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ONLINE ABSTRACT SYLLABUS

INVITED ABSTRACTS

CARDIOVASCULAR RADIOLOGY

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EUROPEAN SOCIETY OF CARDIOVASCULAR RADIOLOGY

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ESTI EUROPEAN SOCIETY OF THORACIC IMAGING

A-853

A systematic approach to reading CXR

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Body*

Even in the age of cross-sectional imaging, chest x-ray is still the most frequently performed x-ray examination. Since it is a projection image, i.e. a three-dimensional body is reduced to a two-dimensional image, it is much more difficult to distinguish "normal" from "pathological" than, for example, in computed tomography. Also, it can be tricky to determine the correct diagnosis in case of pathological changes.
The lecture will provide a systematic approach for the analysis of a chest x-ray. First the normal anatomy including the "lines and stripes" will be presented. Based on this knowledge, pathological changes and their differential diagnoses will be discussed. The limitations of the chest x-rays will be mentioned.

Take Home Points*

1. Systematic approach for the analysis of a chest x-ray
2. Normal anatomy including the "lines and stripes"
3. Pathologic changes on chest x-ray including differential diagnoses
4. Limitations of chest x-ray

A-858

A systematic approach to reading lung CT: Increased and decreased density

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Body*

Several pulmonary conditions are characterized by a variable lung attenuation in a lobular or multilobular distribution on high-resolution CT scans of the lungs.
Increased lung attenuation may be observed as air-space consolidation or “ground-glass opacity”.
Decreased lung attenuation, not reflecting cystic lesions or emphysema may be recognized on HRCT, can be focal, lobular or lobar, or multifocal.

Air space consolidation occurs when alveolar air is replaced by fluid, cells, or other material. On HRCT, results in an increase in lung opacity associated with obscuration of underlying vessels.
“Ground-glass opacity” is a nonspecific term referring to a hazy increase in lung opacity associated with obscuration of underlying vessels.

Mosaic pattern of lung attenuation

The mosaic pattern of lung attenuation is characterized by a sharply defined geographic patchwork of regions of increased and decreased density on full inspiratory images. This pattern presents a challenge to the radiologist when deciding *which are the abnormal regions of lung*--those of low attenuation, those of high attenuation, or both.
Establishing a cause of mosaic attenuation pattern requires careful consideration of many factors, including clinical features/history, results of relevant laboratory tests, and associated HRCT findings.
We emphasize the additional diagnostic value of volumetric expiratory HRCT scans in providing additional significant information in the evaluation of a variety of diffuse lung diseases characterized by areas of increased and decreased density.
Air trapping consists of focal zones of decreased attenuation seen at expiratory thin-section CT scans of the lungs obtained during suspended expiration following a forced exhalation.
The presence of air trapping is an excellent clue to the diagnosis of small airways disease. Air trapping is a manifestation of many diverse entities such as infections, aspiration or inhalation of foreign substances, immunologic and connective tissue disorders, and miscellaneous causes.

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Take Home Points*

- Recognize the most common diffuse lung diseases associated with increased and decreased density relative to adjacent normal lung parenchyma on high-resolution CT.
- Emphasize the additional diagnostic value of volumetric expiratory HRCT scans in the evaluation of a mosaic pattern of lung attenuation.
- Combination of pattern recognition with knowledge of the clinical setting is the best approach to parenchymal lung diseases.

A-860

A systematic approach to reading lung CT: Airway disease

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Body*

Respiratory pathologies include a wide range of inflammatory, fibrotic and neoplastic lung diseases. High-resolution CT plays a key role in the detection and classification of these pathologies. Non-neoplastic lesions of the central airways are uncommon, have various aetiologies, with focal or diffuse involvement of the tracheobronchial tree. Diseases of the small airways can be seen directly or indirectly on high-resolution CT. They include centrilobular nodules, branched nodular opacities (tree in bud), and/or the demonstration of mosaic attenuation which is typically amplified on expiratory CT.
Alterations in airway structure contribute to airflow obstruction. This presentation will provide some information on quantitative airway analysis to study airway wall remodelling.

Take Home Points*

High-resolution CT is the non-invasive examination of choice for assessing the tracheobronchial airways because it offers multi-planar capabilities, assesses wall morphology and can be acquired in seconds or less.
Diseases of the small airways include centrilobular nodules, branched nodular opacities (tree in bud), and/or the demonstration of mosaic attenuation which is typically amplified on expiratory CT.

EBCR DIPLOMA PREPARATORY SESSION: HOW-I-DO-IT (BASIC)

A-801

My Approach to ARVC

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Body*
In this lecture will be discussed the approach of right ventricular arrhythmogenic cardiomyopathy. Cardiac magnetic resonance protocol will be discussed.
Cine images and planes, black blood images and late gadolinium enhancement protocol will be showed. Findings of ARVC will be showed. A small part regarding the role of CT will be discussed at the end.
Take Home Points*
- Cardiac magnetic resonance protocol
- Findings of ARVC
- Role of CT

