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ONLINE ABSTRACT SYLLABUS

INVITED ABSTRACTS

COMMON TRACK

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ESTI EUROPEAN SOCIETY OF THORACIC IMAGING

A-854

Clinical applications for cardiac CT

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Body*

Since the introduction of cardiac CT, a significant advance in technology has strengthened the role of cardiac CT in clinical practice. Cardiac CT offers anatomical and functional information to guide patient management.
A continuously growing scientific evidence supports noninvasive coronary CT as an important diagnostic test for the management of appropriately selected patients with acute chest pain and chronic coronary artery disease as well as for asymptomatic individuals at intermediate risk of atherosclerotic cardiovascular disease.
Moreover, cardiac CT offers essential anatomical information for planning interventions for patients with structural heart disease, for preprocedural planning in patients with congenital heart disease, for left ventricular lead placement as well as for the evaluation of cardiac valves with and without prosthesis.

Take Home Points*

1- To get acquainted with different applications of cardiac CT
2- To learn about various indications for coronary CT and coronary calcium scoring
3- To understand the role of cardiac CT in planning cardiac interventions and for the evaluation of prosthetic cardiac valves

A-866

How to do a Cardiac MR

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Body*

The lecture will offer a concise and complete overview of the basics of Cardiac-MRI.
In particular, the purpose will be to answer the common and essential questions that arise when starting to perform Cardiac-MRI exams.
- What are the technical requirements?
- How to prepare the patient for a cardiac-MRI?
- What are the acquisition plans and how are they obtained?
- Which sequences and which protocols?
- What information can we get?
- How are the images analyzed and interpreted?

Emphasis will be devoted to setting up a standard protocol for the study of the most common cardiac conditions (cineMR sequences, STIR T2 weighted, late gadolinium enhancement, Phase Contrast 2D).
The lecture will also include the description of the most recently introduced sequences (mapping, 4D flow) and those used in specific settings (Coronary MR Angiography, 3D whole heart).

Take Home Points*

- A proper knowledge of the basics in scan plans and sequences is essential for a proper execution of the Cardiac MRI exam and interpretation of the images.
- Cardiac MRI protocols must be adapted to the specific clinical indication and scenario, given the long acquisition times and the intrinsic limitations of the method.
- Some dedicated sequences may offer added value in specific clinical settings (e.g. congenital conditions).

OPENING CEREMONY: WHERE HEART AND LUNGS MEET

A-766

Pulmonary Hypertension due to Left Heart Disease: Role of CT and MR

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Body*

Pulmonary Hypertension related to left heart disease is the most common form of PH and is either a consequence or biomarker of underlying cardiac disease. Typically patients with PH-LHD have advanced disease and poorer prognosis. The differentiation between PH-LHD from other forms of PH can be challenging due to the complex cardiopulmonary hemodynamics and also due to the high prevalence of cardiovascular risk factors in all PH groups. Echocardiographyplays a critical role in the detection of PH-LHD but operator variability, acoustic window and non-tomographic views can limit its utility in the individual patient. The investigative pathway therefore uses a multimodal approach combining other non-invasive tests such as cardiac magnetic resonance imaging and computed tomography. This talk will elaborate on the diagnostic and prognostic benefits of MRI and CT in assessment of the PH-LHD

Take Home Points*

1. PH-LHD is the most prevalent form of PH high morbidity and mortality.
2. Whilst right heart catheterization is the gold standard for diagnosis of PH, the role of non-invasive imaging (with emphasis on CT and MRI) in the diagnosis and management of PH-LHD will be discussed

A-810

Assessment of pulmonary hemodynamics: Can we predict mPAP by cross-sectional imaging?

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Body*

Pulmonary hypertension (PH) is a multifaceted condition, the diagnosis and management of which necessitates an understanding of pulmonary haemodynamics, particularly the mean pulmonary artery pressure (mPAP). Traditionally, right heart catheterisation (RHC) has been employed to measure mPAP, but its invasive nature, cost and associated risks call for non-invasive alternatives.

This is where cross-sectional imaging techniques like computed tomography (CT) and magnetic resonance imaging (MRI) come into play. These methods can provide visual signs of PH such as enlargement of the pulmonary artery (PA) and septal deviation, both of which can suggest elevated mPAP and, therefore, warrant more thorough investigation.

However, to truly advance this field, a more nuanced approach is required. The future potentially lies with innovative techniques like machine learning and radiomics, which are capable of extracting detailed information from images, thus potentially predicting mPAP more accurately. Nevertheless, these techniques require further validation through multi-centre studies, along with standardisation of imaging protocols and quantification methods.

Moreover, a collaborative approach is vital to progress in this field, with radiologists, cardiologists, pulmonologists, and data scientists all playing significant roles. Additionally, the best prediction model for mPAP will likely come from integrating these imaging findings with other clinical and haemodynamic parameters.

Take Home Points*

- MPAP is pivotal for the diagnosis and management of PH, with a trend towards non-invasive alternatives to RHC.
- Cross-sectional imaging techniques, such as CT and MRI, can provide visual evidence suggestive of elevated mPAP.
- Future advances may lie with machine learning and radiomics, but they require further validation and standardisation.
- Collaborative efforts across disciplines are key to progress in this field.
- A multi-modal approach integrating imaging findings with other clinical parameters could provide the most accurate prediction model for PH.

COMMON TOPICS 1 – CARDIOTHORACIC LIGHTNING SESSION I

A-814

Clinical imaging in acute PE - State of the art

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Body*

Acute pulmonary embolism (PE) is a common and potentially fatal disease. To efficiently establish the diagnosis, a systematic approach is recommended for stable patients using clinical pretest probability assessment (like the Wells or Revised Geneva scores), D-dimer testing, and imaging when indicated. In patients with low or intermediate clinical probability, PE can be excluded without imaging studies if the D-dimer levels are negative, while in patients with high probability or positive D-dimer levels, further evaluation by imaging is required. Computed tomographic pulmonary angiography (CTPA) is the imaging study of choice for the diagnosis of PE because it has a high diagnostic performance and low inconclusive rate. In pregnant patients with a normal chest radiograph, a perfusion lung scan is an alternative to CTPA. Optimized CTPA scanning technique includes thin slices, bolus timing, saline flush, and adequate patient coaching for shallow breath-holding. Artifacts of poor enhancement, respiratory and cardiac motion, as well as beam hardening, are still common. A diagnostic scan should be able to exclude PE at least to the segmental level.
Dual-energy iodine maps can be incorporated into CTPA interpretation. This should be used, however, in conjunction with the pulmonary arterial images and lacks a standardized presentation and reading pattern.

Take Home Points*

1. Correct implementation of validated clinical decision rules in the diagnostic workup for PE, such as the Wells score and revised Geneva score, improves the efficient use of CTPA for the more highly suspected patients while avoiding unnecessary tests.
2. Artifacts on CTPA are common, coaching the patient for shallow breath-holding can prevent poor arterial opacification.
3. Dual energy CT can enhance the detection of small emboli by showing perfusion defects on the iodine maps and improve arterial enhancement using the virtual monoenergetic images at low keV.

A-875

Right heart failure in acute PE - What to know and see

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Body*

What to know

Depending on its severity and the degree of hypoxia induced, acute PE causes vasoconstriction of the pulmonary arterial vasculature, associated with a sudden increase in right ventricular afterload.
This manifests itself in a dilated right ventricle (RV), contrasting with a left ventricle (LV) that remains normal in size.

What to see

The ratio of RV to LV diameters must be systematically quantified on a CT scan performed in cases of suspected PE, and when it is > 1, as it is a widely recognized sign of the PE severity.
If right heart failure is in the foreground of the clinical presentation, the radiologist must formally rule out pulmonary embolism on the CT scan, which is often performed as the first line of investigation, before evoking possible global heart failure when the LV
The ratio of RV to LV diameters must be systematically quantified on a CT scan performed in cases of suspected PE, and when it is > 1, as it is a widely recognized sign of the PE severity.
is dilated (diameter > 55 mm), or tamponade in the presence of pericardial fluid filling associating small right cavities (Right Atrium,RV) and dilated vena cava.

Take Home Points*

The ratio of RV to LV diameters must be systematically quantified on a CT scan performed in cases of suspected PE, and when it is > 1, as it is a widely recognized sign of the PE severity.

A-861

Endovascular thrombectomy in acute PE

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Body*

Venous thromboembolism is the leading cause of preventable death in hospitalized patients and the third most common cause of cardiovascular death worldwide (after stroke and myocardial infarction). It is highly associated with age.
With the advancements in endovascular mechanical thrombectomy (MT) with large bore aspiration catheters for treating pulmonary embolism (PE), especially intermediate-high-risk and high-risk patients, have received a promising novel interventional treatment option.

