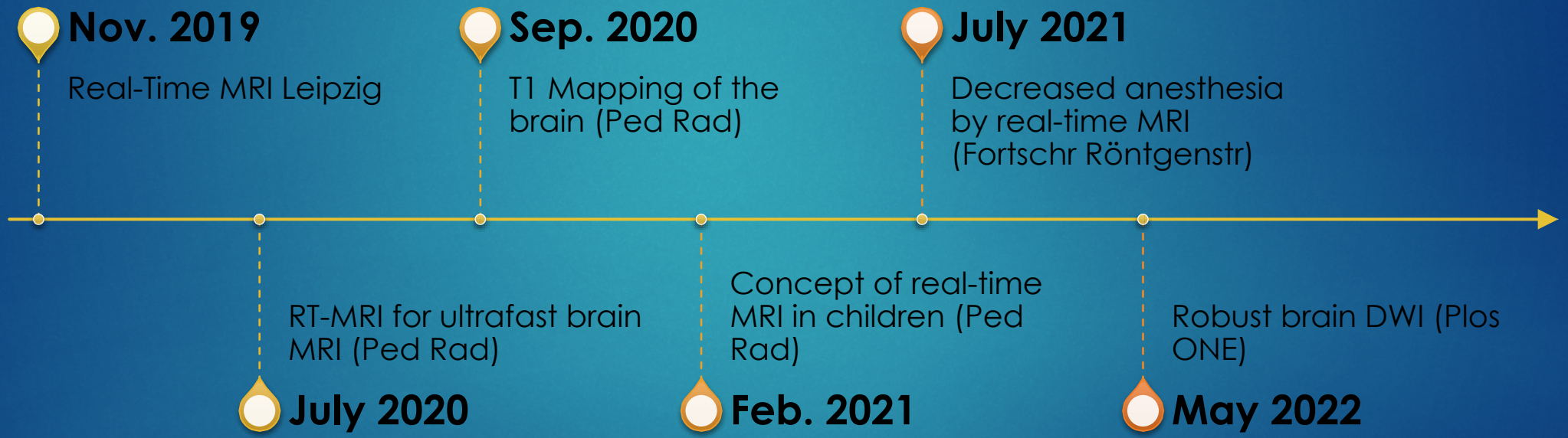
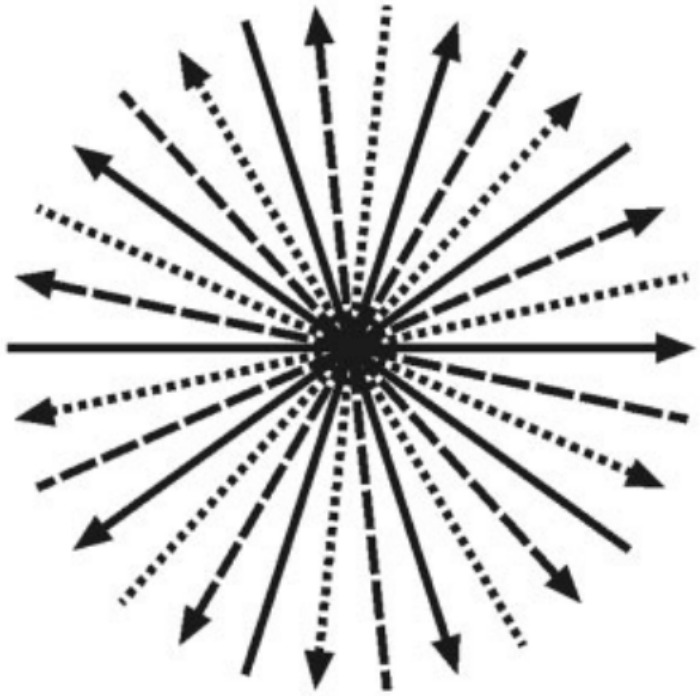
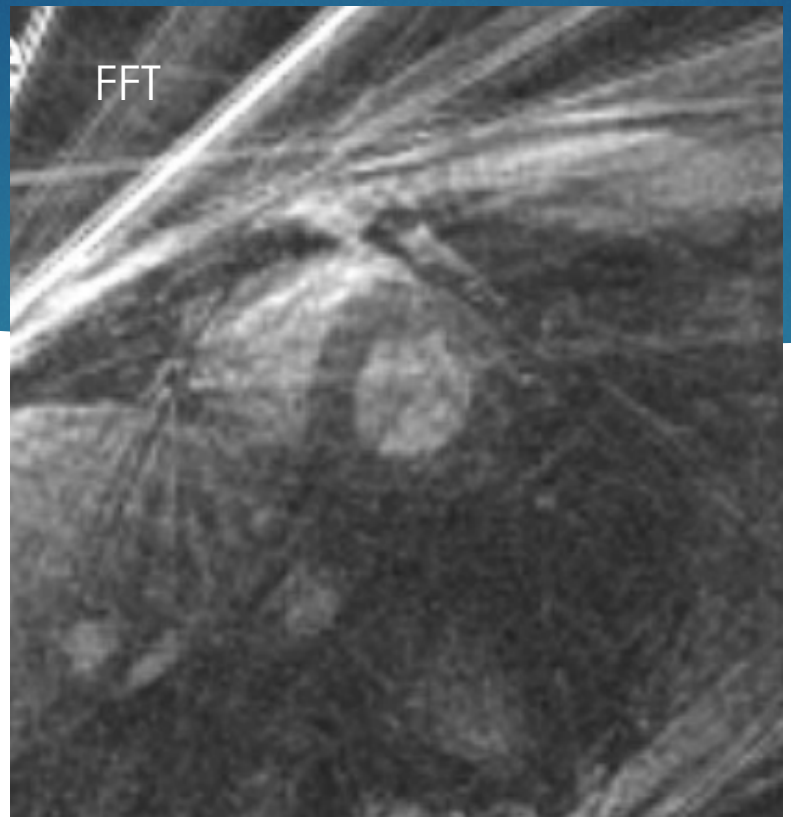
Guy-Sebag Grant 2019: Real-time cardiac MRI

