to have no independent impact on coronary PP.

148 Quantitative evaluation of non-ischemic dilated cardiomyopathy by late iodine enhancement using rapid kV switching dual-energy computed tomography: A feasibility study

Yasutoshi Ohta, Shinichiro Kitao, Hiroto Yunaga, Tomomi Watanabe, Natsuko Mukai—Yatagai, Junichi Kishimoto, Kazuhiro Yamamoto, Toshihide Ogawa

Diagnostic performances of myocardial iodine density and extracellular volume fraction (ECV) from delayed iodine density images using dual-energy computed tomography (DECT) for differentiating non-ischemic dilated cardiomyopathy (NIDCM) from normal myocardium were evaluated in 35 normal subjects and 11 patients with NIDCM. In histogram analyses, kurtosis was higher in NIDCM than in controls. ECV could differentiate normal myocardium from NIDCM with 91.0% sensitivity and 86.0% specificity at a cut-off of 28.82% (area under the curve, 0.906). Iodine density and ECV from DECT yielded high diagnostic accuracy for discriminating between NIDCM and healthy myocardium.

157 Global longitudinal strain assessment by computed tomography in severe aortic stenosis patients - Feasibility using feature tracking analysis

Miho Fukui, Jeffrey Xu, Islam Abdelkarim, Michael S. Sharbaugh, Floyd W. Thoma, Andrew D. Althouse, Gianni Pedrizzetti, João L. Cavalcante

The feasibility of global longitudinal strain (GLS) assessment by novel feature tracking software analysis using retrospective gated computed tomography angiography (CTA) datasets is unknown. A total of 123 patients undergoing transcatheter aortic valve replacement (TAVR) with sinus rhythm and adequate image quality were evaluated using same post-processing software for both transthoracic echocardiography (TTE) and CTA. The correlation of GLS between CTA and TTE was moderate ($r=0.62$, $p<0.001$) but variability existed between imaging modalities suggesting a potential for modality-specific GLS values. Additional functional information from gated CTA might be helpful in AS patients with difficult TTE images undergoing TAVR evaluation.

163 Machine-learning integration of CT histogram analysis to evaluate the composition of atherosclerotic plaques: Validation with IB-IVUS

Takanori Masuda, Takeshi Nakaura, Yoshinori Funama, Tomokazu Okimoto, Tomoyasu Sato, Toru Higaki, Noritaka Noda, Naoyuki Imada, Yasutaka Baba, Kazuo Awai

We investigated whether machine learning with histogram analysis of coronary CT angiography (CCTA) yields higher diagnostic performance for coronary plaque characterization than the conventional cut-off method using the CT number. We included 78 coronary plaques who had undergone CCTA and integrated backscatter intravascular ultrasound (IB-IVUS) studies. Using 5-fold cross validation of the plaque CT number, the area under the receiver operating characteristic curve of the machine learning and the conventional cut-off method was compared. The machine learning was superior the conventional cut-off method for coronary plaque characterization using the plaque CT number on CCTA images.

Letter to the Editor

e1 The effect of coronary plaque on events in patients with type 2 diabetes

Tomoyuki Kawada

e2 Reply: Impact of diabetes on coronary artery plaque volume by coronary CT angiography and subsequent adverse cardiac events

Simon Deseive, Jörg Hausleiter

e3 Reply to letter to the editor regarding "Prevalence and impact of scan-related anxiety during Coronary CT angiography: A prospective cohort study of 366 patients"

Mickaël Ohana, Stephanie L. Sellers, Jonathon A. Leipsic

e4 Patient anxiety during CCTAs

Noah Weg

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