The presentation will cover the experience gained with new endovascular mechanical thrombectomy (MT) with large bore aspiration catheters, including
- outlook
- own site(s) experience
- device
- details/features
- guidelines (ESC and S2k), and
- studies

Take Home Points*

Recent advancements in endovascular mechanical thrombectomy with large bore aspiration catheters allow removal of voluminous thrombus with immediate improvement on - among other parameters - oxygenation, right ventricular strain, and well-being in selected patients

The presentation conveys knowledge on
- epidemiology; pathology; clinical data
- patient selection; risk stratification
- preparing/building pulmonary embolism centers as well as
- interventional techniques and case presentations

A-817

Prediction of CTEPH in patients with suspected acute PE

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Body*

Chronic thromboembolic pulmonary hypertension (CTEPH) is a rare disease and its overall incidence after acute pulmonary embolism (PE) is low. However, signs of CTEPH may exist in patients with a first symptomatic PE. Closer reading of computed tomography pulmonary angiography (CTPA) scans of patients presenting with acute PE may identify those at high risk of developing (CTEPH).
There are specific imaging findings suggesting the presence of preexisting vascular changes in keeping with previous non-resolved subclinical thromboembolic events. These are intravascular webs, arterial narrowing or retraction, poststenotic vascular dilatation, mosaic perfusion, parenchymal bands, dilated bronchial arteries, RV/LV ratio ≥ 1, flattening of the interventricular septum, pulmonary infarction, pulmonary trunk dilatation, RV hypertrophy. Recently, studies have been published following patients after acute PE to determine the individual prognostic potential for each parameter to predict CTEPH.
As to be expected, more experienced readers are more likely to report on these specified findings (non-expert readers: 28% vs. expert readers: 88%).
Therefore, the aim for this presentation is to revisit the various radiologic signs and the prognostic potential for each parameter to predict CTEPH.

Take Home Points*

Awareness of radiologic signs suggesting preexisting CTEPH at the time of acute PE may allow for targeted follow-up strategies, risk-adapted screening, and early diagnosis of CTEPH.

A-807

Underlying pulmonary disease in pulmonary hypertension

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Body*

The “disease” pulmonary hypertension is highly heterogeneous, and diagnosis heavily relies on multimodality imaging in combination with clinical multidisciplinary team assessment.
Pulmonary hypertension has many different causes, and the main purpose of imaging assessment is to identify those that may be treated surgically (e.g. chronic thromboembolic disease) from those where medical therapy or (ultimately) heart/lung transplantation should be considered.

Pulmonary hypertension can be classified according to five main groups:
Group 1: Pulmonary arterial hypertension
Group 2: Pulmonary hypertension due to left heart disease
Group 3: Pulmonary hypertension due to chronic lung disease
Group 4: Chronic thromboembolic pulmonary hypertension
Group 5: Pulmonary hypertension due to unclear multifactorial mechanisms.

Recent mortality data over a period of nearly 20 years from the USA demonstrated an improved outcome in patients in group 1, whereas there was greater mortality in group 2-5.
Recent new definitions and treatment guidance has suggested that better outcomes in group 3 can be expected in the future.
Furthermore, there is likely a difference in various underlying diseases and how they should be approached.
This presentation will go over the clinical assessment and demonstrate some of the more common examples of adult patients with pulmonary hypertension in groups 1, 2, 3 and 5 (group 4 is presented elsewhere during the meeting).

Take Home Points*

PH is a heterogeneous clinical diagnosis.
Imaging plays a vital part in identification of underlying causes.
It is crucial to recognise five groups of PH, as the etiology, treatment options and prognosis may be quite different.
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COMMON TOPICS 2 – ADVANCED TECHNIQUES

A-471

MR 4D Flow in Cardiovascular Imaging

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Body*

Magnetic resonance 4D flow imaging allows to acquire the time resolved multidirectional, volumetric blood flow velocity field in the heart and the surrounding vessels, providing comprehensive information about intra-cardiac and cardiovascular flow dynamics. Due to the ongoing technical developments, 4D flow is not only able to quantify conventional flow parameters as velocities and stroke volumes through cross sections, but also provides new hemodynamic parameters which have potential to contribute to the understanding of pathophysiological processes of cardiovascular diseases.
The lecture aims to briefly discuss 4D flow acquisition and analysis processes, and to give an overview on clinical applications of cardiac and cardiovascular 4D flow imaging including conventional and novel hemodynamic parameters.

Take Home Points*

· MR 4D flow represents a powerful tool to investigate the interrelation between cardiovascular hemodynamics and cardiovascular disease in vivo.
· Multiple hemodynamic parameters are evaluated retrospectively from 4D flow data.
· 4D flow offers many advantages over other non-invasive techniques investigating cardiac and cardiovascular hemodynamic (MR 2D flow, echocardiography) and the time for widespread routine clinical use has arrived.

A-849

Ultrasound of lung parenchyma

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Body*

High diagnostic accuracy, increasing clinical experience and technical improvements are good reasons to consider lung ultrasound (US) for the assessment of pleural and pulmonary diseases. In the emergency room and in intensive care, it is well acknowledged, but application in other settings is rare.
Pneumothorax, atelectasis, interstitial edema, pneumonia, exacerbated chronic obstructive pulmonary disease/asthma and pulmonary embolism can be distinguished by particular ultrasound signs, artifacts and their combinations. A highly standardized selection of access points and terminology for the description of imaging findings contributes to high diagnostic accuracy even in challenging patients and settings.
Increasing concerns about medical radiation exposure warrant a more extensive use of this sometimes underestimated modality as a cost-, time- and radiation-saving alternative or valuable adjunct to the standard imaging modalities, including contrast-enhanced examinations.

Take Home Points*

Lung US is a safe, quick and readily available method with options for dynamic imaging of respiratory function. Proper selection of technical parameters customized to the clinical question and standardized terminology for the precise description and interpretation of the imaging signs regarding patient history determine its diagnostic accuracy
US can differentiate pneumothorax, lung edema, pneumonia, pulmonary embolism, atelectasis and pleural effusion, it allows monitoring lung ventilation and fluid administration. It saves radiation exposure in follow-up for pregnancy and pediatric population.

COMMON TOPICS 3 – INFLAMMATORY/RHEUMATOLOGIC DISEASE

A-788

Collagen vascular diseases – lung

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Body*

Collagen vascular diseases encompass a diverse range of disorders characterized by complex inflammatory and autoimmune damage to various tissues, including the respiratory system. Due to the wide range and frequent occurrence of thoracic manifestations, high-resolution computed tomography (CT) of the chest plays a pivotal role in the evaluation of patients. The main causes of mortality and morbidity in these patients are fibrotic interstitial lung disease (ILD) and pulmonary arterial hypertension, although the airways and pleura can also be affected. It is essential to identify comorbidities and associated conditions during the initial work-up, which may include pleuro-parenchymal fibro-elastosis, emphysema, or esophageal dilation. CT scans play a crucial role in monitoring progression of fibrosis during follow-up. Additionally, CT imaging helps identify complications related to treatment, such as drug toxicity and infections.

Take Home Points*

-Collagen vascular diseases can affect all components of the respiratory system, including the lungs, airways, blood vessels, and pleura, and individuals with these conditions are at risk of complications related to immunosuppressive treatments.
-Chest high-resolution computed tomography (CT) is extensively utilized during the initial work-up of the disease and follow-up to assess progression or diagnosis of complications.
-The collagen vascular diseases that are most commonly associated with the development of interstitial lung disease (ILD) include rheumatoid arthritis, systemic sclerosis, idiopathic inflammatory myopathies, and Sjögren's syndrome. ILD can have an acute or chronic presentation and is linked to increased mortality and morbidity rates.
-In cases of rheumatoid arthritis or Sjögren's disease, involvement can occur in both proximal and distal airways, leading to conditions such as bronchiectasis, follicular bronchiolitis, or constrictive bronchiolitis. These conditions may manifest as centrolobular micronodules or mosaic patterns on CT scans.
-When it comes to constrictive bronchiolitis, the mosaic attenuation can sometimes be mild and requires careful examination, especially in patients with airflow obstruction detected during pulmonary function tests. Techniques such as minimum intensity projection (minIP) reconstructions or dedicated expiratory CT scans to highlight air trapping may be utilized.
-Furthermore, as many patients with collagen vascular diseases are smokers, they are at increased risk of developing emphysema and lung cancer. Therefore, any lung nodules observed should be investigated accordingly.

A-848

Collagen vascular diseases - Heart

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Body*

Collagen vascular diseases (CVDs) are a heterogeneous group of disorders with autoimmune features which can affect multiple systems and cause end-organ damage. Heart involvement is common and cardiovascular events are the major cause of mortality in patients affected by these diseases.
Cardiovascular manifestations include myocarditis, cardiac fibrosis, conduction disturbancies, coronary artery disease, pericardial disease, pulmonary hypertension and heart failure. They are related to a complex interplay between traditional risk factors and dysregulation of autoimmunity: several autoantibodies play a major role in mediating cardiac damage, directly or triggering inflammatory mechanisms.
The silent presentation and the high mortality of cardiovascular involvement in CVDs requires versatile, non-invasive and operator-independent diagnostic tools for early diagnosis, risk stratification and treatment follow-up.
Despite echocardiography, nuclear imaging and coronary angiography are still the milestones of cardiovascular imaging, they cannot reliably detect cardiovascular inflammation, fibrosis and micro-vascular disease in pre-clinical stages. Cardiovascular magnetic resonance (CMR), thanks to its capacity to perform tissue characterization and reproducible morpho-functional and blood flow analysis, can identify early cardiovascular involvement in asymptomatic patients, thus it has been indicated as an essential instrument to diagnose occult manifestations which can benefit from early appropriate treatments.