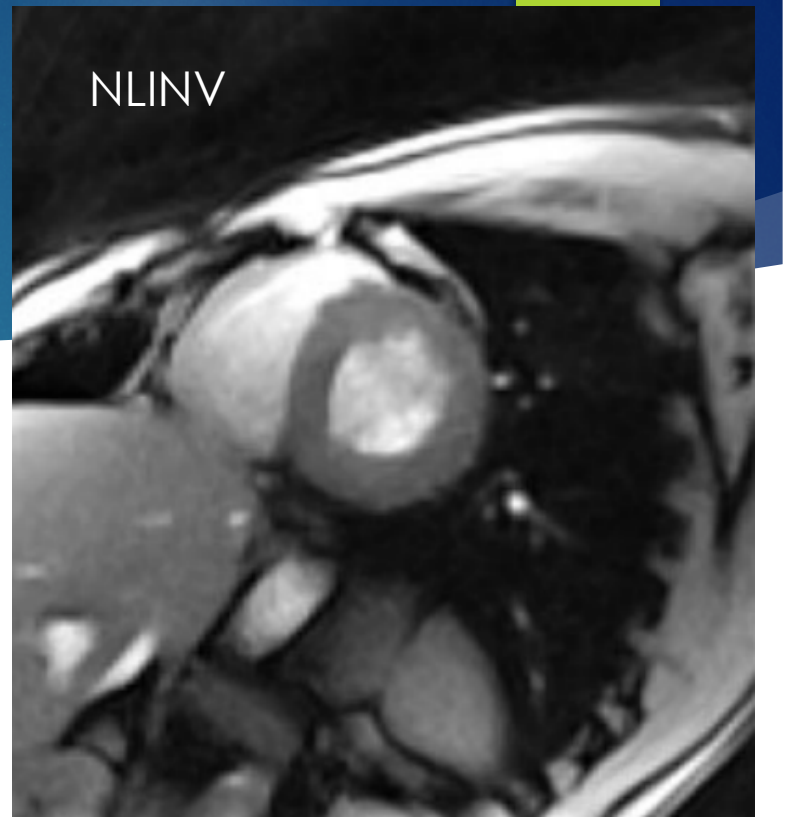
DANIEL GRÄFE – UNIVERSITY HOSPITAL LEIPZIG - GERMANY

Timeline


Nov. 2019
Real-Time MRI Leipzig
Sep. 2020
T1 Mapping of the brain (Ped Rad)
July 2021
Decreased anesthesia by real-time MRI (Fortschr Röntgenstr)
RT-MRI for ultrafast brain MRI (Ped Rad)
July 2020
Concept of real-time MRI in children (Ped Rad)
Feb. 2021
Robust brain DWI (Plos ONE)
May 2022







5 spokes, 30ms

Nonlinear inverse reconstruction (of undersampled data)

Uecker 2010

Prequisites

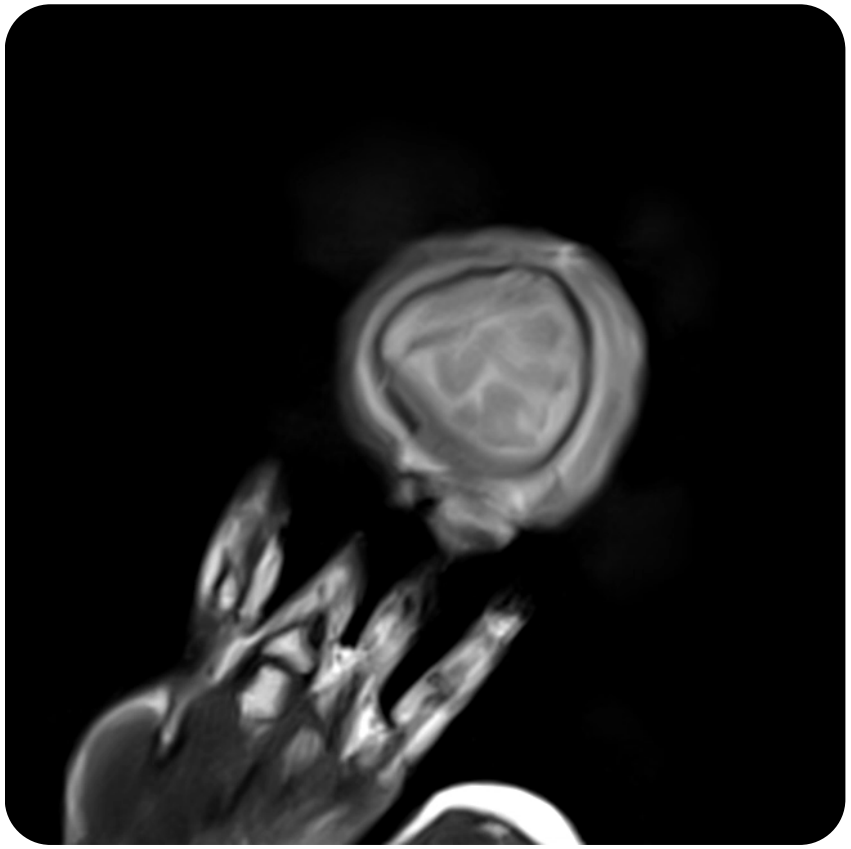
Fast gradients
Multi-channel coils

$$y_j(t) = \int_{\Omega} dx' \, \rho(x') \, c_j(x') \, e^{-i\vec{k}(t)\vec{x}}$$

Algorithms

GPU Cluster (8 high end graphic cards)

