MRI of Lung

Essay

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بسم الله الرحمن الرحيم

﴿ سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ ﴾

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List of Abbreviation

AEP	Acute eosinophilic pneumonia
AIP	Acute interstitial pneumonia
BLADE	Brand name/not an acronym (rotating phase encoding sequence; Siemens)
CEP	chronic eosinophilic pneumonia
CTEPH	Chronic thromboembolic pulmonary hypertension
COP	Cryptogenic organizing pneumonia
CWP	Coal worker's pneumoconiosis
CF	Cystic fibrosis
COPD	Chronic obstructive pulmonary disease
DIP	Desquamative interstitial pneumonia
DLD	Diffuse lung diseases
DWI	Diffusion weighted imaging
EP	Eosinophilic Pneumonia
Flash	Fast low angle shot (the basic technique for GE sequences; Siemens)
FoV	Field of View
FSE	Fast spin echo
GRE	Gradient echo (sequence)
HASTE	Half-Fourier short turbo spin echo sequence

IPF	Idiopathic pulmonary fibrosis
LAM	Lymphangioleiomyomatosis
LC	Lymphangitic carcinomatosis
LCH	Langerhans' cell histiocytosis
LIP	Lymphocytic interstitial pneumonia
NSIP	Non-specific interstitial pneumonia
PAH	Pulmonary arterial hypertension
PAP	Pulmonary alveolar proteinosis
PE	pulmonary embolism
PROPELLER	Periodically Rotated Overlapping Parallel Lines with Enhanced Reconstruction (rotating phase encoding sequence; GE)
rt	respiratory triggering
SE	Spin Echo
SSFP	steady-state free precession sequence(gradient echo sequence with steady state acquisition)
STIR	Short tau inversion recovery
TB	Tuberculosis
TRICKS	Time-resolved imaging of contrast kinetics (a temporally resolved 3D gradient echo sequence with temporal resolution (3D+t) achieved by echo sharing; GE)
TrueFISP	True fast imaging with steady state precession (gradient echo sequence with steady state acquisition; Siemens)
TWIST	Time-resolved angiography with stochastic trajectories (temporally resolved 3D gradient echo sequence with temporal resolution

	(3D+t) achieved by echo sharing; Siemens)
TSE	Turbo Spin Echo
UIP	Usual interstitial pneumonia
VIBE	volume interpolated gradient echo sequence (a 3D gradient echo sequence with volume interpolation and RF fat saturation; Siemens)

Introduction

Magnetic resonance imaging (MRI) of the lung is a powerful evolving tool for scientific and clinical application.

Besides chest radiography, the most commonly employed first-line test for chest disorders, and Computed tomography (CT), so farther most comprehensive and detailed modality for cross-sectional and three-dimensional (3D) imaging of the lung, MRI is becoming an alternative, third method for the assessment of pulmonary diseases **(Eibel R et al ,2006)** . However, MRI offers additional advantages beyond the scope of X-ray-based techniques due to its functional imaging capacities. More than any other modality, MRI combines excellent soft tissue contrast and functional information **(Biederer J 2005).**

The key technique for MRI of lung morphology is based on the resonant high-frequency signal of protons in tissues and liquids, so-called proton-MRI or 1H-MRI. The recent technical advances have helped MRI to challenge its well-known limitations as they are defined by the low proton density in the lung and the fast signal decay due to susceptibility artefacts at air-tissue interfaces **(Puderbach M et al, 2007).**

Once broadly available, it will likely become a modality of choice for cases in which exposure to ionizing radiation should be strictly avoided. This would comprise children, pregnant women and disorders requiring repeated examinations over prolonged period patients with neutropenia, in which MRI could contribute significantly to lowering the cumulative radiation dose **(Eibel R et al, 2006).**

Aim of the work

The aim of this work is to highlight the role of MRI in diagnosis and imaging of various lung diseases.

Anatomy

The anatomical organization of the lungs consists of the bronchovascular bundles and the secondary lobules. The bronchovascular bundles are made up of the main bronchi, the pulmonary vessels and the interstitial framework around them (central interstitium).The secondary lobules are the peripheral units of parenchyma where the airways meet the capillaries within the interstitial framework supporting them (peripheral interstitium). ***(Maffessanti et al., 2006)***

BRONCHOVASCULAR BUNDLES:

The bronchovascular bundles are therefore made up of the bronchi, the main arteries and the surrounding connective tissue (peribronchovascular interstitium) and extend from the hilar-parahilar regions (main arteries and bronchi) to the most peripheral prelobular branches. These structures become narrower at each dichotomous branching. ***(Maffessanti et al., 2006)***

The Secondary Pulmonary Lobule:

The secondary pulmonary lobule is the smallest anatomical unit of the lungs .Typical secondary pulmonary lobules are irregular polyhedral units that vary in size, measuring from approximately 1 to 2.5 cm in diameter and incorporating up to 24 acini. An average diameter for pulmonary lobules ranges from 11 to 17 mm in adults. The secondary pulmonary lobule is surrounded by a mantle of connective tissue septa. A central bronchovascular bundle, consisting of the lobular bronchiole and the accompanying pulmonary artery, enters the