Take Home Points*

Cardiovascular involvement in collagen vascular diseases is common and it is the major cause of mortality.
Several cardiovascular manifestations have been described in CVDs; however, they are subtle and sub-clinical, presenting with symptoms in advanced stages.
Non-invasive, and operator-indipendent diagnostic tools are essential to early diagnose cardiovascular involvement in CVDs, to stratify patient’s risk and to monitor treatment.
Cardiac magnetic resonance has been indicated as an essential tool to diagnose cardiovascular manifestation in subclinical stages, which can benefit from early treatments.

A-865

Eosinophilic pneumonia

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Body*

Eosinophilic pneumonia comprises a heterogenous group of pulmonary disorders associated with tissue or peripheral eosinophilia. Primary eosinophilic lung diseases include simple pulmonary eosinophilia, acute eosinophilic pneumonia, chronic eosinophilic pneumonia, hypereosinophilic syndrome, and eosinophilic bronchitis. Secondary eosinophilia can be found in patients with allergic bronchopulmonary aspergillosis, bronchocentric granulomatosis, or parasitic or fungal infections and as a reaction to drugs or toxins. Eosinophilia also occurs in eosinophilic granulomatosis with polyangitis. These diseases exhibit a wide range of imaging findings, including consolidation, ground-glass opacities, nodules, and masses. Imaging findings are often detected with chest radiography, but CT is preferable with thin slice thickness and high spatial resolution image reconstruction algorithm to delineates parenchymal abnormalities. However, it is important to note that diagnostic imaging alone is not sufficient to make a definitive diagnosis. A thorough history, clinical examinations, and laboratory tests are also required to make an accurate diagnosis.

Take Home Points*

Imaging findings combined with certain clinical information facilitate the diagnosis of eosinophilic pneumonia.

A-787

Eosinophilic Myocarditis

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Body*

Eosinophilic myocarditis is a type of inflammatory cardiomyopathy characterized by eosinophilic infiltration into myocardial tissue. In this talk an overview of imaging characteristics of eosinophilic myocarditis is given and its implications on clinical managment is given.

Take Home Points*

- Clincial presentation and diagnsotic criteria of eosinophilic myocarditis
- Imaging findings (espically CMR) in eosinophilic myocarditis
- treatment and prognosis of eosinophilic myocarditis

A-850

Pulmonary Sarcoidosis

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Body*

I. Introduction
A. Definition and overview of pulmonary sarcoidosis
B. Importance of radiologic imaging in diagnosis and management

II. Classic Imaging Features of Pulmonary Sarcoidosis
A. Chest X-ray findings
1. Bilateral hilar lymphadenopathy (BHL)
2. Parenchymal infiltrates
B. High-resolution computed tomography (HRCT) findings
1. Nodules and micronodules
2. Ground-glass opacities
3. Septal thickening
4. Fibrosis and honeycombing

III. Unusual Manifestations of Pulmonary Sarcoidosis
A. Atypical radiologic patterns
1. Upper lobe predominant disease
2. Reticular opacities without BHL

IV. Differential Diagnosis and Mimickers
A. Distinguishing pulmonary sarcoidosis from other interstitial lung diseases
B. Recognizing atypical radiologic patterns and mimickers

V. Role of PET-CT in Pulmonary Sarcoidosis
A. Utility of FDG-PET for staging and assessing disease activity
B. Differentiating sarcoidosis from malignancy using PET-CT

VI. Case Studies and Clinical Correlations
A. Presenting challenging cases with radiologic and clinical correlations
B. Discussing the impact of imaging on patient management

Take Home Points*

Conclusion
A. Recap of key radiologic findings in pulmonary sarcoidosis
B. Emphasizing the importance of multidisciplinary approach for accurate diagnosis and treatment.

A-867

Cardiac sarcoidosis

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Body*

Sarcoidosis is a multiorgan system disease caused by a non-necrotic granulomatous inflammation that most often affects the

lungs and lymph nodes, but can affect any organ in the body. Although sarcoidosis is assumed to be an auto-immune disease, genetic susceptibility and environmental factors are recognized, with a higher prevalence in African Americans and Northern Europeans. Although cardiac sarcoidosis (CS) is only clinically suspected in about 5% of patients with sarcoidosis, imaging and autopsy studies indicate that the prevalence is around 25% and that it can occur as part of systemic sarcoidosis as well as in an isolated form. CS can remain subclinical but can also cause atrioventricular conduction disorders, arrhythmias and heart failure. It can be difficult to recognize, potentially depriving patients of treatment to help prevent formation of myocardial fibrosis and risk of progressive heart failure, life-threatening ventricular arrhythmias, sudden cardiac death and all-cause mortality. Although a definite CS diagnosis requires myocardial tissue biopsy with histopathological confirmation there is increasing support for making a probable CS diagnosis by extracardiac histology combined with cardiac imaging and clinical cardiac manifestation. Transthoracic echocardiography is an insensitive imaging screening tool for CS, while both cardiac MRI (CMR) and whole body ^{18}F-FDG-PET imaging have a much higher diagnostic accuracy for CS. Combining CMR and FDG-PET gives a higher certainty of CS than a single imaging exam, however CMR has a high negative predictive value and a good quality normal CMR without LGE can often rule out CS.

On CMR, CS should be part of the differential diagnosis if patchy late gadolinium enhancement (LGE) is seen in a mixed pattern (epicardial, mid-wall, subendocardial, transmural) and in a non-coronary distribution in either ventricle and especially in the intraventricular septal wall. Important signs are the "hook sign" where LGE in the intraventricular septum extends to the right ventricular wall and the “whale tail sign” () where LGE in the intraventricular septum extends to epicardial LGE in both ventricles in either the inferior or anterior wall. LGE of the atria, papillary muscles or moderator band is seen in both CS and cardiac amyloidosis but CS has a patchy distribution, while cardiac amyloidosis is by definition a diffuse infiltrative disease with often diffuse enhancement of the whole heart. CS is “greatest mimicker of them all” in both the early inflammatory stage as well as the late fibrotic stage and can imitate both ischemic and non-ischemic cardiomyopathies, as well as myocarditis.

Whole body ^{18}F-FDG-PET is used to confirm the suspicion of CS on MRI and to assess both cardiac and extra-cardiac disease extent and activity. Affected lymph nodes are often more accessible for biopsy than the heart. Active inflammation is best assessed on ^{18}F-FDG-PET and is an important predictor of response to corticosteroid and other immunosuppressive treatment. Serial ^{18}F-FDG-PET scans are performed to evaluate the response to treatment. Adequate suppression of the physiological myocardial glucose uptake is essential and requires a low carbohydrate diet followed by prolonged fasting. Administration of intravenous heparin just before the scan can help to further suppress the normal myocardium.

In conclusion, sarcoidosis is a systemic disease with diverse clinical expression that necessitates a multidisciplinary approach. The radiologist and nuclear medicine specialist are essential to help recognize (cardiac) sarcoidosis as well as being part of the team assessing treatment response.

Take Home Points*

1. Cardiac sarcoidosis can be isolated or part of multiorgan disease and can mimic all cardiomyopathies and myocarditis.
2. Patchy, mixed forms of myocardial late enhancement in different vascular regions on cardiac MRI are suspect for cardiac sarcoidosis.
3. Enhancement of the intraventricular septum, atria, papillary muscles and right ventricular moderator band can be seen in cardiac sarcoidosis.
4. ^{18}F-FDG-PET can help confirm cardiac sarcoidosis, assess extra-cardiac disease, assess disease activity and evaluate response to treatment.

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COMMON TOPICS 4 – HEART-LUNG-TRANSPLANTATION

A-874

Detection of lung transplant rejection

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Body*

Computed tomography (CT) imaging plays a crucial role in the evaluation of lung transplant recipients, aiding in the assessment of post-transplant complications and overall graft health. This review summarizes the diverse spectrum of CT findings encountered in these patients, ranging from normal postoperative changes to potential complications such as bronchiolitis obliterans syndrome, infection, acute rejection, and vascular abnormalities. The utilization of advanced imaging techniques, such as high-resolution CT and quantitative analysis, enhances the accuracy of diagnosing and monitoring these conditions. A comprehensive understanding of CT imaging findings post lung transplant is imperative for timely intervention and optimal patient care.

Take Home Points*

Understand the normal evolution of transplanted lungs
Recognize common opportunistic infections
Differentiate transplant rejection early from late

A-827

Detection of rejection: mpMRI

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Body*

Heart transplantation remains the definitive treatment for end-stage heart failure; however, allograft rejection poses a significant challenge to its long-term success. Early and accurate detection of rejection is essential for timely intervention and improved patient outcomes. In recent years, multiparametric Magnetic Resonance Imaging (MRI) has emerged as a promising non-invasive tool for assessing heart allograft rejection, providing comprehensive and detailed insights into the morphological, functional, and molecular aspects of the transplanted heart.

This presentation aims to review the current state of knowledge concerning the role of multiparametric MRI in the evaluation of heart allograft rejection. A systematic literature search was conducted to identify relevant studies and clinical trials published up to July 2023.

Multiparametric MRI enables the simultaneous assessment of various parameters, including myocardial edema, fibrosis, perfusion, and myocardial strain. These metrics, when integrated, offer a more comprehensive and accurate evaluation of the allograft's condition compared to conventional imaging modalities. Moreover, multiparametric MRI techniques allow for non-invasive, radiation-free assessment, reducing the potential risks and limitations associated with invasive endomyocardial biopsies.