Ultrafast Brain MRI without sedation



Pediatric Radiology
https://doi.org/10.1007/s00247-020-04771-5

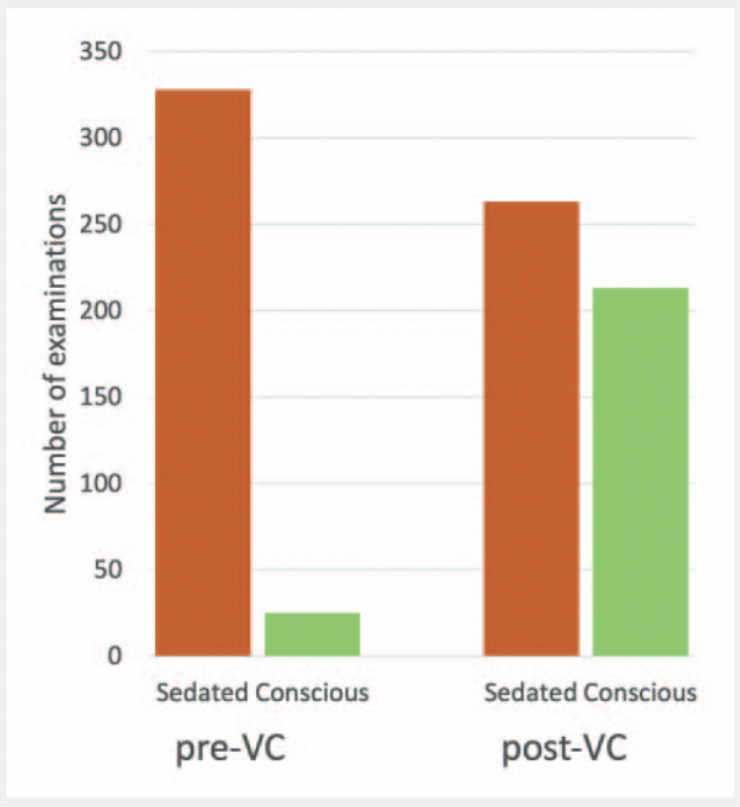
ORIGINAL ARTICLE

Outpacing movement — ultrafast volume coverage in neuropediatric magnetic resonance imaging

Daniel Gräfe[1] · Christian Roth[1] · Margit Weisser[2] · Matthias Krause[3] · Jens Frahm[4] · Dirk Voit[4] · Franz Wolfgang Hirsch[1]

Received: 26 February 2020 / Revised: 10 April 2020 / Accepted: 1 July 2020

… reduces sedation



Pediatric Radiology

Thieme

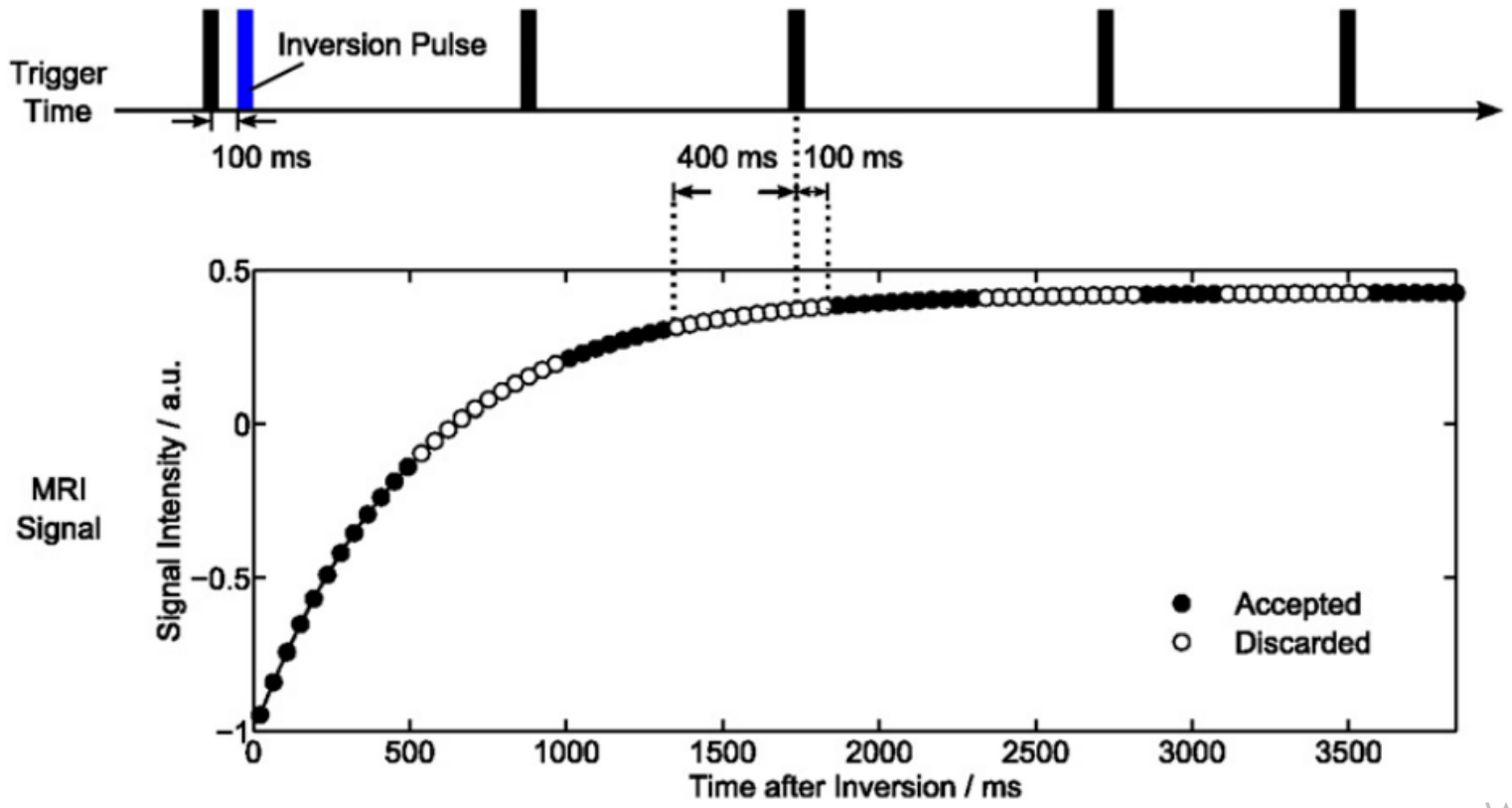
Decreased Need for Anesthesia during Ultra-Fast Cranial MRI in Young Children: One-Year Summary

Vermeidung von Sedierungen bei Säuglingen und Kleinkindern durch ultraschnelle kraniale MRT: Résumé des ersten Jahres