A-830

My approach to dilated cardiomyopathy

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Body*
Dilated cardiomyopathy (DCM) poses significant challenges in clinical management and diagnosis due to its diverse etiologies and variable clinical presentations. To address these complexities, a comprehensive approach utilizing both cardiac magnetic resonance (CMR) and cardiac computed tomography angiography (CCTA) emerges as a valuable tool in the hands of cardiac radiologists. This will highlight the strengths of these imaging modalities to enhance diagnostic accuracy and clinical decision-making in patients with DCM.
CMR, offers superior tissue characterization and accurate biventricular functional assessment. Tissue characterization through late gadolinium enhancement and T1/T2 mapping tools enables the detection of myocardial fibrosis/edema, aiding in identifying the underlying pathological substrate of DCM. It also yields prognostic significance and servers as tool for accurate therapeutic management in cases like patients candidate to the implantation of implantable cardioverter defibrillator. CTCA complements and plays a crucial role to rule out ischemic etiologies contributing to DCM and has been recently proposed as a novel tissue characterization tool.
Complementary use of CMR and CTCA as a powerful approach for precise and comprehensive evaluation of dilated cardiomyopathy. This multimodality imaging approach equips cardiac radiologists with a valuable toolset to provide accurate diagnoses, facilitate appropriate therapeutic decisions, and ultimately improve patient outcomes.
Take Home Points*
The integration of cardiac MR and cardiac CT in the evaluation of DCM provides a comprehensive assessment of cardiac structure, function, and coronary arteries, enhancing diagnostic accuracy.
CMR facilitates tissue characterization through LGE and mapping techniques, aiding in the identification of myocardial fibrosis and underlying etiologies.
CCTA, is invaluable in ruling out coronary artery disease as a cause of DCM and evaluating coronary artery patency.
An integrated imaging approach aids cardiac radiologists in tailoring patient management strategies, leading to improved clinical outcomes and better-informed therapeutic decisions in patients with DCM.
References:

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A-871

Key-note lecture: Cardiovascular Imaging: New kids on the block

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Body*

Among the newest developments in cardiovascular imaging, spectral imaging, photon counting CT and 4D flow MRI are possibly the techniques that have elicited the strongest interest and the greatest number of publications.

Since its introduction years ago, spectral imaging has changed the way we look at CT technology in terms of acquisitions, contrast media injection protocols, patients' safety. Last but not least, spectral imaging has deeply modified the way we look at CT scans. Indeed, it opened the way to new types of images and to the imaging of materials.

Photon counting CT can couple the benefits of spectral imaging with improved spatial resolution and artefact reduction. All combined, these features are breaking some of the "taboos" of cardiovascular imaging such as the assessment of patency of coronary stents and grading of stenosis of heavily calcified coronary arteries.

4D flow MRI allowed for a deeper understanding of the physiopathology of many aortic and cardiac diseases and is a formidable ally in clinical practice for instance for the follow-up of patients with congenital diseases.

AI can (and will) help unleash the potential of all these methods in both research and clinical practise.

All these techniques are modifying the way cardiovascular diseases are diagnosed and, therefore, the entire management of patients. As cross-sectional imaging becomes irreplaceable for more and more cardiac and vascular pathologies, the role of radiology in this field will take new shapes.

Take Home Points*

Spectral imaging, photon counting CT and 4D flow MRI are deeply changing our understanding of cardiovascular diseases.

These methods are affecting the way we diagnose cardiovascular diseases and they are shaping the role of cardiovascular radiology of the future.

ESCR MEETS ASCI: RISK STRATIFICATION AND PROGNOSIS IN NON-ISCHEMIC CARDIOMYOPATHY

A-822

LGE imaging

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Body*

Sudden cardiac death (SCD) due to arrhythmia remains a significant risk in patients with dilated cardiomyopathy (NICM), and implantable cardioverter defibrillators (ICDs) have proven effective in preventing SCD. However, current guidelines recommend selecting an ICD based on a low ejection fraction (EF) of 35% or less. Furthermore, a significant number of SCD cases occur in patients with EF greater than 35%. Therefore, more sophisticated selection strategies are needed to improve patient prognosis. Cardiac magnetic resonance (CMR) imaging with late gadolinium enhancement (LGE), which allows identification of myocardial fibrosis, provides a more accurate approach to risk stratification in NICM. Meta-analyses have shown that LGE is associated with increased cardiovascular mortality, ventricular arrhythmic events, and hospitalizations for heart failure in NICM patients, while patients without fibrosis have a lower risk of SCD. Epicardial LGE, transmyocardial LGE, and the combination of septal LGE and free wall LGE have been found to be associated with increased risk.
This presentation aims to provide a comprehensive overview of the role of LGE imaging in risk stratification and prognosis assessment in patients with NICM by reviewing key clinical studies that have established the prognostic significance of LGE and its high-risk patterns.

Take Home Points*

1. Sudden cardiac death (SCD) is a significant risk in dilated cardiomyopathy (NICM), and ICDs are effective in prevention. However, current guidelines may miss high-risk patients with EF > 35%.
2. Cardiac MRI with late gadolinium enhancement (LGE) provides accurate risk stratification in NICM by identifying myocardial fibrosis linked to adverse outcomes, including increased cardiovascular mortality and arrhythmic events.
3. Specific patterns of LGE, such as epicardial LGE, transmyocardial LGE, and the combination of septal LGE and free wall LGE, have been linked to increased risk in NICM patients.

A-770

Mapping (T1 + ECV)

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Body*

Purpose: Tissue characterisation is a unique and distinguishing feature of cardiac MRI and enables characterization of various myocardial conditions. Clinical applications, technical considerations and pitfalls of T1 mapping pre- and post- contrast as well as Extracellular Volume (ECV) measurements will be presented.