Several studies have demonstrated the utility of multiparametric MRI in detecting early signs of acute cellular rejection, myocardial edema being a key feature in the initial stages. Additionally, quantification of myocardial fibrosis and perfusion deficits has shown promise in identifying chronic rejection, allowing for the early detection of graft vasculopathy, a significant contributor to long-term graft failure.

Furthermore, multiparametric MRI offers a unique opportunity to monitor therapeutic responses and guide management strategies. Serial imaging with these techniques enables the identification of treatment-resistant cases and potential prognostic implications.

Despite its promising potential, challenges remain in the widespread adoption of multiparametric MRI in heart allograft rejection assessment. These include the need for standardization and validation of imaging protocols, accessibility to advanced MRI technology, and expertise in image interpretation.

Take Home Points*

1. Understand the pathophysiological basics of heart allograft rejection.
2. Evaluate the potential of multiparametric MRI in the management of heart allograft rejection.
3. Identify the role of MRI in the management of heart transplant recipients and identify the callenges that remain

A-863

Coronary CTA in CPU

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Body*

Since the ESC guidelines on acute chest pain without persistent ST elevation published in 2020, CCTA started play a major role in the diagnostic workup being one of the first additional tests to rule in or rule out ACS. By this, expertise on how to perform the exam is mandatory although in the acute setting sometimes challenging. The patient can be unresponsive, hemodynamically unstable and therefore the heart rate challenging to control. In adition to acute coronary syndrome, there is a broad differention on acute chest pain that also needs to be adressed as an emergency: acute aortic syndrome, tension pneumothorax and pulmonary embolism being the the important ones. There are different protocols to address them therefore a good clinical evaluation of the patient and percise clinical question is beneficial, however sometimes not possible (unresponsive patient, atypical presentation...). We adress the technical approach to imaging of an acute chest pain patient, the protocol for CCTA, as well as the protocols for the differentials and address the option and technical requirements of a protocol that might evaluate them all and support this with cases.

Take Home Points*

- Cardiac CT became one of the key players in the workup of acute chest pain
- The differential of acute chest pain is broad and percise clinical evaluation beneficial but sometimes not possible
- There are technical requirements that have to be met
- There are different protocols one can use to make the best evaluation

A-868

Imaging of Acute Aortic Syndrome

D. Suchá
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Body*

Acute aortic syndromes pose life-threatening risks, necessitating urgent and accurate diagnosis to guide clinical decision-making.
The aim of this lecture is to comprehensively discuss essential aspects related to imaging, interpreting and reporting of acute aortic syndromes, including:
- imaging strategies and the role of latest multi-energy CT techniques
- the spectrum of acute aortic syndromes and their characteristics
- thresholds for surgical intervention: and comparisons between recent AHA versus ESC guidelines
- common treatment strategies with relevance to the reporting of acute aortic syndrome cases
- novel insights gained from recent publications, and markers for prognosis, treatment and outcome
- case based analysis to show key imaging features and prevent diagnostic errors

Take Home Points*

A thorough understanding of acute aortic syndromes and the skill to interpret imaging findings accurately and communicate them correctly are crucial for making clinical decisions and providing effective patient care. This lecture will delve into precise interpretation, emphasize the clinical relevance of findings, and provide guidance on what information to report while avoiding common mistakes.

A-844

Differential Diagnosis: Acute chest pain from other than CAD and PE

H. C. Schmidt
University Medical Imaging Toronto, Joint Department of Medical Imaging, Toronto, Canada

Body*

Acute chest pain is a common presentation in emergency departments, and frequently patients are primarily assessed to rule out an acute cardiac event and coronary artery disease (CAD). However, more than half of those patients eventually do not have a cardiac diagnosis.
When CAD has been excluded clinically, it is often a computed tomography (CT) scan that is performed to determine the reason for the acute chest pain. First and foremost, the request is to rule out one of the possible acute life-threatening conditions (aortic dissection, pulmonary thromboembolism, and pericardial tamponade), but CT accurately displays the entire thoracic anatomy and reveals many of the alternate differential diagnoses. These causes of acute chest pain can be grouped into three main categories:
1. within the chest
- Heart and large vessels (e.g., aortic dissection, aortic aneurysm or aortitis, pericarditis and myocarditis)
- Lungs (e.g., Pneumonia, pneumothorax, or fat embolism)
- Esophagus (e.g., gastroesophageal reflux disease (GERD), esophageal dysmotility, achalasia, esophagitis)
2. in the chest wall
- Musculoskeletal (e.g., fractures, osteolytic lesions)
3. outside of the chest
- Psychological (e.g., anxiety, panic attacks)
- Abdominal
The detection of some of the differential diagnoses can be an incidental finding, and not all of the non-cardiac causes for chest pain can be identified on a chest CT. In this setting, it is important to be aware of the available information and limitations of a chest CT.
During the presentation, the typical appearance of possible reasons for acute chest pain will be illustrated. Ultimately, when the CT is normal, a few differentials remain as possible causes.

Take Home Points*

Acute chest pain is commonly caused by CAD.
Alternative etiologies can be identifed on CT, both within the thorax, in the chest wall, and outside of the chest.

A-838

Cardiac MRI in patients with MINOCA

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Body*

Myocardial Infarction with Non-Obstructive Coronary Arteries (MINOCA) encompasses a group of conditions in which patients show signs of acute myocardial infarction but without significant obstructive coronary artery disease on angiography. While initially thought of having no eventual clinical impact, our understanding of MINOCA has evolved over time. Recent insights have recognized that MINOCA can in some patients lead to a more severe prognosis than initially believed, leading to increased research and efforts to establish a standardized diagnostic pathway for MINOCA to improve treatment.
Several societies have recently issued guidelines recommending Cardiac Magnetic Resonance Imaging (CMR) as an essential imaging modality for assessing patients suspected of having MINOCA. This preference for CMR is due to its diagnostic consistency, its ability to assess the myocardium, and its minimally invasive nature. The conditions encompassing MINOCA (Acute myocardial infarction, myocarditis and Tako-Tsubo stress-induced cardiomyopathy) have potential similarities in terms of clinical features and laboratory findings. CMR plays a crucial role in this regard by employing various imaging techniques to offer concrete evidence for a specific pathology.
In this lecture, we will discuss the latest insights regarding MINOCA, demonstrate how CMR can aid in diagnosing and managing patients with the condition, and present a step-by-step approach for incorporating CMR alongside other imaging methods in emergency situations.

Take Home Points*

* Recent research has shown that MINOCA can have a more serious impact on certain patients than previously thought.
* Among available different imaging modalities, CMR plays an important role in characterising the type of myocardial injury and guiding further management
*It is important to properly incorporate CMR into the diagnostic process for patients with MINOCA along with other imaging techniques.

COMMON TOPICS 6 – CARDIOTHORACIC LIGHTNING SESSION II – TOXIC SIDE-EFFECTS

A-859

Medication-related Pneumotoxicity

J. Babar
Cambridge University Hospitals, Addenbrooke's hospital, Radiology, Cambridge, United Kingdom

Body*

1. Several different high resolution computed tomography (HRCT) patterns relating to pulmonary drug toxicity have been reported. Moreover, a single drug can be associated with multiple radiologic patterns.
2. The CT patterns most commonly encountered reflect the stage of presentation. Acutely, diffuse alveolar damage, eosinophilia pneumonia and organising pneumonia are the most common patterns. Subacute and chronic drug related pneumonitis can present with a pattern of disease most in keeping with UIP, NSIP or hypersensitivity pneumonia.
3. As well as ILD, drug related toxicity can present with pulmonary oedema, obliterative bronchiolitis, pulmonary haemorrhage and pleural effusions.
4. Treatment is avoidance of further exposure and systemic corticosteroids in patients with progressive or disabling disease.

Take Home Points*

The imaging patterns of drug related pneumotoxicity are rarely specific, an accurate evaluation of the clinical history is required and a multidisciplinary approach is essential.

A-879

Pneumotoxicity in new cancer drugs

C. Schaefer-Prokop
Meander Medical Centre, Amersfoort, The Netherlands

Body*

The presentation will focus on pulmonary pathology induced by immunotherapy and targeted cancer therapy. Findings include patterns known from idiopathic interstitial lung disease such as UIP, NSIP, OP and DAD. There are no specific patterns related to specific drugs. Diagnosis requires an interdisciplinary approach with information about timeline and type of chemo / immunotherapy and radiation therapy as well as acute clinical parameters including laboratory findings, renal insufficiency, or fever. Preexisting lung disease affects the CT findings. Most challenging differential diagnosis include infection, cardiogenic edema, and primary tumor progression.