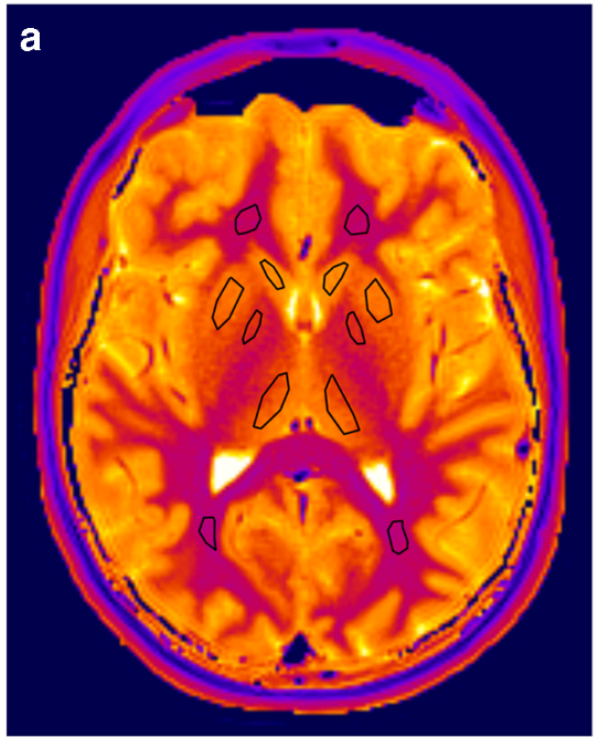
Authors

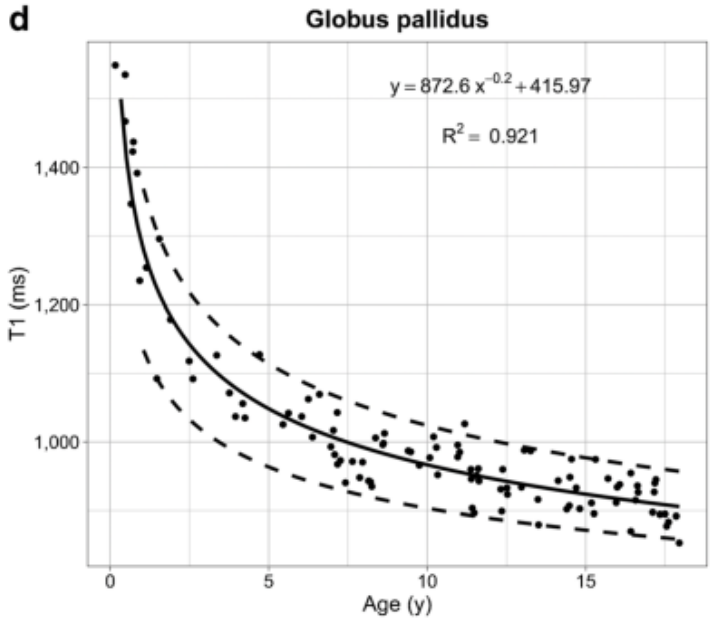
Ina Sorge[1], Franz Wolfgang Hirsch[1], Dirk Voit[2], Jens Frahm[3], Matthias Krause[4], Christian Roth[1], Peter Zimmermann[5], Daniel Gräfe[1]

T1 Mapping of the brain



Wang et al 2016





Pediatric Radiology
https://doi.org/10.1007/s00247-020-04842-7

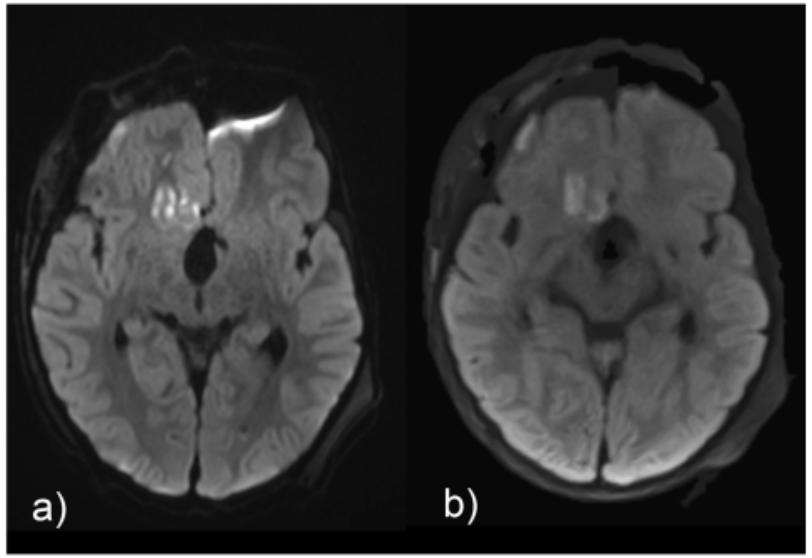
ORIGINAL ARTICLE

Quantitative T1 mapping of the normal brain from early infancy to adulthood

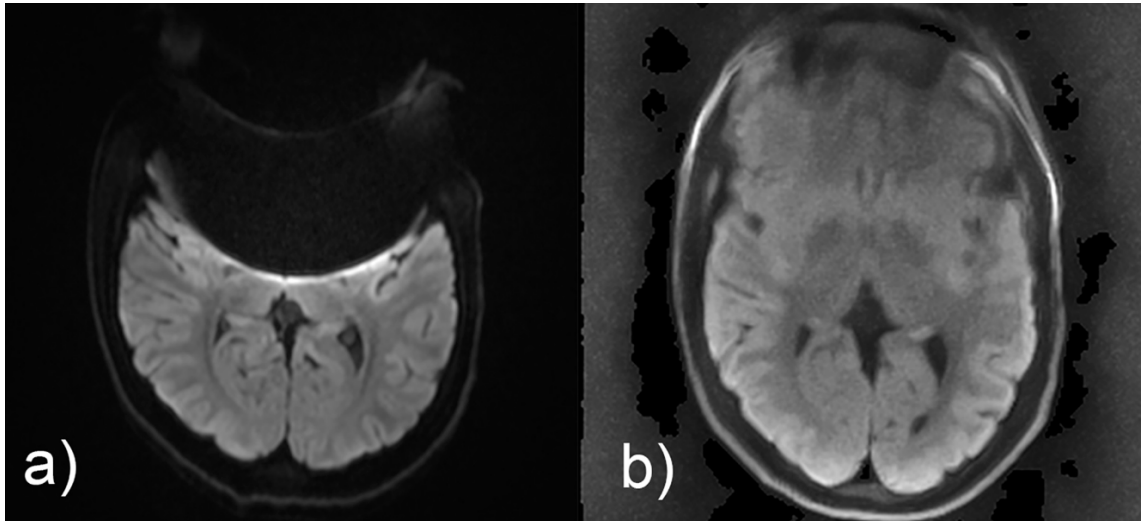
Daniel Gräfe[1] · Jens Frahm[2] · Andreas Merkenschlager[3] · Dirk Voit[2] · Franz Wolfgang Hirsch[1]