Methods and Results: The introduction of Late Gadolinium enhanced MRI (LGE-MRI) opened the door for tissue characterization, not available with other imaging modalities. Further refinements such as T1- and ECV mapping enable even more detailed tissue characterization. Combining pre- and postcontrast T1-mapping allows ECV calculation, when hematocrit values are available from blood samples. Contrast enhanced T1-mapping allows assessment of subtle structural changes such as in mild inflammation. ECV enables detection and quantification of replacement fibrosis such as in treatment with cardiotoxic medication or infiltrative diseases such as amyloidosis. It must be emphasized, however, that T1-values must be interpreted with caution, since they may vary among sequences and magnets. This explains the need to establish normal values for every hardware and sequence system. Moreover, T1-times at 3 Tesla are typically longer than at 1.5 Tesla. ECV values, however, are less dependent on specific hard- and software.

Conclusion: Parametric myocardial tissue T1- and ECV-mapping are powerful clinical tool to predict outcome and guide therapy.

Take Home Points*

Multiparametric tissue mapping is a unique feature of MRI
T1 values may vary among different imaging platforms
ECV mapping enables comparison of tissue characteristics among different imaging platforms

A-835

Strain imaging for risk stratification in non-ischemic cardiomyopathy

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Body*

Non-ischemic cardiomyopathy is a heterogeneous group of diseases that are characterized by impaired left ventricular (LV) function in the absence of coronary artery disease. The prognosis of non-ischemic cardiomyopathy is variable, and there is a need for better tools to stratify patients at risk of adverse outcomes.

Strain imaging is a technique that uses echocardiography, magnetic resonance imaging, or computed tomography to measure the deformation of the LV during the cardiac cycle. Myocardial strain is clinically useful in the early diagnosis of myocardial dysfunction. Strain imaging has been shown to be a useful tool for risk stratification and prognosis in non-ischemic cardiomyopathy. Studies have shown that reduced LV strain is associated with an increased risk of death, heart failure, and ventricular arrhythmias in patients with non-ischemic cardiomyopathy.

In addition to its prognostic value, strain imaging can also be used to guide therapy in patients with non-ischemic cardiomyopathy. Studies have suggested potential use of strain imaging to predict outcomes after treatment such as ICD implantation or cardiac resynchronization therapy.

Take Home Points*

1. Strain imaging is a useful tool for risk stratification and prognosis in non-ischemic cardiomyopathy.
2. Reduced LV strain is associated with an increased risk of death, heart failure, and ventricular arrhythmias.
3. Strain imaging can be used to guide therapy in patients with non-ischemic cardiomyopathy.

CHRONIC CORONARY SYNDROMES (BASIC)

A-781

Chronic coronary syndromes - overview of current guidelines

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-, Edinburgh, United Kingdom

Body*
This talk will give an overview of current guidelines for chronic coronary syndromes in Europe and around the world. It will discuss the background to their current development and the role of non-invasive imaging in the management of patients with chronic coronary syndromes. It will discuss similarities and differences between the guidelines and factors to consider when selecting an appropriate imaging investigation.

Take Home Points*
Guidelines for the diagnosis and management of patients with chronic coronary syndromes vary around the world.
Non-invasive imaging tests are important in the diagnosis of chronic coronary syndromes I.
A variety of patient, imaging and local factors should be taken into consideration when selecting an appropriate diagnostic test.

A-828

Coronary CTA: Plaque and stenosis assessment

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Body*
Coronary CTA has become the first line imaging modality in outpatients presenting with chest pain (chronic coronary syndrome). Clinical application of coronary CTA is also emerging on both ends of the spectrum of atherosclerotic coronary artery disease, including the setting of acute coronary syndrome, heart-team meetings for planning revascularizations (based on CT) and to a lesser extend cardiovascular risk management in asymptomatic patients. This presentation will focus on the “what, why and how” of plaque and stenosis assessment in routine clinical practice in the setting of first-time outpatient presentation of chest pain. Topics for discussion include: CT-scan requirements, interpretation considerations regarding image quality and consequences for diagnosis, prognosis additional testing and treatment.

Take Home Points*
To create awareness about:
- minimal requirements regarding image quality for routine clinical practice
- interpretation considerations related to image quality and disease severity
- consequences of interpretation and reporting for diagnosis, prognosis, additional investigations and treatment

A-857

Functional CT imaging FFR-CT and perfusion

J. Weir-McCall
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Body*

This lecture will focus on the approaches to functional assessment of coronary artery disease using cardiac CT. This will cover both CT derived fractional flow reserve (CT-FFR) and CT stress perfusion imaging.

The basics of both techniques will be covered, with tips and tricks to optimise the acquisition of these. Current recommendations for the interpretation of the outputs of these techniques, and guidance on reporting the findings will be covered, as will downstream management and investigation. These will be framed within the results of recent trials.

Take Home Points*

Functional assessment of coronary artery stenosis is now feasible, expanding the potential role of cardiac CT beyond anatomical assessment.

CT-FFR can be incorporated within routine clinical protocols, better determining the functional significance of anatomicaly moderate to severe stenosis, and reducing the need for invasive coronary angiography.