Take Home Points*

To get familiar with the most frequent CT patterns of drug-related pneumotoxicity
To learn about the integration of clinical information and image interpretation
To learn about the challenges of differentiating pneumotoxicity from other underlying diseases by discussing illustrative cases

A-831

Cardiotoxicity in new cancer drugs

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Humanitas University, Milan, Italy

Body*

Cardiotoxicity is a growing concern with novel cancer drugs, including immune checkpoint inhibitors, tyrosine kinase inhibitors, and monoclonal antibodies. Anthracyclines and HER2-targeted agents remain established cardio-toxic drugs. To optimize patient outcomes, early detection is crucial. Cardiovascular Magnetic Resonance (CMR) and Coronary Computed Tomography Angiography (CCTA) play pivotal roles in cardiotoxicity assessment. CMR provides soft tissue contrast and functional evaluation, quantifying ventricular function, myocardial tissue, inflammation, and perfusion. CCTA non-invasively assesses coronary anatomy, detecting drug-induced coronary artery pathology. Integrating CMR and CCTA in routine cardiovascular assessment can enable prompt intervention, minimizing cardiovascular risks associated with cancer therapies. This lecture explores cardiotoxicity mechanisms and patterns, emphasizing the value of CMR and CCTA in improving patient care in the evolving landscape of cancer therapeutics.

Take Home Points*

- Emerging cancer drugs, including immune checkpoint inhibitors, tyrosine kinase inhibitors, and monoclonal antibodies, present a concerning risk of cardiotoxicity, necessitating vigilant monitoring and early detection strategies.
- The integration of CMR and CCTA into routine cardiovascular assessment for cancer patients undergoing novel therapies facilitates timely identification and management of cardiotoxicity, enhancing treatment strategies and patient safety in the dynamic landscape of cancer therapeutics.

A-846

Radiation-induced lung disease

A. R. Larici, C. Strappa
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Body*

Radiotherapy (RT) is one of mainstays in the treatment of lung malignancies. Over the years, advances in RT, from intensity-modulated to image-guided RT - including novel motion management technology - have led to increasingly accurate dose delivery. Ablative doses could therefore be safely administered, ultimately resulting in improved outcomes. Accordingly, stereotactic body radiotherapy (SBRT) has been increasingly employed, with fast growing widening of its applications, from early-stage non-small-cell lung cancer (NSCLC) in patients not suitable for surgery to salvage therapy for local recurrence; it is also indicated in oligometastatic lung disease and in limited-stage small cell lung cancer (SCLC).

Despite more accurate dose delivery with more effective sparing of surrounding tissues, risk of radiation-induced lung injury (RILI) is still an important limiting factor.

RILI is conventionally distinguished into an early stage disease, occurring within 6 months after treatment completion, and a late stage disease, which instead occurs from 6 months onwards.

At Computed Tomography (TC) early changes commonly appear as ground-glass areas and consolidations of variable extents, while late changes consist of radiation fibrosis.

SBRT-induced abnormalities are more common than those induced by conventional RT and have different appearance; indeed, due to different beam arrangements and a steep dose gradient between target and surrounding tissues, they tend to develop in high-dose region and thus to be more conformal to the lesion. Furthermore, they usually occur later than those after conventional RT, potentially arising from 6 weeks to more than 1 year after treatment completion and evolving even to more than 2 years.

Distinguishing radiation-induced lung changes from local recurrence may not always be straightforward. Prompt identification of local recurrence in the context of RILI is essential and imaging modalities play a crucial role, as biopsy might be challenging. Several CT features potentially suggestive of local recurrence, alone or especially in combination, have been described, and in presence of suspicious findings, further confirmation is warranted. PET (Positron Emission Tomography)/TC proved to have a significant negative predictive value in this context. Nevertheless, the evidence of false positive results might impair its reliability, especially in the earliest phases, but also in the late phase due to possible persistence of RILI uptake even up to 2 years. Conversely, combined use of CT and PET/TC, especially in the first 12 months, may instead increase the likelihood of a proper recognition of local recurrence.

Take Home Points*

1) Advances in RT have led to increasingly accurate dose delivery, and ablative doses could therefore be safely administered resulting in improved outcomes.

2) The CT appearance of RILI varies according to the RT delivered, the beam arrangements and the time elapsed from treatment completion; the knowledge of all these characteristics is crucial to accurately interpret images.

3) Imaging multimodality approach increases the likelihood of a proper recognition of local recurrence, especially in the first 12 months.

A-815

Radiation-induced Cardiac Disease

J. Carvalho
Centro Hospitalar Universitário de Santo António, Radiology, Porto, Portugal

Body*

Cardiovascular disease is the leading cause of non-cancer related death in cancer survivors treated with radiotherapy (RT). However, radiation-induced cardiac disease is still under-recognized.

RT can potentially damage all parts of the heart, including the pericardium, myocardium, coronary arteries, valves, and conduction system. The total dose of mediastinal radiation is a major risk factor for the development of cardiac disease and therefore radiation exposure to the heart should be kept as low as reasonably achievable.

Radiation-induced cardiac disease is usually a late adverse effect, presenting 10-30 years following the initial treatment.

Patients who received >15 Gy of mean heart dose (MHD) are considered high-risk and non-invasive screening for coronary artery disease (CAD) should be considered every 5-10 years, starting 5 years after radiation. RT lesions are typically proximal, severe, diffuse, and long, affecting more frequently the left anterior descending and right coronary arteries. Non-invasive stress testing is recommended in asymptomatic patients with new moderate or severe RT-induced CAD detected on CCTA to guide management.

Chest RT is the main risk factor for valvular heart disease in cancer survivors. Left sided valves are usually affected, regardless of dose distribution. Aortic regurgitation is the most common valvopathy, followed by aortic stenosis, which requires treatment more frequently. Both TAVR and SAVR have higher mortality in patients who had previous chest RT.

Radiation-induced pericardial disease ranges from asymptomatic calcifications to constrictive pericarditis. Acute pericarditis is uncommon with modern RT protocols.

When the myocardium is affected, restrictive cardiomyopathy is the most common phenotype after radiation, which leads to fibrosis of the myocardium and epicardium. The risk is further increased in patients who received concomitant treatment with anthracyclines. Also, the right ventricle is frequently affected due to its anterior position closer to the radiation beam.

Take Home Points*

Coronary artery disease is the most common manifestation of radiation-induced cardiac disease, and its incidence continues to increase as cancer survival rates improve.

Imaging plays a critical role in the diagnosis of radiation-induced cardiac disease.

According to the ESC guidelines, non-invasive screening for CAD should be considered every 5–10 years in asymptomatic patients who received >15 Gy MHD, starting at 5 years after radiation.

Aortic stenosis is the most common valvopathy requiring treatment.

A multidisciplinary team approach is recommended to discuss treatment strategies for radiation-induced coronary artery and valvular disease.

A-808

Lung effects of recreational drug abuse

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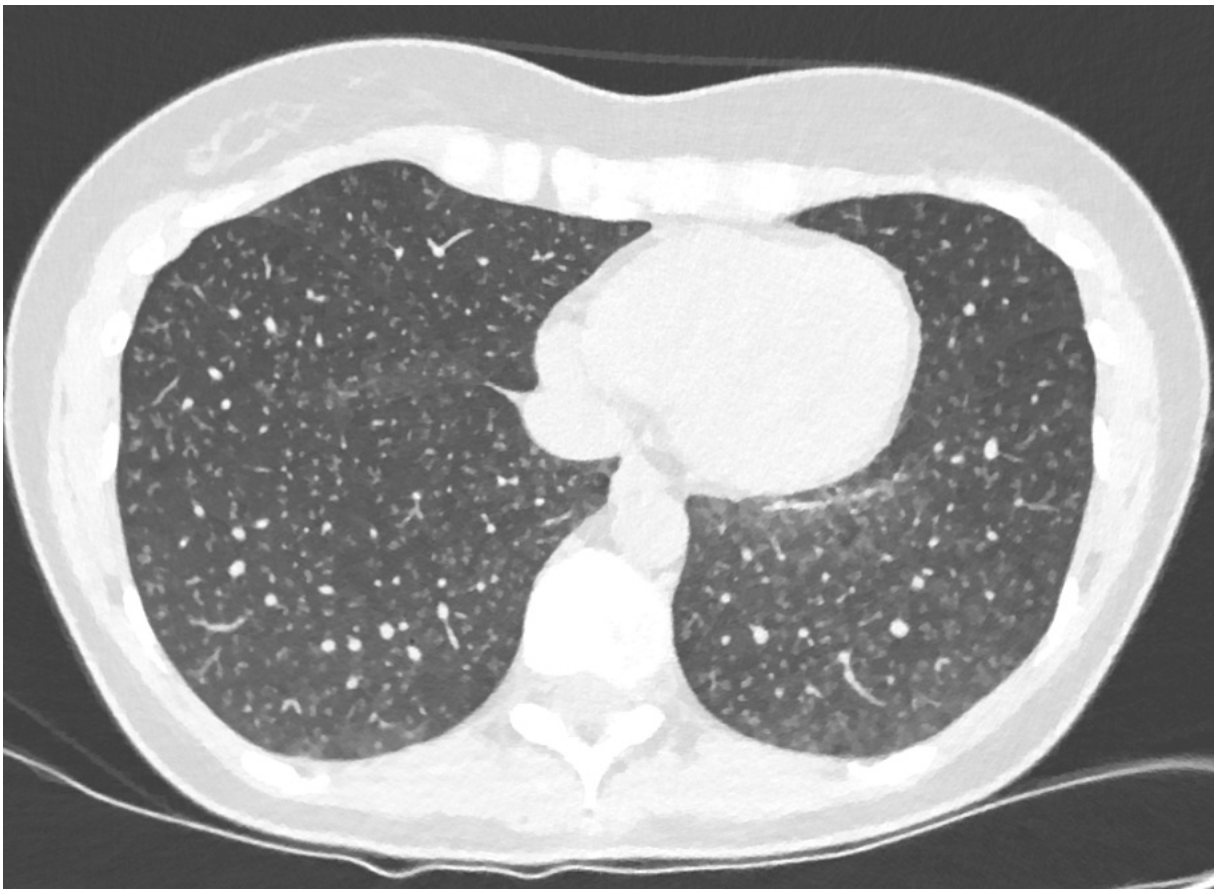
Body*

Drug history is often unknown or withheld from the medical care providers. Therefore, radiologists may be in a unique position to be the first to suggest the diagnosis based on imaging findings in combination with patient profile and possible history. Being familiar with thoracic effects of drug use is therefore paramount to allow proper diagnosis and treatment.