Received: 21 April 2020 / Revised: 12 July 2020 / Accepted: 7 September 2020

T1 mapping of the brain



EPI STEAM



EPI STEAM

Robust brain DWI

PLOS ONE

RESEARCH ARTICLE

STEAM-DWI as a robust alternative to EPI-DWI: Evaluation in pediatric brain MRI

Daniel Gräfe[1]*, Anne Päts[1], Andreas Merkenschlager[2], Christian Roth[1], Franz Wolfgang Hirsch[1], Jens Frahm[3], Dirk Voit[3]

1 Department of Pediatric Radiology, Leipzig University, Leipzig, Germany, **2** Department of Pediatrics, Leipzig University, Leipzig, Germany, **3** Biomedical NMR, Max Planck Institute for Multidisciplinary Sciences, Göttingen, Germany

Concept of real-time MRI in children

Pediatric Radiology (2021) 51:840–846
https://doi.org/10.1007/s00247-020-04828-5

TECHNICAL INNOVATION

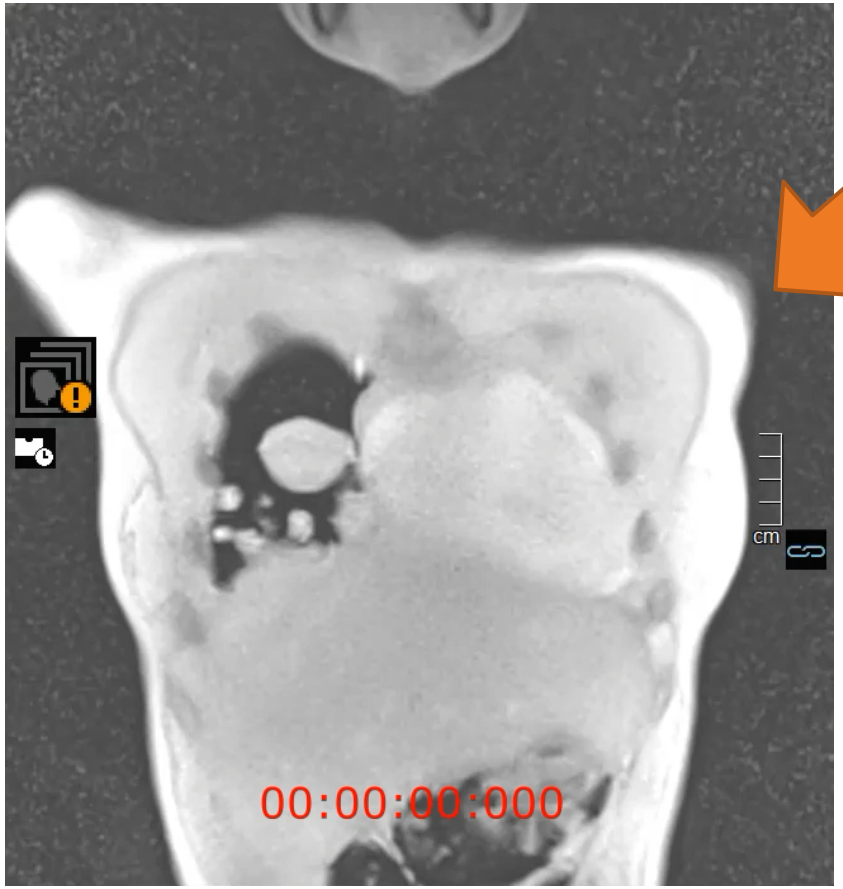
Real-time magnetic resonance imaging in pediatric radiology — new approach to movement and moving children

Franz Wolfgang Hirsch[1] · Jens Frahm[2] · Ina Sorge[1] · Christian Roth[1] · Dirk Voit[2] · Daniel Gräfe[1]

Received: 19 March 2020 / Revised: 17 June 2020 / Accepted: 23 August 2020 / Published online: 10 February 2021