CT perfusion is highly accurate, and boosts the accuracy of CT angiography alone, particularly in the evaluation of coronary stents where current CT-FFR technology is limited

A-803

Follow-up of patients with CHD: Tetralogy of Fallot

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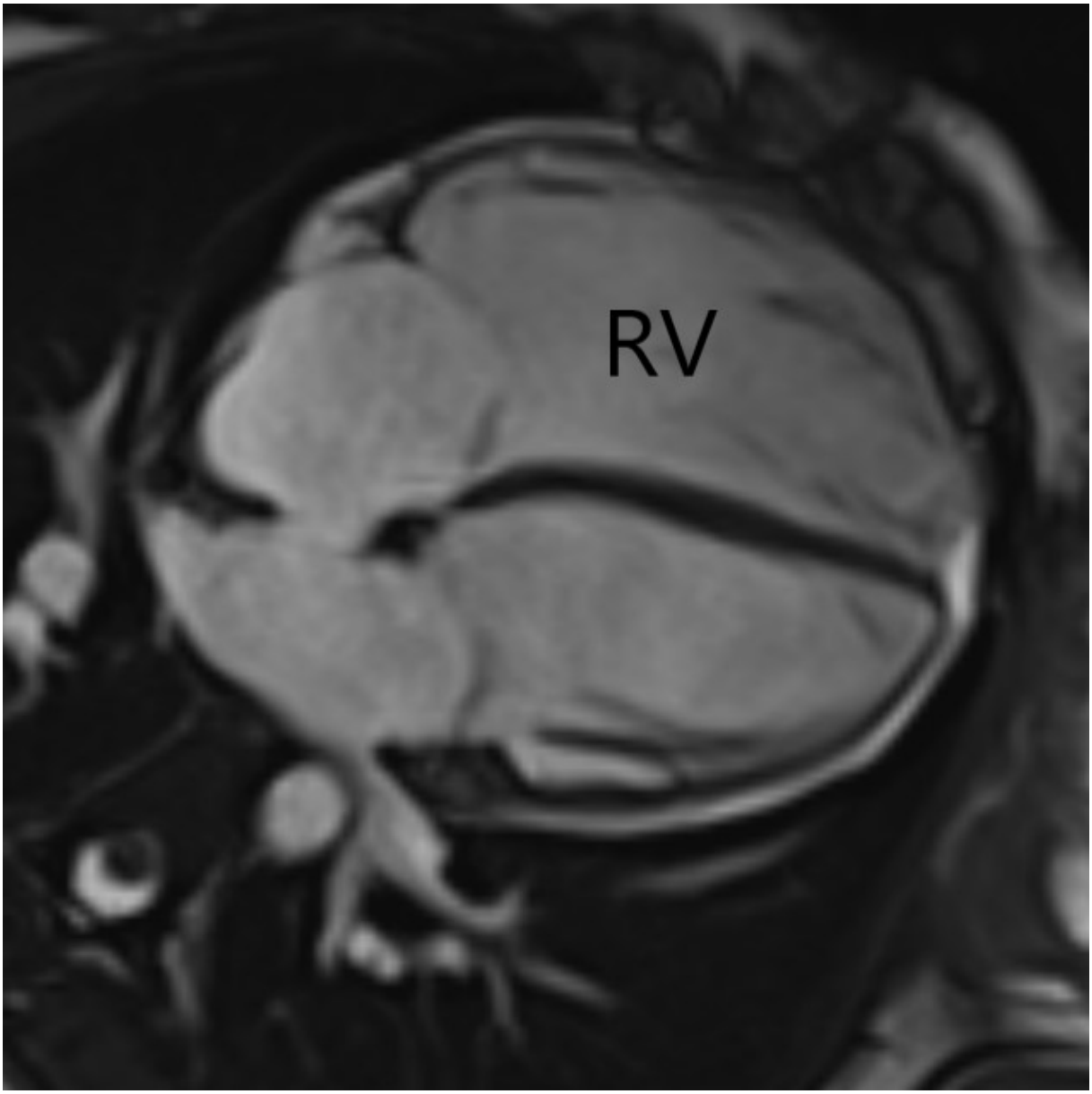
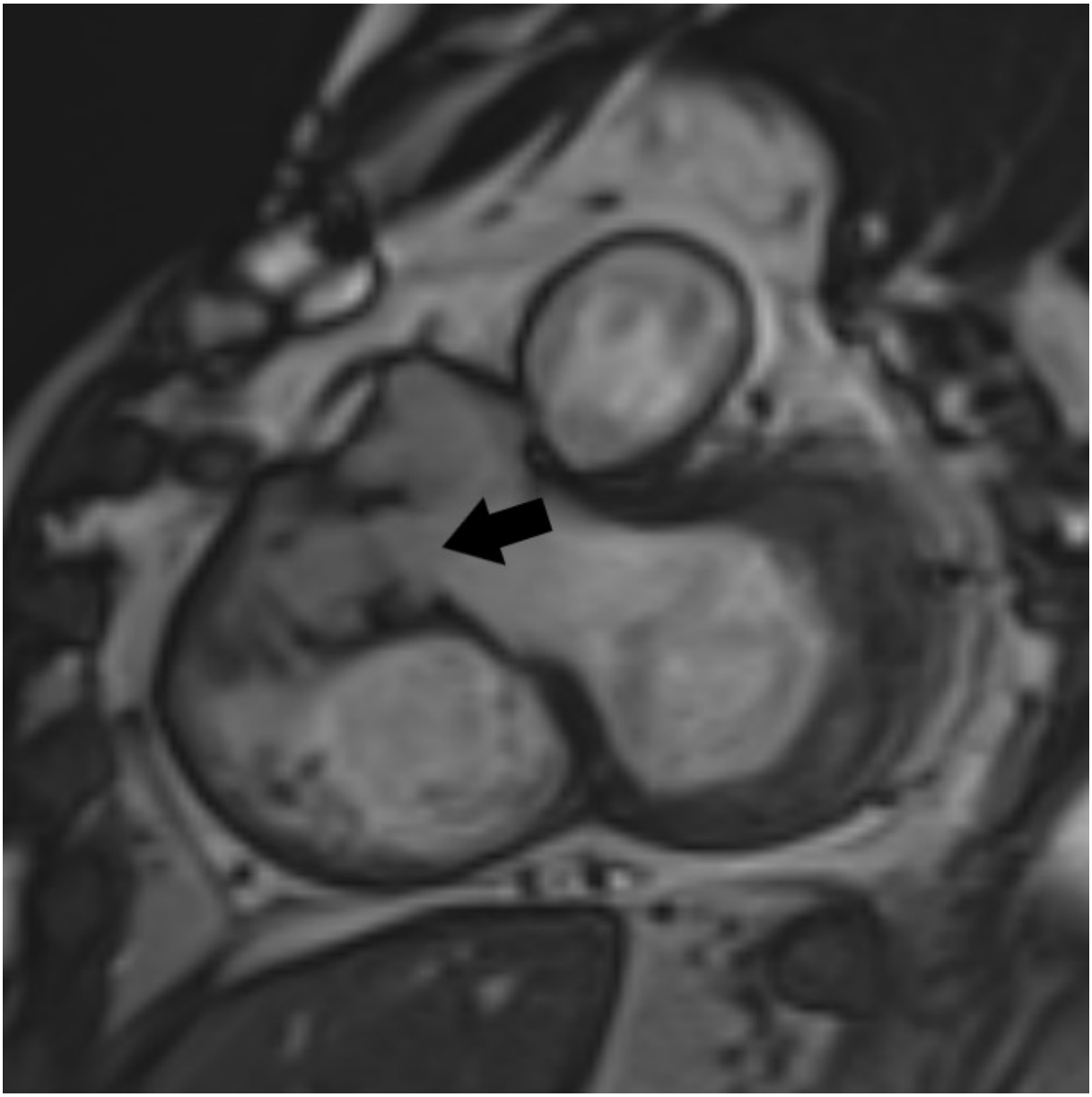
Body*