Effects from drug use may be multifactorial, due to either biochemical effects of the drug, effects from mixed substances used in “cutting”, and/or method of drug administration. Furthermore, presentation may be complex due to multisubstance abuse. In discussing drug-related lung pathology one may either go by radiological pattern or etiology. Complicating factor is that there may be considerable overlap between radiological findings and different drugs. Also, drug use can be highly variable between regions and may differ over time, exposing radiologists to completely different imaging findings.

The aim of this talk is to present different categories of drug-related lung pathology, with case-based examples and a few ‘imaging pearls’.



Diffuse centrilobular nodules due to PA proven talcosis, although initially intravenous administration of tablets was denied.

Take Home Points*

- Considerable overlap in radiological findings may be present for recreational drug abuse, as drug effects are often systemic, may be multifactorial, and often complicated by multisubstance use.
- There is a difference between drug-induced and drug-related pathology
- Types of drug-induced lung pathology encountered, as well as the rate of exposure is highly influenced by your working environment.

A-832

Cardiac effects of recreational drug abuse

F. Catapano
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Body*

The cardiac effects of recreational drug abuse pose a significant concern for cardiovascular health, leading to potentially severe complications. This presentation delves into the pathophysiology of myocardial damage induced by common recreational drugs, emphasizing the pivotal role of Cardiovascular Computed Tomography Angiography (CCTA) and Cardiovascular Magnetic Resonance (CMR) in its detection and assessment.

Recreational drugs exert diverse mechanisms on the heart, leading to oxidative stress, inflammation, and sympathetic overactivation, culminating in arrhythmias and cardiomyopathies. The drugs' impact on endothelial function and coronary vasoconstriction contributes to myocardial ischemia, ultimately resulting in coronary artery disease.

Early diagnosis is pivotal, as myocardial damage caused by recreational drugs can be asymptomatic or present with subtle signs, necessitating prompt medical attention. Integrating CCTA and CMR findings into clinical practice empowers clinicians to tailor interventions addressing specific drug-induced cardiac pathologies.

Take Home Points*

- Recreational drug abuse disrupts cardiovascular homeostasis through oxidative stress, inflammation, and sympathetic hyperactivity, resulting in arrhythmias and cardiomyopathies.
- CCTA and CMR serve as valuable tools in identifying coronary artery disease and characterizing myocardial damage, enabling early intervention to mitigate long-term cardiac consequences.
- Understanding the pathophysiological basis of myocardial damage is vital in formulating effective prevention and treatment strategies for individuals engaged in recreational drug use.

COMMON TOPICS 7 – THE HEART ON NON-CARDIAC CT

A-869

Cardiovascular calcification - Just statistics?

A. P. Parkar
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Body*

The presence and extent of coronary artery calcification (CAC) is associated with future cardiovascular events and the clinical importance of reporting it is well established. The Agatson CAC score and more recent MESA calculators give an indication of the risk/severity based on measurements done on ECG-gated CTs. Recently, there is mounting evidence that assessment done on non-gated CTs can also predict future events with relatively high accuracy.
The recommendation is that if a subject is included for lung cancer screening, they should also receive a CAC evaluation at the same time. Thus, thoracic radiologists must make themselves familiar with CAC. The presentation will explain the difference between an Agatson score and ordinal visual score, highlighting the pros and cons of each method

Take Home Points*

Currently, a simple ordinal on non-gated CTs is the easiest to implement in LCS, however, if financially viable, EGC-gated examinations would be time-saving.

A-855

Cardiac chambers - Size matters!

B. Wintersperger
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Body*

Judgement of the cardiac size on non-dedicated cardiac imaging techniques has been part of clinical routine for decades. Especially the assessment of the cardiothoracic ratio on PA chest x-ray has played a major role. While ratios of >0.50 (>0.55) have been considered abnormally high suggesting cardiac enlargement, aspects such as prominent epicardial fat as well as variations of the lung volume (e.g. expiration, hyperinflation) may skew results. In any case, results are very crude and become less relevant in the age of increasing use of echocardiography but specifically also the use of computed tomography (CT). Chest CT imaging has become essential to care in many not only pulmonary and oncologic diseases but is also increasingly used in various vascular and systemic diseases.
Based on the technical advances of modern CT scanners that predominately relate to demands in cardiac imaging, also non-cardiac Chest CT has benefitted from such improvements.
Despite improved temporal resolution in CT, motion artifacts remain the challenge in assessment of cardiac chamber size in non-cardiac chest CT.
Judgment of potential right ventricular (RV) strain in patients with pulmonary embolism has entered clinical chest CT imaging long time ago while left ventricular (LV) assessment is less common.
While a translation of the cardiothoracic ratio into CT is of limited use, the assessment of ventricular ratios (RV to LV) has helped to judge RV pressure burden in the setting of predominately acute settings. Nevertheless, simaltenous LV enlargement may lead to RV strain underestimation.
Beside RV changes, also echo confirmed LV enlargement can be identified by non-cardiac chest CT.
Influencing factors for cardiac chamber size assessment is depending on the type of examination (non-contrast/contrast CT) as well as the cardiac axis and the degree of RV rotation along the LV axis.
Like ventricular assessment, also atrial size can be gauged by non-gated CT and such information becomes important in the differential diagnosis of various cardiovascular diseases that may accompany non cardiac problems.
In today's clinical practice, despite possibly not including numerical assessment, any chest CT should include statements related to cardiac chamber size. Level of detail may vary with the general indication for the exam.

Take Home Points*

1. Chest CT ALWAYS covers the heart.
2. Chest CT reports should generally include statements on overall cardiac CT
Dedicated chamber assessment may be added in specific cases and guide further 3. management/assessment.
4. Chest CT cannot replace dedicated imaging approached to cardiac size assessment.