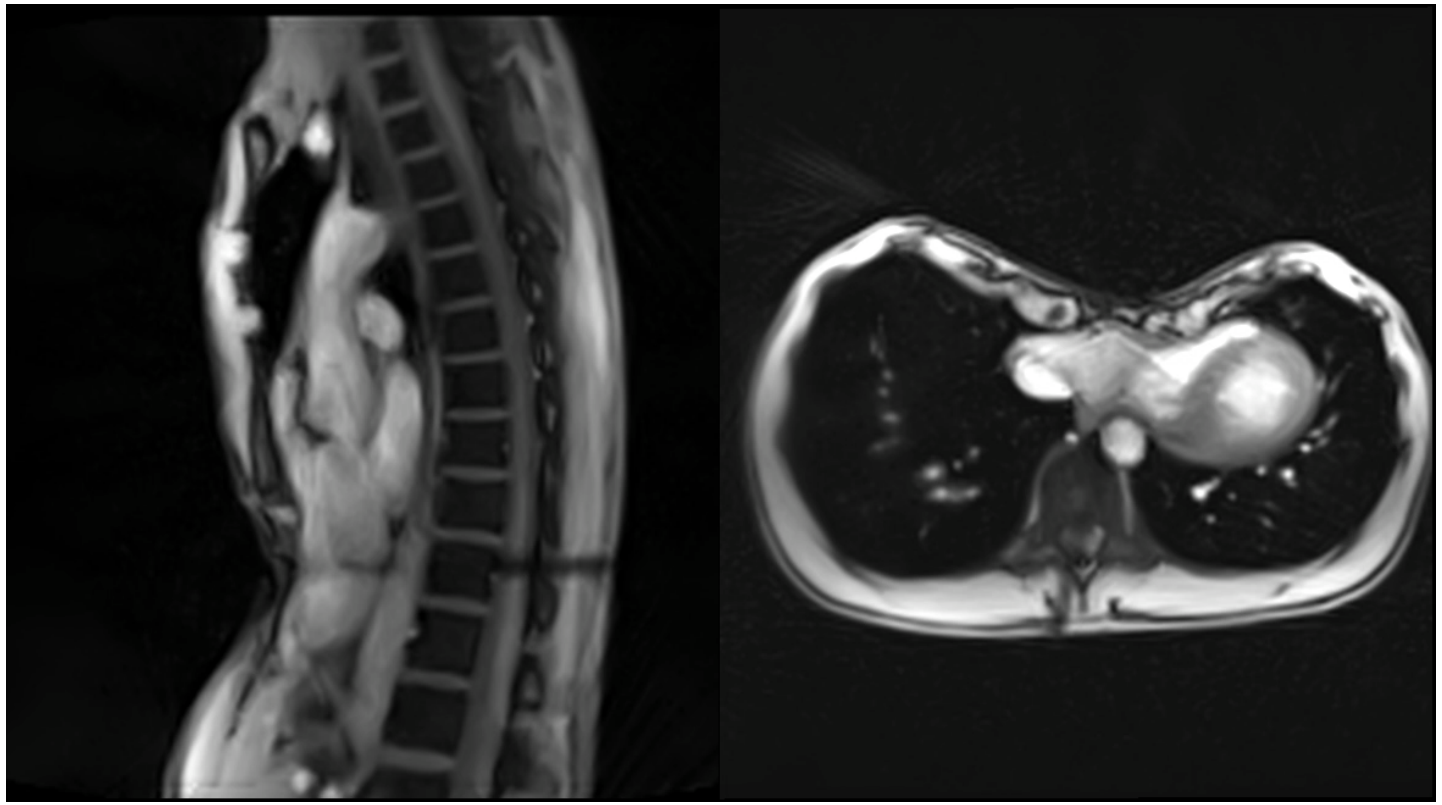
In review

Real-time lung MRI

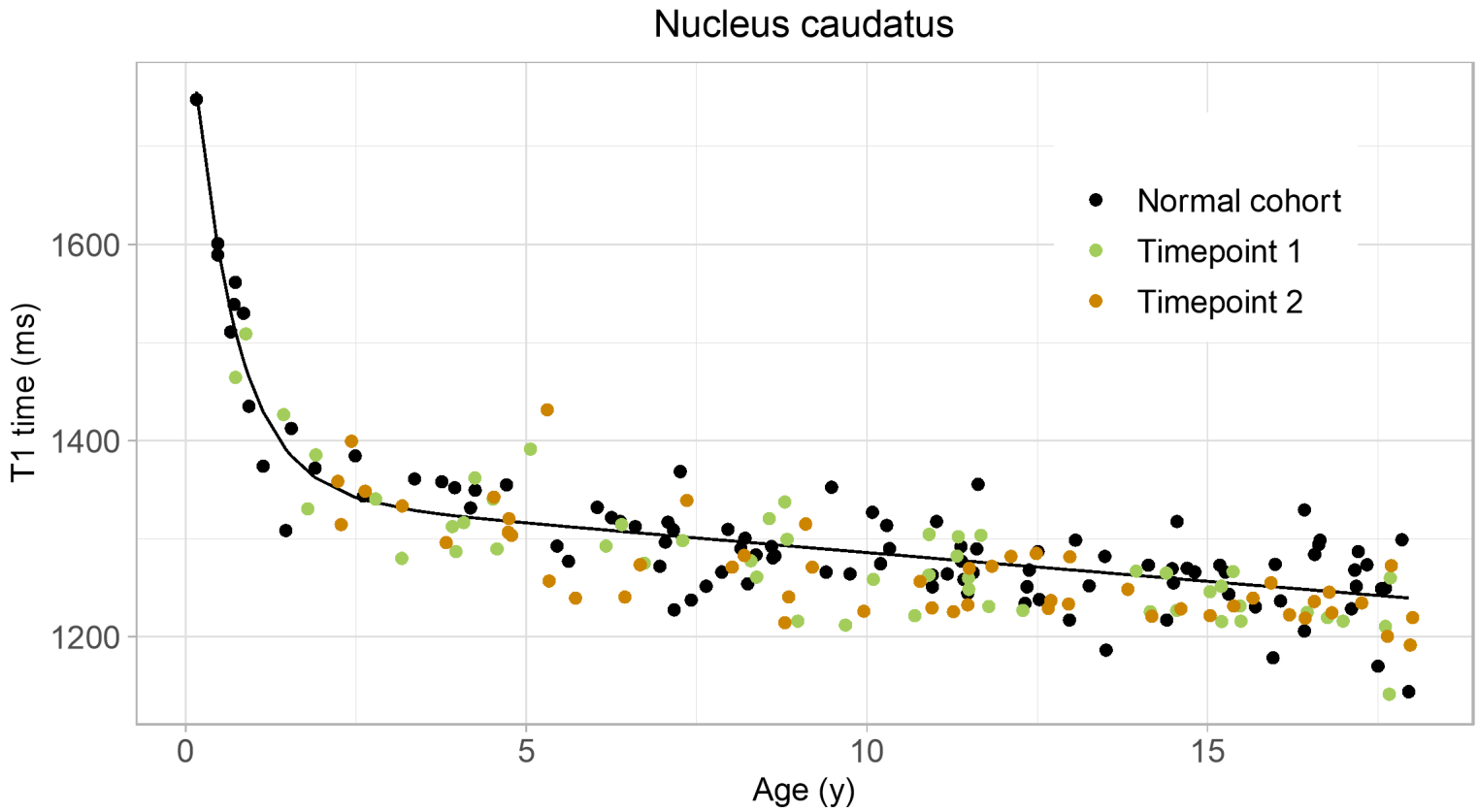


Real time !