Tetralogy of Fallot (ToF) is the most common cyanotic congenital heart disease characterized by a nonrestrictive ventricular septal defect (VSD), overriding aorta, right ventricular outflow tract (RVOT) obstruction (infundibular, valvular or supravalvular) and/or branch pulmonary artery (PA) stenosis, as well as consequent right ventricular (RV) hypertrophy [1]. It is usually initially treated surgically in terms of VSD closure and RVOT obstruction relief by infundibulectomy, transannular patch repair or RV-PA conduit implantation. The most common residual abnormality after surgery is a relevant pulmonary regurgitation (PR) leading to RV volume overload, dilatation, and dysfunction, with or without secondary tricuspid regurgitation.



Enddiastolic SSFP 4-chamber image of the heart in a patient with repaired tetralogy of Fallot and pulmonary regurgitation (regurgitation fraction 35%). The right ventricle (RV) is enlarged (EDVi 154 ml/m2)
Other possible complications include residual RVOT obstruction, RVOT aneurysm, residual VSD, branch PA stenoses, progressive aortic dilation, aortic regurgitation, left ventricular dilatation, and dysfunction.



Cine short-axis image showing the residual ventricular septal defect (arrow) with Qp : Qs = 1.6

Therefore, the most common late interventions include surgical or interventional pulmonary valve replacement, conduit replacement, and pulmonary artery angioplasty and stenting.