A-825

The Heart as Source of Thromboembolism

A. Kallifatidis
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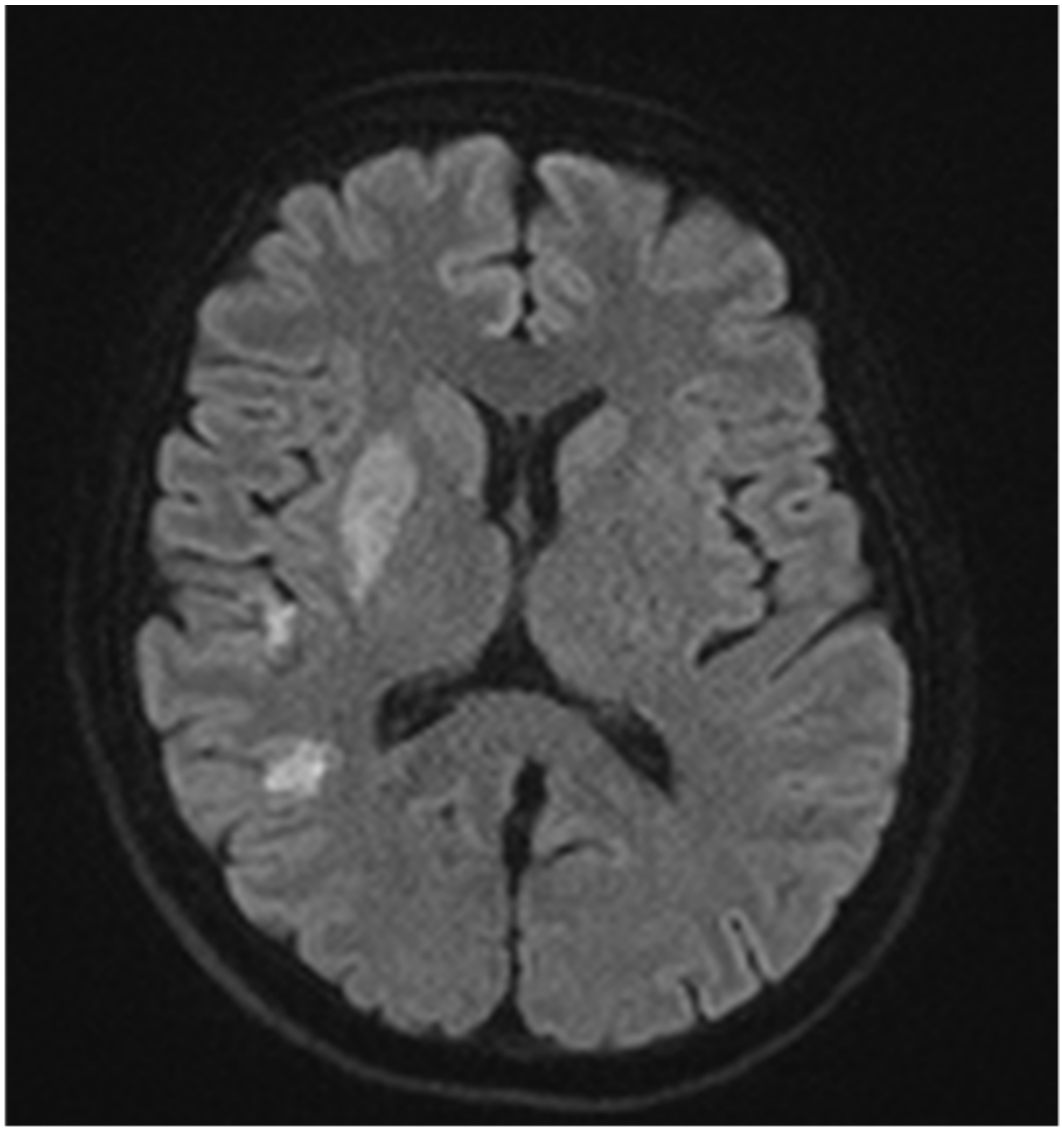
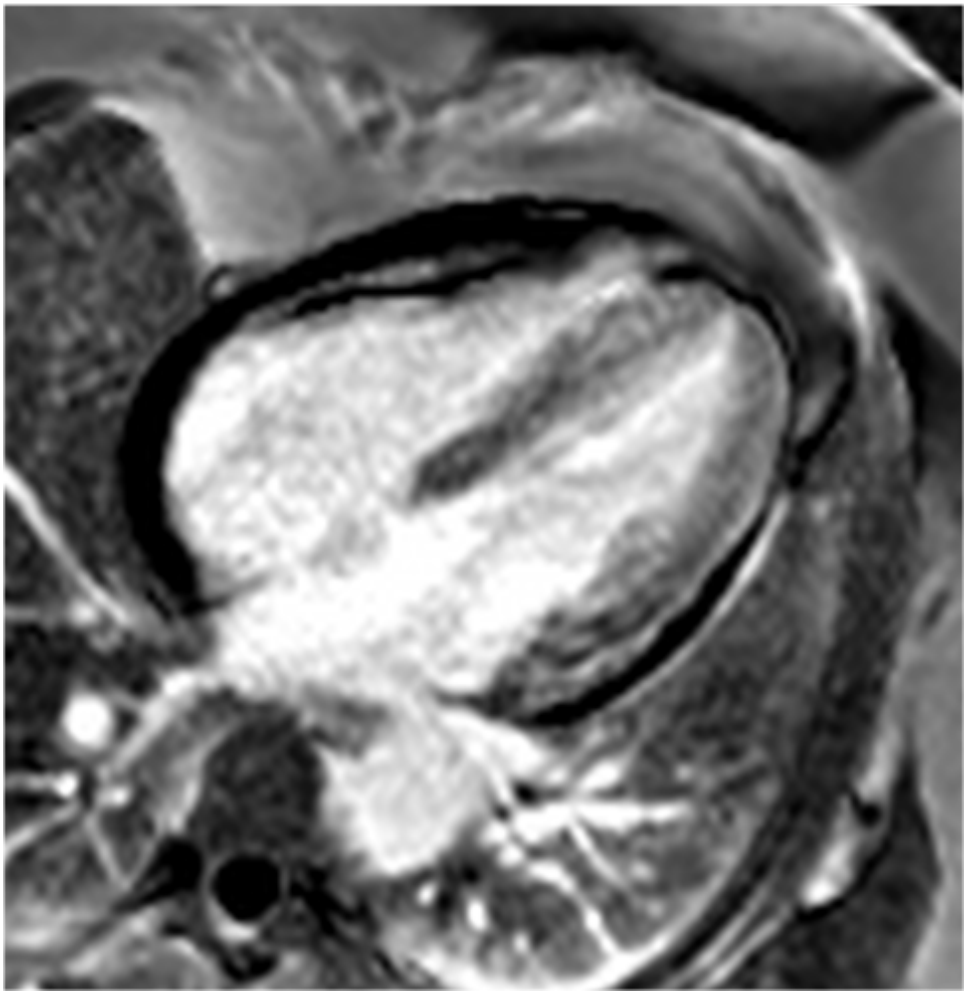
Body*

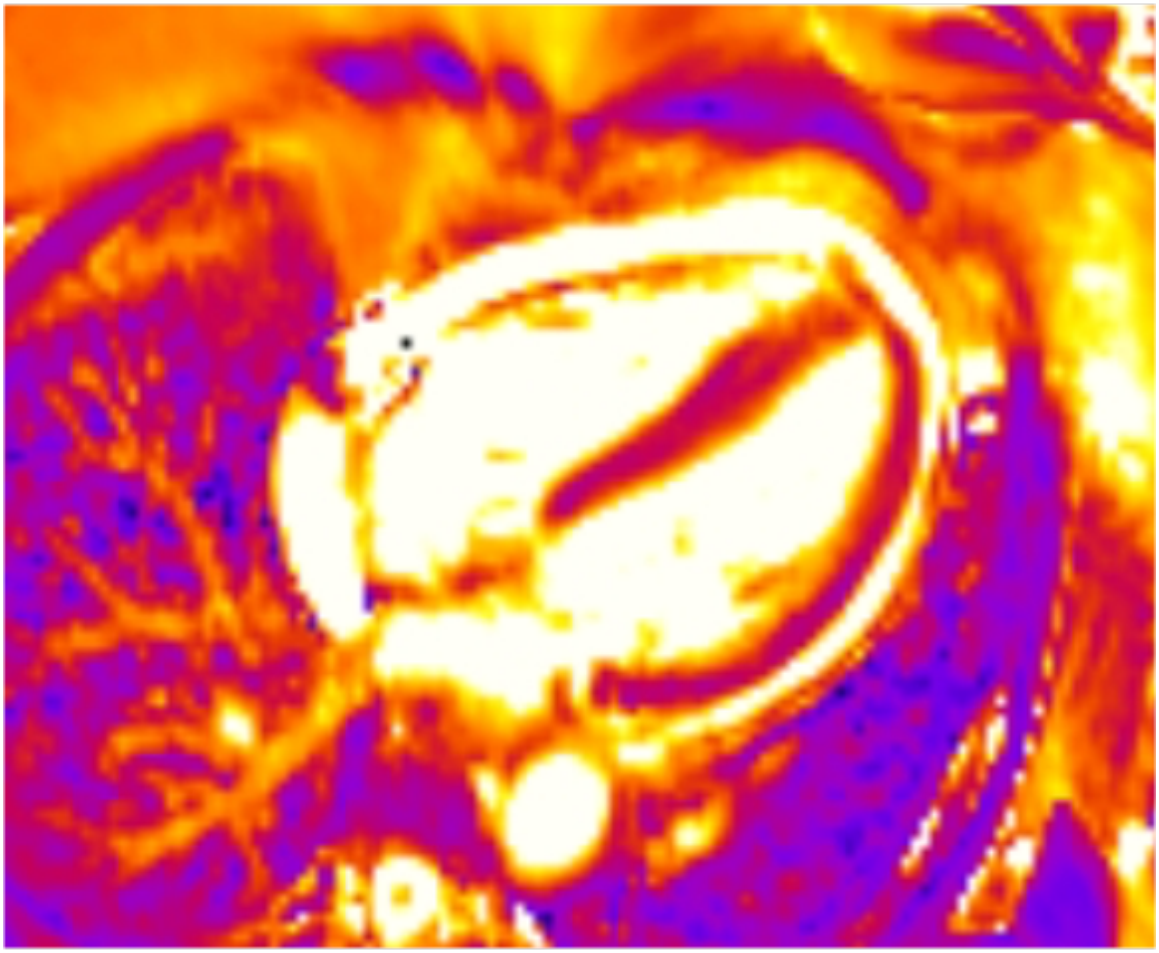
Thromboembolisn is a leading cause of death worlwide. Cardioembolic stroke accounts for 14–30% of all ischemic stokes and is generally severe with a high risk of early and long- term recurrence, and high mortality.
Emboli originating in the atria, left atrial appendage (LAA), PFO (patent foramen ovale), ventricles, valves, proximal aorta and venous system can cause stroke, TIA (transient ischemic attack, coronary artery occlusion and peripheral embolization.
Atrial fibrillation is the most common cause of embolic sources, and about 60% of cardioembolic strokes are caused by left atrium (LA) and LAA thrombi secondary to atrial fibrillation or flutter.
Approximately 1.0–2.5% of patients with acute myocardial infarction experience a stroke during the first 4 weeks after the infarction.
Systemic embolization occurs in 22–50% of infective endocarditis cases.
Cardiac tumors such as myxomas and papillary fibroelastomas are associated with a high frequency of embolic events.
Thrombo-embolic events are important complications of myocarditis, associated with a dysfuntional left ventricle.



Brain MRI, Diffusion Sequence demonstrating Cerebral embolism



Cardiac MRI, PSIR Sequence showing diffuse enhancement



Cardiac MRI, T2 mapping showing diffuse myocardial edema due to myocarditis

Imaging plays a key role in the ivestigation of potential cardiac causes of emboli. TTE (transthoracic) or TEE (transesophageal) Echocardiography (2D or 3D) is the initial and frontline imaging technique but modern and more advanced imaging modalities like Cardiac CT and Cardiac MRI can offer valuable and accurate information about the potential cardiac source of an embolism and exclude other potential sources.
Cardiac CT or MRI can be accurately used in alternative to echocardiography in the following circumstances: patients who cannot tolerate TEE, equivocal results from TTE, characterization of a cardiac mass detected on TTE or TTE.

