**Faster Pediatric Brain MRI**

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**Aim**

- To deliver a ~5 minute motion-corrected protocol for pediatric imaging

**Equipment**

- 3T GE system and 8-channel head coil

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**Introduction: Problems in MRI**

- MRI is slow
  - Total scan time at our institution (minutes)
  - Fast imaging sequences are needed to reduce scan times.

- MRI is prone to motion artifacts
  - Motion correction is necessary for accurate results.

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**Echo-Planar Imaging (EPI)**

- EPI is excellent for correcting for motion in pediatric diffusion-weighted MRI
  - but EPI is limited for high-resolution anatomical imaging.

**Readout-Segmented (RS)-EPI and Short-axis Propeller (SAP)-EPI**

- pretty fast, and less distortion than EPI
  - RS-EPI
  - SAP-EPI
**RS-EPI and SAP-EPI** can also be corrected for motion.

SAP-EPI can be extended to 3D motion corrected can be done between blades (here only 2D motion correction is possible).

**Using 3D SAP-EPI** one can correct for motion in 3D.

Motion corrected can be done between blades (here only 3D motion correction is possible).

**SAP-EPI can be extended to 3D**

**We are developing a rapid (~5 minute or less) motion corrected pediatric MRI protocol**

**Dual Echo DW-EPI**

- DWI of Echo 2:
  - Used for lesion sensitivity
- ADC of Echo 1
  - for high maps

**Dual-Echo DWI also gives us a R2 (1/T2) map**

- R2 map sensitive for mineralization and blood products.
Fluid Attenuated Inversion Recovery (FLAIR) RS-EPI

5d seconds

(very) Preliminary data

1:42min 1:03min 1:45min

4-yr old patient (3T)

Total 5:42min

Dual echo DWI

Summary

- We are targeting a 5-minute motion-corrected protocol for pediatric imaging
  - Dual-Echo Diffusion-Weighted EPI (DW-EPI)
  - FLAIR RS-EPI
  - T1-w SAP-EPI
  - T2*-w SAP-EPI (with additional SWI processing)

Future work:
- Test motion-correction capability in patients
- Test clinically utility of SWI-processed T2*-w SAP-EPI
- Compare 5-minute protocol with current (~30-40 minute) protocol to determine if it can be a fast alternative protocol.

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