

SPECIALTY: How we do it – Diffuse Liver Disease

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HIGHLIGHTS:

- Liver fat and iron are important features of diffuse liver disease
- Proton-density fat fraction (PDFF) is a MR imaging biomarker of liver fat
- T2 and T2* are MR imaging biomarkers of liver iron
- Liver fat and iron quantitative imaging techniques are now commercially available, and can be incorporated into clinical practice

TALK TITLE: Liver Fat and Iron Quantification using Multiecho Gradient Recalled Echo Imaging

TARGET AUDIENCE: Clinical radiologists interested in quantitative imaging of diffuse liver disease

OBJECTIVES:

- Familiarize with emerging quantitative imaging techniques for liver fat and iron.
- Understand the need for standardization in liver fat and iron quantification and reporting.
- Learn how to incorporate quantitative imaging into clinical workflow.

SYNOPSIS: Diffuse liver disease represents a spectrum of conditions and etiologies are broad, including alcoholic, metabolic, infectious, immune/inflammatory, and hydrostatic/cholestatic. Regardless of the specific causes, the key histological features are, fat, iron, inflammation/injury/necrosis, and fibrosis. In particular, toxicities related to fat and iron plays the main pathogenic role in primary fat/iron storage diseases such as nonalcoholic fatty liver disease and various forms of hemochromatosis. Fat and iron are also important co-factors that accelerate disease progression in other forms of diffuse liver diseases. Quantifiable MR tissue properties have been proposed as biomarkers including proton-density fat fraction (PDFF) for liver fat, and T2 or T2* relaxation time for liver iron. These are the main focus of this presentation.

Liver fat and iron quantification can be performed using a breath-hold multiecho gradient echo acquisition with automated post-processing for PDFF or T2* map reconstruction. The scan parameter set-up, the mathematical model, and estimation algorithm, can be packaged into a commercial product, and technical details hidden from the end-user. Liver iron can also be quantified using multiple spin-echo acquisition with offline liver T2 reconstruction by a commercial data analysis service (e.g. FerriScan®, Resonance Health, Ltd.) These commercial solutions are increasingly available from a variety of scanner manufacturers and/or 3rd party vendors, and can be easily incorporated into clinical workflow.

We will present our clinical experience with liver fat and iron quantitative imaging. Through a series of clinical cases, we will demonstrate the clinical workflow, from patient selection, image acquisition, map reconstruction, to image interpretation and reporting. We will discuss limitations and potential pitfalls of the existing techniques, as well as some promising new and improved techniques on the horizon.