Take Home Points*
Numerous conditions can give rise to emboli in the heart.

Echocardiography is the initial imaging technique in order to scrutinize potential cardiac sources of emboli.

However, in selected patients who have a contraindication to TEE or in challenging cases with suboptimal or equivocal imaging findings, advanced imaging with Cardiac CTA or Cardiovascular MRI should be considered as a complementary or alternative test.
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[2] Cardiac Thromboembolism: cardiac sources of embolism, Clinical Echocardiography

COMMON TOPICS 8 – ARTIFICIAL INTELLIGENCE

A-823

Artificial Intelligence in Lung Cancer Imaging

J. B. Seo
University of Ulsan College of Medicine, Asan Medical Center, Radiology, Seoul, Republic of Korea (South Korea)

Body*

The artificial intelligence, particularly deep learning algorithm, has shown performances superior to those of human in voice and image recognition. Accordingly, many researchers and companies has tried to apply artificial intelligence to healthcare system. Imaging field has been a frontier in applying artificial intelligence in medicine.

Imaging has been played an important role in almost all steps of lung cancer practice, i.e., in screening, diagnosis, staging, choice of treatment options, evaluating the response and monitoring the patients after treatment. Over the past years, many researchers have tried to apply artificial intelligence in lung cancer imaging for multiple tasks, including adding detection of early cancer, predicting pathological subtypes, predicting treatment response and so on. In this lecture, basic concept and recent studies applying AI in lung cancer imaging will be briefly introduced. In addition, the future direction of AI application in cancer imaging will be discussed.

Take Home Points*

1. To understand current status of AI applications in lung cancer imaging
2. To improve detection of lung nodule in lung cancer CT screening using AI
3. To use AI combined with radiomics in characterization of lung nodule and lung cancer staging.

A-826

AI in Cardiac Image Post-Processing

C. De Cecco
Emory University, Department of Radiology and Imaging Sciences, Atlanta, United States of America

Body*

Artificial intelligence (AI) is having a significant impact in medical imaging, advancing almost every aspect of the field, from image acquisition and post-processing to automated image analysis with outreach toward supporting decision making. Non-invasive cardiac imaging is one of the main and most exciting fields for AI development. AI has been successfully used in cardiac imaging to perform time-consuming tasks, such as post-processing, data acquisition and reconstruction, and grading of disease severity, with a resulting improvement in terms of analysis time and accuracy. This lecture will focus on recent advancements in AI-based post-processing solutions in cardiac imaging and will provide examples on how to integrate AI analysis in clinical practice.

Take Home Points*

At the end of the lecture the attendees will learn recent AI advancements in AI-based post-processing solutions in cardiac imaging, and the benefits of implementing AI analysis in clinical practice to improve the work-flow.

COMMON TOPICS 9 – WHAT COMES NEXT?

A-769

Acute/Long/Post COVID-19:Can we close the books?

A. Triani, P. De Nitto
Südtiroler Sanitätsbetrieb /Azienda Sanitaria dell'Alto Adige I Azienda Sanitera de Sudtirol, South Tyrol Pulmonology Service, Bolzano, Italy

Body*

Dr. Antonio Triani Director of the Betrieblicher Pneumologischer Dienst/Servizio Pneumologico Aziendale/South Tyrol Pulmonology Service

•Staff: Director + 8 Doctors ,•Medical staff 23,•Administrative staff 8
•Locations: 6 in the South Tyrol (Bolzano/Bozen, Egna/Neumarkt, Merano/Meran, Silandro/Schlanders, Bressanone/Brixen, Brunico/Bruneck).
•2 medical clinics located out of the Hospital and 4 in the Hospital
•Patient access: Telephone, mail, Wards, Internal Bookings
•Visit: in-and out-patients
•Objectives: Demand, control and appropriateness according to CCM, EMERGENCY, PNRR etc.
•Referent for taking charge of all Respiratory Home Care, TB, Neuromuscular Patients, Rare disease
•Trend: Increased demand
•Specificity: "taking care of patients"
•PATIENTS VISITED:
02.01- 31.12.2019 **8180**
02.01- 31.12.2020 **6432**
02.01- 31.12.2021 **7723**
02.01 - 31.12.2022 *9010*
The Mission of the South Tyrol Pulmonology Service: Taking care of patients
Medical examination and dedicated test prescription.
Tests during examination:
Spirometry, Carbon monoxide diffusion (DLCO), Oxygen saturation (SpO2), Measurement of oxygen, carbon dioxide etc. in arterial blood (EGA). Measurement of muscle strength (MIP and MEP).
Specific questionnaires for dyspnoea, quality of life (MMRC, SGRQ).
Chest X-ray, ultrasound scanning.
Schedule diagnostic completion examinations (6 MWT, Ergospirometry, ECG, Ecocardiographie, Chest CT, Scintigraphy, PET etc.) arrangement of an appointment for check-up
PATIENTS LONG/POST COVID
2020-2022 **1471**
2023 just 207
Long covid what are we talking about? Long-COVID symptoms are extremely heterogeneous and can affect multiple organs or apparatuses
Our Long-COVID Patients: The clinical assessment is carried out, supported by respiratory function tests (e.g. spirometry, DLCO, etc.) and imaging (chest X-ray).
If further specialist examinations are necessary (e.g. cardiological, neurological, psychiatric, physiatrist, etc.), the patient is taken over by the specialists, without passing through the CUP (Patient reservation centre), thanks to the interdisciplinary collaboration that has been established at company level.
South Tyrol Pulmonology Service and COLLABORATION WITH ISS (Italian Superior Institute of Health) "Analysis and response strategies to the long-term effects of CV-19
•national surveillance, coordinated by ISS will be guaranteed by the participation of the IRCCS networks to which more than 30 IRCCSs on the national territory belong and by the Regions participating in the project"

Take Home Points*

"He who writes a book wants to make his thoughts known.
If we read it, we always keep in the depths of our memories the impressions and feelings it provoked in us.
A book is never closed, it is only put back in the private library, but it is always there!"

A-775

Triple Screening: CD/LC/Emphysema

R. Vliegenthart
University Medical Center Groningen, Radiology, EB44, Groningen, The Netherlands

Body*

Lung cancer, COPD (emphysema/bronchitis) and cardiovascular disease (CVD) are among the main killeres in the Western population. It is known that the target population for CT lung cancer screening, namely individuals with long-term smoking history, are also at increased risk of COPD and CVD. On one and the same CT scan, early signs of these diseases can be evaluated. The current presentation will discuss the current evidence regarding evaluation of biomarkers for COPD and CVD on chest CT, including the relation to prognosis.

Take Home Points*

Low-dose chest CT as used for lung cancer screening, allows evaluation of early biomarkers for COPD and CVD.
CT based biomarkers for COPD and CVD (in particular emphysema and calcium score) are related to worse prognosis.
Including COPD and CVD biomarkers in the evaluation of lung cancer screening CT scans, may increase the cost-efficiency of CT screening.
However, currently there are no trials yet showing the benefit of CT screening for COPD and CVD.

A-851

The future role of cardiothoracic radiology

F. Gleeson
Oxford University, Oxford, United Kingdom

Body*

Cardiothoracic imaging is like all other imaging undergoing significant changes, being driven by changes in image acquisition and analysis.
Imaging the heart and lung has always been hampered by motion, but this is becoming less of a concern as scanners continue to improve and image acquisition becomes quicker. There is now also a step change in the options available for scanning, including: photon counting CT, Digital and Whole Body PET-CT, and Hyperpolarised Xenon MRI. These new techniques provide new opportunities not just for diagnosis, but also for insights into both the physiology of health and disease.
The COVID pandemic opened the world's eyes to the major importance of the lungs and coupled with the great strides that have been made in Lung Cancer Screening, there is now increased awareness from health care providers and the public of lung disease.
The pandemic has provided an impetus to hyperpolarised xenon MRI and functional lung imaging. The research from the Lung Cancer Screening academics has show how to have a significant impact on the world's deadliest cancer.
There has also been a sea change in treatment of interstitial lung disease and lung cancer, both previously thought to be diseases without impactful treatments, and now being repositioned as treatable, reuiring early diagnosis and interventions.
Artificial Intelligence is having an impact on cardiothoracic imaging, providing detection, characterisation and prognostic analysis. But the data so far suggests that medical involvement will remain important.
As clinical developments such as tumour and other biomarkers are developed, it is likely that multimodal/multiomic will become more commonplace and play an important part of disease diagnosis and management.
This presentation will briefly touch upon the above developments and their impact on the future of cardiothoracic imaging

Take Home Points*

1. New technologies, such as photon counting CT, Whole Body PET-CT and Hyperpolarised Xenon MRI will open new areas of research and clinical cardiothoracic imaging
2. Artificial Intelligence aided image acquisition and analysis will play an important role in cardiothoracic imaging, but the well trained radiologist will continue to play an important role
3. Multimodal and multiomic medicine is likely to play a key role in the future of cardiothoracic imaging and medical care