Pectus excavatum (in review)

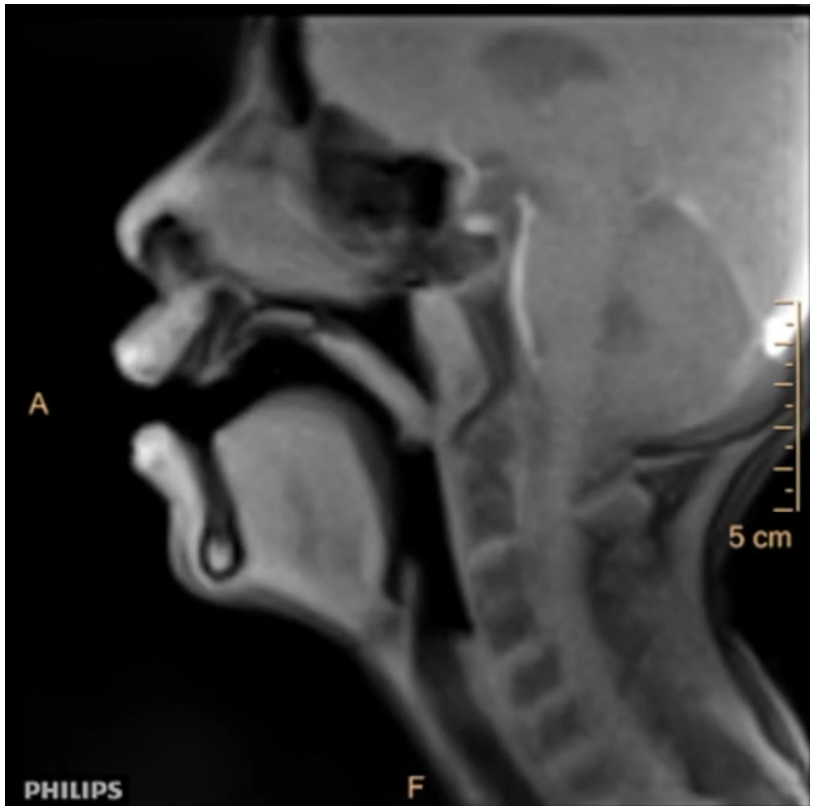


Gadobutrol deposition by T1 Mapping



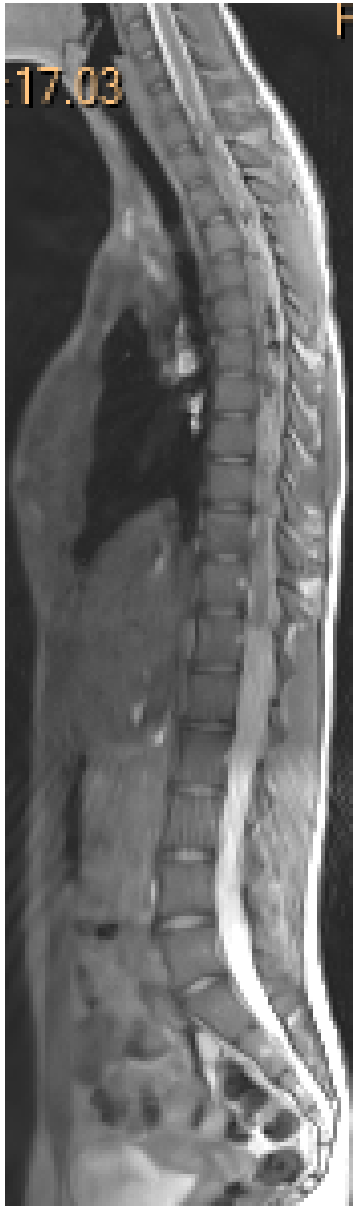
Ongoing projects

Velopharyngeal insufficiency



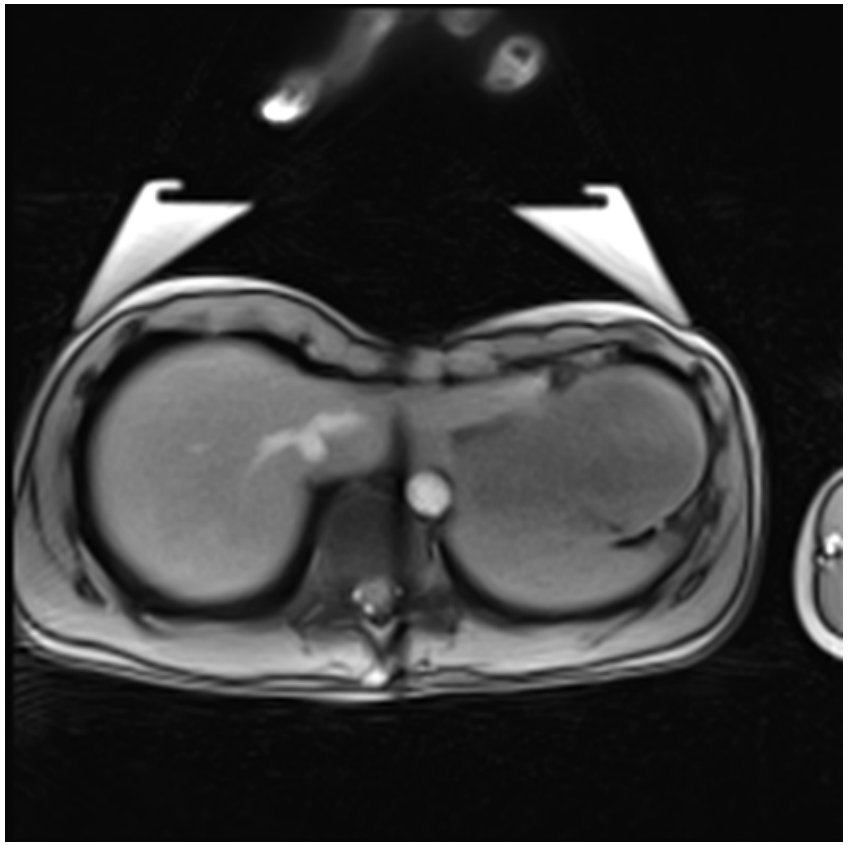
