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Research Interests

• Quantitative Ultrasound Backscatter Tissue Characterization
  • Diagnosis and Grading of Non-Alcoholic Fatty Liver Disease
  • Quantitative Characterization of Breast Masses
  • Liver Masses
  • Pre-Term Cervix

• Ultrasound Inverse-Scatter Computed Tomography
• Breast Ultrasound Computer-Aided Diagnosis
• Observer Performance Studies (ROC)
• Quantitative X-Ray Computed Tomography
Non-Alcoholic Fatty Liver Disease (NAFLD)

Leading cause of chronic liver disease (USA: 21-50% adults, 17% children)
Steatosis -> Steatohepatitis -> Fibrosis -> Cirrhosis -> Carcinoma

Reference Standards:
- Biopsy
- MRI-PDFF
- Clinical US

CUS: High reader variability, operator dependent, low sensitivity at early stages
Participan’t’s Liver
Reference Phantom

(a.)

QUS
ROI (window function)

Raw RF signal from transducer
(b.)

Average Power Spectrum of Participant
Average Power Spectrum of Reference Phantom
(c.)
Compare QUS to MRI PDFF

Define NAFLD as PDFF $\geq 5\%$

BSC, AC highly correlated
Both accurately diagnose NAFLD
AUC = 0.98 (BC), 0.89 (AC)
Infiltrating Ductal CA

Ultrasound CT

MG

SONOGRAM

MIP

MRI

Coronal

T1

Coronal

Sound Speed

Reflection