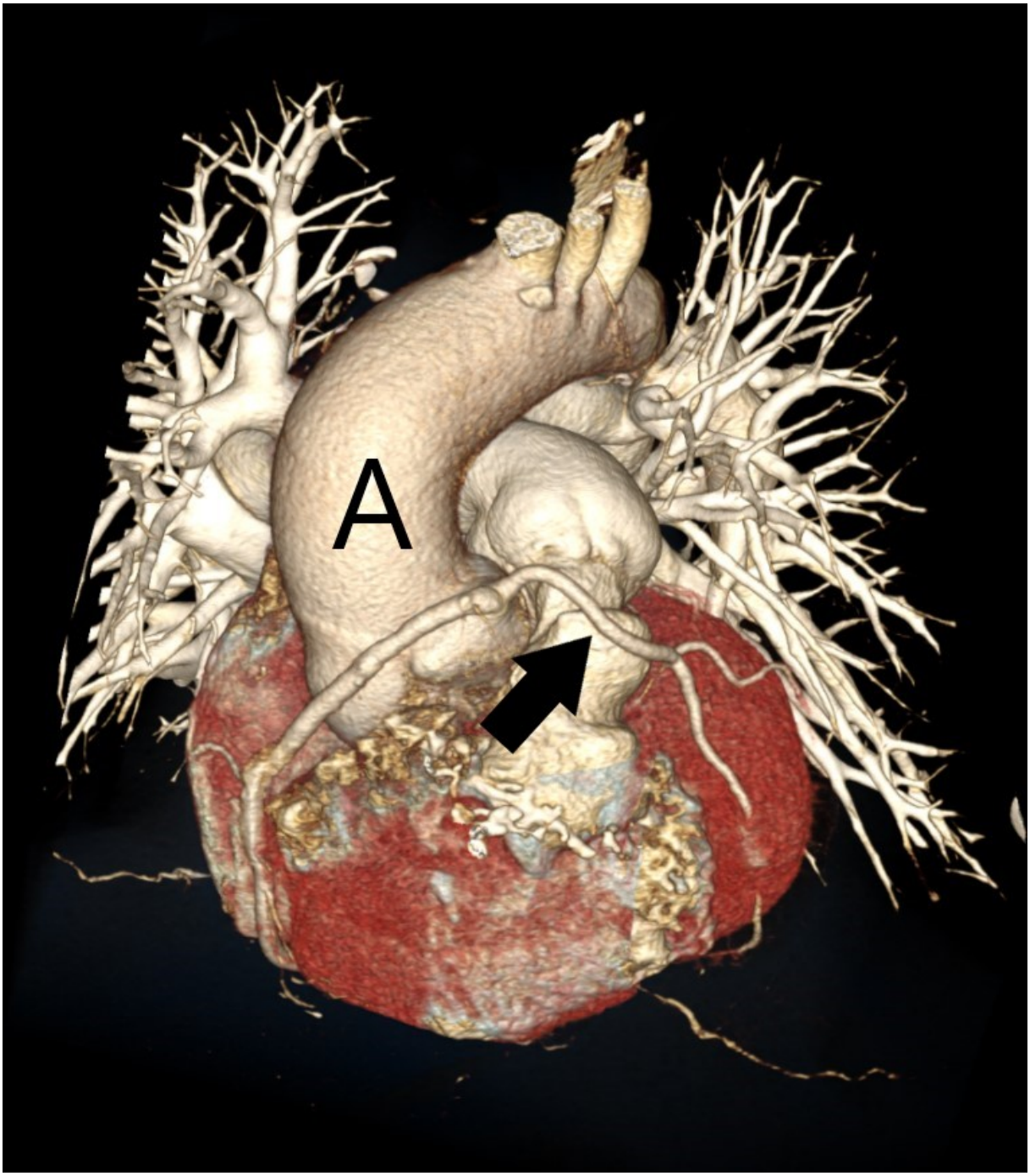
Magnetic resonance imaging (MRI) is the method of choice for PR quantification, as well as RV volume and function assessment, and enables the optimal timing for interventional/surgical treatment [2]. It also enables early detection of other postsurgical complications. MRI protocol that should be used for follow-up of ToF patients is depicted in Table 1.

Sequence	Plane	Evaluation	Results
Cine SSFP	Short-axis, 4Ch, LV 2Ch and 3Ch, RV 2Ch and 3Ch	MRI volumetry, evaluation of regional wall motion abnormalities	LV and RV volumes and ejection fraction, regional wall motion abnormalities (RVOT)
Phase-contrast imaging	Pulmonary valve, aortic valve, RPA, LPA	Flow evaluation (volume, velocity)	Degree of pulmonary regurgitation and RVOT obstruction, secondary tricuspid regurgitation, differential PA flow, Qp : Qs, aortic regurgitation
CE-MRA	Coronal	MPA, RPA and LPA diameter, ascending aorta diameter	PA stenoses, aortopulmonary collaterals, aortic dilatation
LGE	Short-axis, 4Ch, LV 2Ch and 3Ch, RV 2Ch and 3Ch	Myocardial scarring	LGE extent and distribution, thrombi

Table 1. MRI protocol for follow-up of patients born with Tetralogy of Fallot

Providing comprehensive morphological and functional assessment without the use of ionizing radiation, MRI is an ideal tool for longitudinal follow-up of ToF patients. However, metal artifacts may limit the MRI evaluation of patients after prosthetic valve implantation or stenting of pulmonary arteries.

If interventional PR treatment with Melody valve implantation is planned, computed tomography (CT) enables a detailed morphological depiction of the pulmonary valve, conduit calcification, and relationship between coronary arteries and RVOT. CT can depict coronary artery anomalies, PA stent lumen, aortopulmonary collaterals, and the relationship between cardiovascular structures and sternum if re-sternotomy is planned.



CT angiography in a patient with anomalous prepulmonary course of LAD (arrow). Dilatation of the ascending aorta (A)

Take Home Points*

1. MRI is the method of choice for PR quantification and for the evaluation of RV volumes and function after ToF correction.
2. MRI protocol should provide information about ventricular volumes and function, valvular disease, PA morphology, residual shunting, and myocardial scarring.
3. CT may provide additional information for planning pulmonary valve intervention, as well as for evaluation of PA morphology before and after stenting, and for assessment of coronary artery anomalies.

