ASMRM & ICMRI 2020 November 03 - 04, 2020 Virtual Congress http://2020.ksmrm.org

MRM Invited SY22-2



Cardiac MRI: Clinical Application of Advanced Technique

Chul Hwan Park

Radiology, Gangnam Severance Hospital, Yonsei University College of Medicine, Korea

The main advantage of cardiothoracic MRI is its potential for tissue characterization by using various sequences. Quantitative myocardial characterization using cardiac MRI is useful in diagnosis, stratification and prognosis monitoring of various cardiac diseases. Native T1 map and ECV fraction are widely used for myocardial fibrosis. However, native T1 mapping is suffering from relatively low contrast between normal and abnormal myocardium. For the ECV fraction, contrast material injection and blood test are required. To overcome these limitations, the development of new non-contrast CMR markers with improved contrast is required. Recently, technological innovations in MRI have resulted in the development of advanced techniques for cardiac MR imaging including T1rho imaging, Diffusion weighted imaging (DWI) and Chemical exchange saturation transfer (CEST) imaging. T1 rho is the spin-lattice relation in a rotating frame. T1 rho could represent low frequency interaction between free water and macromolecules, which is more sensitive in macromolecular change than that of native T1 relaxation. Cardiac DWI has slowly developed due to its technical difficulties associated with imaging the beating organ, which is highly susceptible to motion. However, cardiac DWI is considered as a promising noninvasive method for cardiac diseases including ischemic cardiomyopathy and non-ischemic cardiomyopathy. Because it could provide deeper understating of cardiac microstructure, function, and disease-related changes without using a gadolinium-based contrast material. CEST is a novel magnetic resonance imaging contrast approach, which is not based on the proton relaxation. Endogeneous diamagnetic CEST is clinically attractive, and endogeneous compounds include amide (-NH), amine (-NH2) and hydroxyl (-OH) groups whose chemical shifts are ~3.5, ~1.8-3.0, and ~0.5-1.5 ppm. In the era of cardiac disease, the interest in creatine CEST is rapidly growing, which could represent myocardial energy metabolism.

With these imaging biomarkers, a new paradigm could be established, which permits a quantitative evaluation of cardiac diseases in diagnosing, evaluating, prognosis predicting, risk stratifying, treatment strategies planning and following up.

In this session, we are going to review in-depth the present and future of promising technologies for cardiac MRI, based on published data.

Kidney, Tumor, MRI

Keyword: Cardiac MRI, T1rho, DWI, CEST