Ultrafast scoliosis protocol

30 seconds

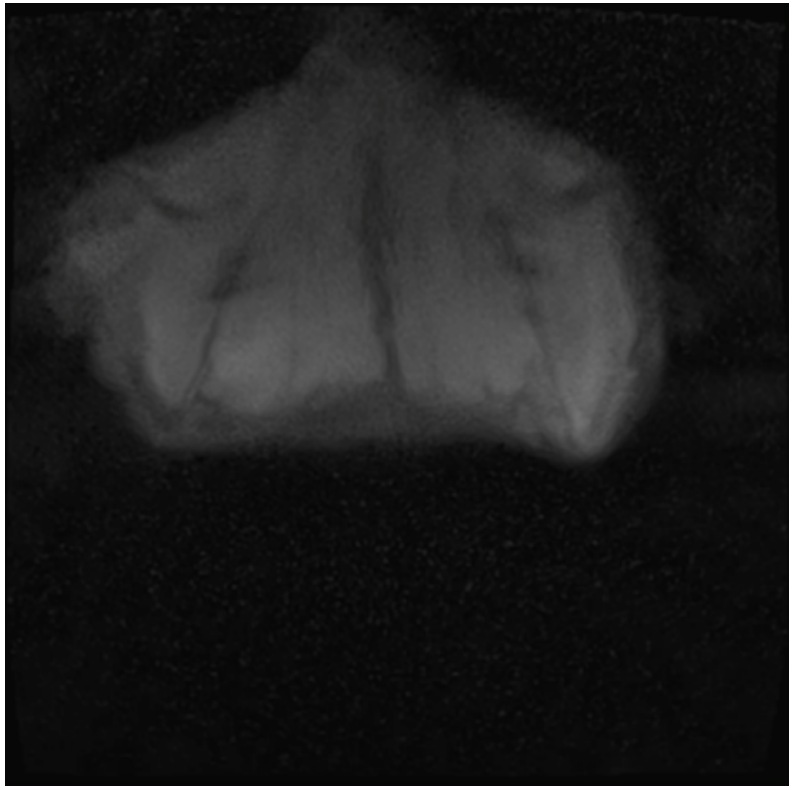


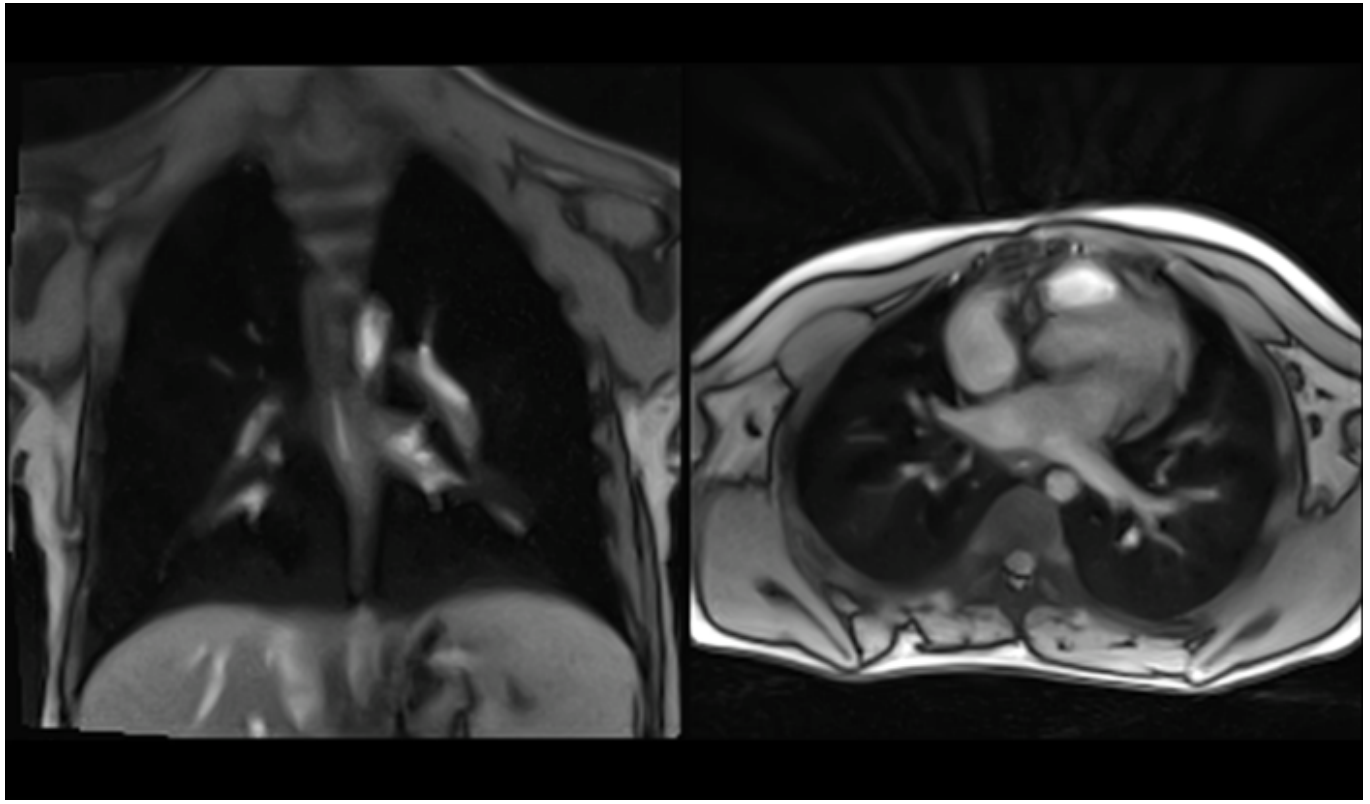
30 seconds

Pectus excavatum with vaccum bell



Sequelae after esophageal atresia





Thank you