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A-811

Transposition of great arteries

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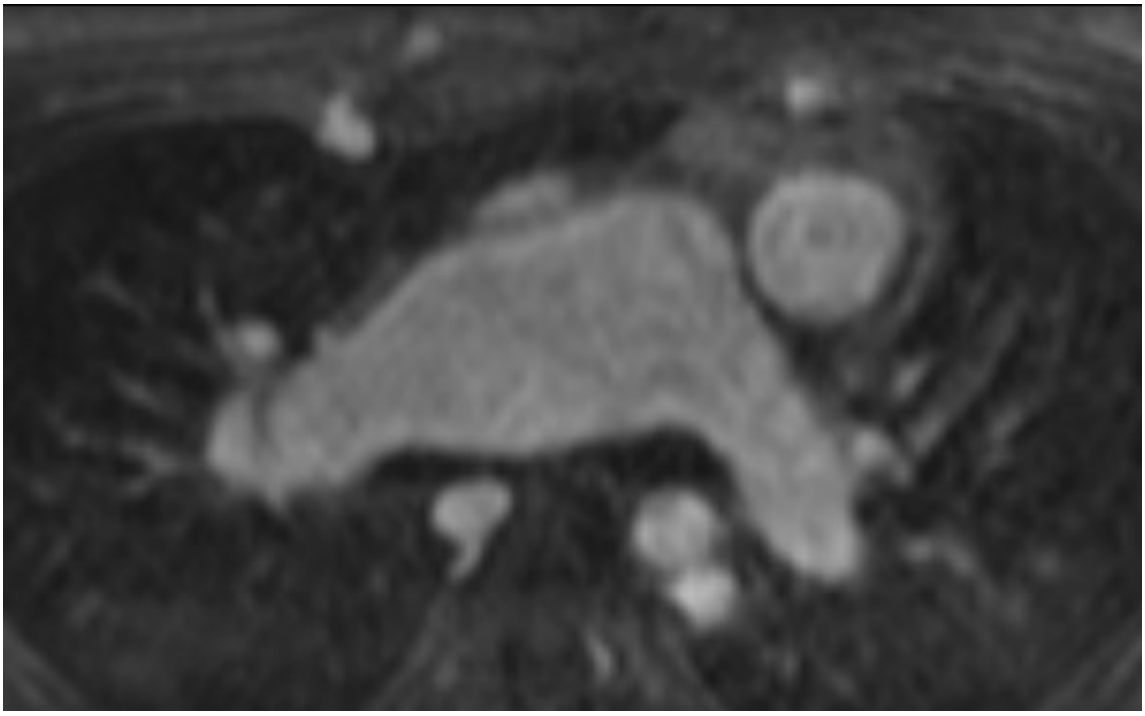
Body*

Transposition of the great arteries (TGA) is a congenital cardiac anomaly arising from an embryological discordance off the connections between the ventricles and aorta and pulmonary artery. It occurs when the conotruncal septum fails to keep in place with its spiral course and instead proceed in a linear positioning, during cardiac development. There are different types of TGA, depending on the viscero-atrial situs (solitus or inversus) and the type of ventricular loop (D or L).

The most usual type of TGA is complete transposition or dextro-transposition of the great arteries (D-TGA), also referred to as D-loop, where the connections between the ventricles and atria are in concordance, and can be summarized as (S,D,D).
Is a cyanotic congenital heart disease, and the degree of shunting between oxygenated and deoxygenated blood, is responsible for the variation on disease clinical manifestations. Mustard/Senning operations (address at the atrial level), were common performed in the past, but are no longer used, while most patients who underwent these procedures, require ongoing imaging follow-up. The Jatene arterial switch operation and the Rastelli baffle/conduit procedure address D-TGA at the level of the great arteries, aortic root translocation with right ventricular outflow tract (RVOT) reconstruction (Nikaidoh), the pulmonary artery translocation (Lecompte), are surgical alternatives of the current treatment.

The second most common type of TGA is congenitally corrected transposition (ccTGA), also referred to as L-loop or L-TGA, where the connections between the ventricles and atria are discordant, with the left atrium connected to the RV, and the right atrium connected to the LV, and can be summarized as {S,L,L}.
Associated abnormalities are usually present, for instance VSD, tricuspid valve malformation and dysfunction, and pulmonary outflow obstruction are frequently present, and these lesions or repair of these lesions should be also assessed on imaging. The aorta is anterior and to the left of the pulmonary artery, best seen on axial images.



Repair of ccTGA may be classical, repairing the associated abnormalities and leaving the RV as the systemic ventricle or may be adressed as a more complex anatomic repair.

Imaging plays always an important role in the evaluation of TGA, before and after surgery, as it can:
Define the anatomy
Quantify hemodynamics
Evaluate complications

Take Home Points*
Although transthoracic echocardiography is the first-line imaging technique and CT can be performed when MRI is contraindicated or expected to have non diagnostic images, the Cardiac magnetic resonance (CMR) remains the most comprehensive non-invasive imaging method, as it provides morphologic and functional informations.

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CONVENTIONAL AND ADVANCED USE OF MAPPING (ADVANCED)

A-856

Assessment of myocardial inflammation T1 – vs. T2 Mapping

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Body*

In the past, evaluation of myocardial edema was strictly confined to T2 BB sequences. In order to overcome the technical limitations of T2 BB, nowadays T1 and T2 mapping approach are widely used in clinical practice. Using T1 mapping (before and after administration of contrast agent) it is possible to evaluate the increased extracellular volume. However increased ECV is a pathological myocardial abnormality that can be observed in different conditions ranging from edema to replacement fibrosis. Using T2 mapping sequences it is possible to identify with high diagnostic accuracy presence of edema.. In particular the application of T1 mapping and T2 mapping in the 2018 Lake Louise criteria increased the sensitivity for detection of acute myocarditis.
The combination of T1 and T2 mapping approach can be extremely helpful however it is important to correlate data of mapping with late gadolinium sequences considering that some pattern of LGE are extremely specific for some cardiac pathologies.

Take Home Points*

T1 and T2 mapping increase the diagnostic accuracy for the evaluation of myocarditis.
Pattern of LGE should be considered in addition to T1 and T2 mapping.

A-872

Assessment of ECV - A New Indispensable Tool?

A. Varga-Szemes
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Body*

Extracellular volume (ECV) quantification by T1 mapping has emerged as a promising imaging tool in cardiac magnetic resonance (CMR) imaging. This talk demonstrates the utility and potential of ECV as a novel, non-invasive method for the quantification of diffuse myocardial fibrosis, offering the prospect of early diagnosis and improved management of various cardiac diseases. The talk will outline the technique's principles, its clinical applications, and the advancements it brings to cardiovascular imaging. ECV quantification provides detailed insights into myocardial tissue health, addressing some of the limitations that conventional late gadolinium enhancement imaging has. Its accuracy in detecting early (subclinical) and diffuse myocardial changes makes it a potential game-changer in the prognostication and therapeutic planning of cardiac diseases. Despite some challenges, such as the need for standardization and validation in large patient cohorts, the role of ECV as an indispensable tool in modern CMR is apparent.

Take Home Points*

ECV quantification by T1 mapping is emerging as an invaluable tool in CMR, offering non-invasive quantification of diffuse myocardial fibrosis.
CMR-based ECV quantification can significantly influence prognostication and therapeutic planning.
Continued research to refine the technique and validate its clinical impact will further strengthen the role of ECV quantification in CMR imaging.

A-862

Innovative Applications of T2 Mapping

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Body*

The talk “Innovative Applications of T2 Mapping” focuses on a critical review of the innovative applications of T2 Mapping in cardiovascular magnetic resonance (CMR) imaging. T2 Mapping, a quantitative CMR technique, has demonstrated promising advancements in the diagnosis, monitoring, and management of cardiovascular diseases. Traditionally, the role of T2 Mapping lies in identifying myocardial changes such as edema. The technique's quantitative nature provides a more detailed, objective assessment of myocardial health, surpassing the limitations of conventional MRI. While challenges such as the need for sequence standardization and improved reproducibility exist, the potential of T2 Mapping in transforming cardiovascular imaging is evident. Innovative applications of T2-based imaging extend the application from myocardial to blood oxygenation changes and open up a new field of research applications such as myocardial perfusion, shunt detection, and evaluation of exercise capacity.

Take Home Points*

T2 Mapping has been established as a tool for myocardial imaging, especially for the visualization and quantification of myocardial edema.
Despite existing challenges such as the need for sequence standardization and improved reproducibility, new innovation focus on the application of T2 mapping to detect changes in blood pool oxygenation.
Such applications may pave the way to improve current CMR strategies for perfusion imaging, shunt detection, or the evaluation of exercise capacity.

ESCR MEETS NASCI: PHOTON-COUNTING CT (ADVANCED)

A-765

Photon-Counting CT: Coronary Arteries and Stents

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Body*
Photon-counting detector computed tomography (PCD-CT) is characterized by various improvements as compared to conventional CT systems. These include an increased spatial resolution, lower noise, higher contrast-to-noise ratio, higher radiation dose efficiency and the inherent spectral information in each scan. All these issues have the potential to improve diagnostics and may impact current patient management pathways. In regard to the coronary arteries, particularly the ultra-high resolution mode of PCD-CT has shown superior quality of tiny anatomical structures including the vessel lumen, vessel wall und atherosclerotic plaques. This scan mode also enables a superior visualization of coronary stents and in particular the in-stent lumen. The presentation aims to demonstrate these major advantages of PCD-CT for coronary artery and coronary stent imaging.

Take Home Points*
- Photon-counting detectors (PCD) represent the most recent innovation in hardware development of computed tomography (CT) systems.
- PCD-CT show several advantages over conventional CT systems in regard to image quality and spatial resolution, and additionally enable the analysis of spectral information from each scan.
- Both the high spatial resolution and the inherent spectral scan mode in combination with the high temporal resolution enable improved coronary artery and coronary stent imaging.
- Particularly coronary plaques and coronary in-stent lumen can be visualized with a better image quality when using PCD-CT scanners.

A-870

K-edge contrast media

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Body*
Recently, CT scanners employing photon counting detectors (PCD-CT) have shown capabilities to improve and drive advancements in cardiovascular imaging.
Benefits in cardiovascular imaging include the improved spatial resolution and reduced electronic noise of PCD-CT as compared to CT scanners equipped with energy-integrating detectors (EID-CT). More benefits of PCD-CT derive from spectral images that can always be reconstructed after the exam as on dual-energy dual-layer EID-CT scanners. Spectral properties of PCD-CT are currently being investigated in humans and are expected to be similar to those of dual energy EID-CT, possibly better.
In addition to the aforementioned improvements, PCD-CT scanners offer an additional feature that does not exist (and cannot exist) for EID-CT scanners: K-edge imaging. K-edge imaging allows depicting a single material of choice and opens new fascinating possibilities especially, but not only, in the field of contrast media development.
Knowing the physics behind this type of imaging is important for understanding the possibilities and the limitations of the technique and its possible uses in association to other spectral images. Phantom and animal studies have highlighted the performances of K-edge imaging for new contrast media and potential usages of this technique, for instance for the visualization of the lumen of small arteries with K-edge of gadolinium. Human studies are currently at the starting blocks.

Take Home Points*
K-edge imaging is possible only with photon counting CT and allows for visualisation of a single material of choice.
This technique is expected to open the way to new possibilities and applications in cardiovascular imaging.
The possibility to perform K-edge imaging is likely to further stimulate new developments in contrast media design and production.