

GE Healthcare
Tomorrow Today

PaedWorks

SIGNA™Works
Fueling the future of MR



SIGNA™Works

The new standard is extraordinary

Our new SIGNA™Works productivity platform redefines productivity across the breadth of our core imaging techniques. It takes full advantage of Total Digital Imaging (TDI), further advancing diagnostics and quickening throughput, while improving patient outcomes and your ROI. It is upgradeable and customizable with additional applications to suit your growing practice.

Standard Applications

Energize your clinical capabilities with all the tools you need to complete an exam. Imaging solutions cover a variety of contrasts, 2D and 3D volumetric data and motion correction capabilities.



Innovative Applications

Expand your expertise to the next level, to deliver improved image quality, higher efficiency and a more streamlined workflow, so you perform better than ever before.



SIGNA™Works

The new standard is extraordinary



► Standard Applications Innovative Applications

BodyWorks

One of the fastest growing areas in MR, BodyWorks allows you to image abdominal and pelvic anatomy with user flexibility to adapt to different patient types.

CVWorks

Gain crucial insights into vascular structure and flow dynamics and access morphology, flow, function and tissue viability with CVWorks.

NeuroWorks

This one-stop solution enables you to image brain, spine, vascular and peripheral nerve anatomy with exceptional tissue contrast.

OncoWorks

Delivers robust tissue contrast, motion-insensitive, high temporal and spatial resolution imaging techniques that capture anatomical and morphological data for oncological assessment.

OrthoWorks

This extensive library of musculoskeletal imaging techniques enables you to image bone, joint and soft tissue with remarkable tissue contrast.

PaedWorks

Delivers distinctive child-centered imaging techniques that provide ease of use for the user and clinical excellence for your smallest, most fragile patients.

SIGNA™Works

The new standard is extraordinary



Standard Applications

► **Innovative Applications**

HyperWorks

HyperWorks means hyper scanning with astonishing imaging and impressive speed. It includes HyperSense, which can deliver higher spatial resolution images or reduced scan times.

ImageWorks

ImageWorks boosts your overall MR performance. READYView visualization and MAGiC one-and-done scanning help ensure consistent and clear results.

SilentWorks

SilentWorks is GE's most advanced noise reducing technology. Traditional exams can be extremely loud. SilentWorks brings the sound level down to ambient noise.

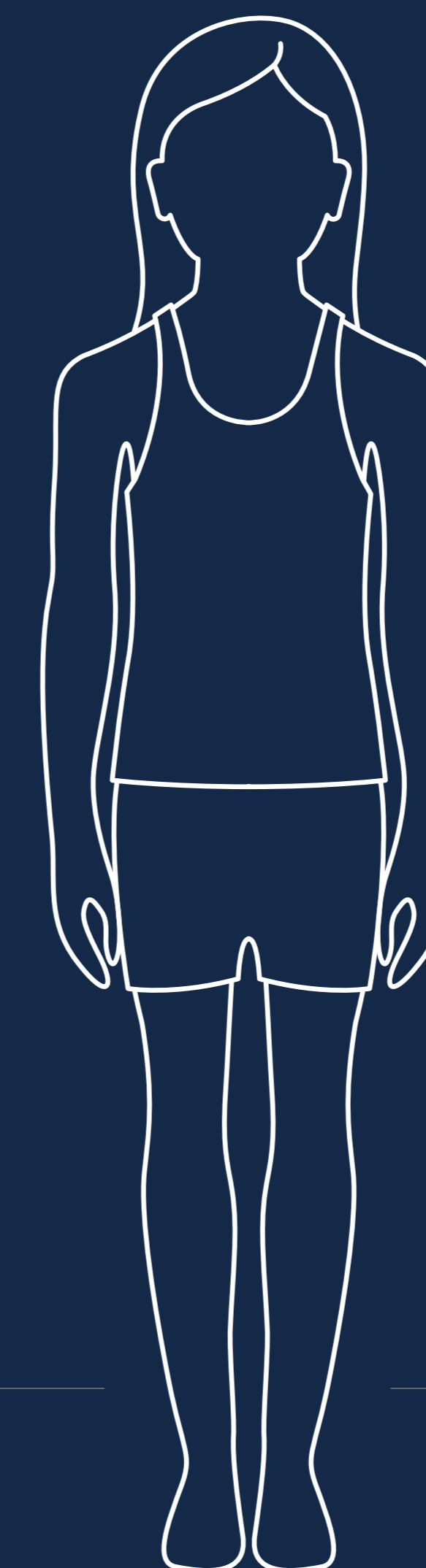
ViosWorks

ViosWorks reduces the complexity and cost of cardiac imaging. For the first time, all 7 dimensions of information can be captured in a cardiovascular scan in 10 minutes or less.

PaedWorks

PaedWorks offers specialized protocols specifically designed to meet the needs of your smallest, most fragile patients. These child-centric imaging techniques provide ease of use for technologists and clinical excellence for clinicians.

- StandardApplications
- Elective Applications
- InnovativeApplications



Proportion of MR sites that perform pediatric procedures:

86%

Source: MV 2016 MR Market Outlook

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Standard Applications

PROPELLER

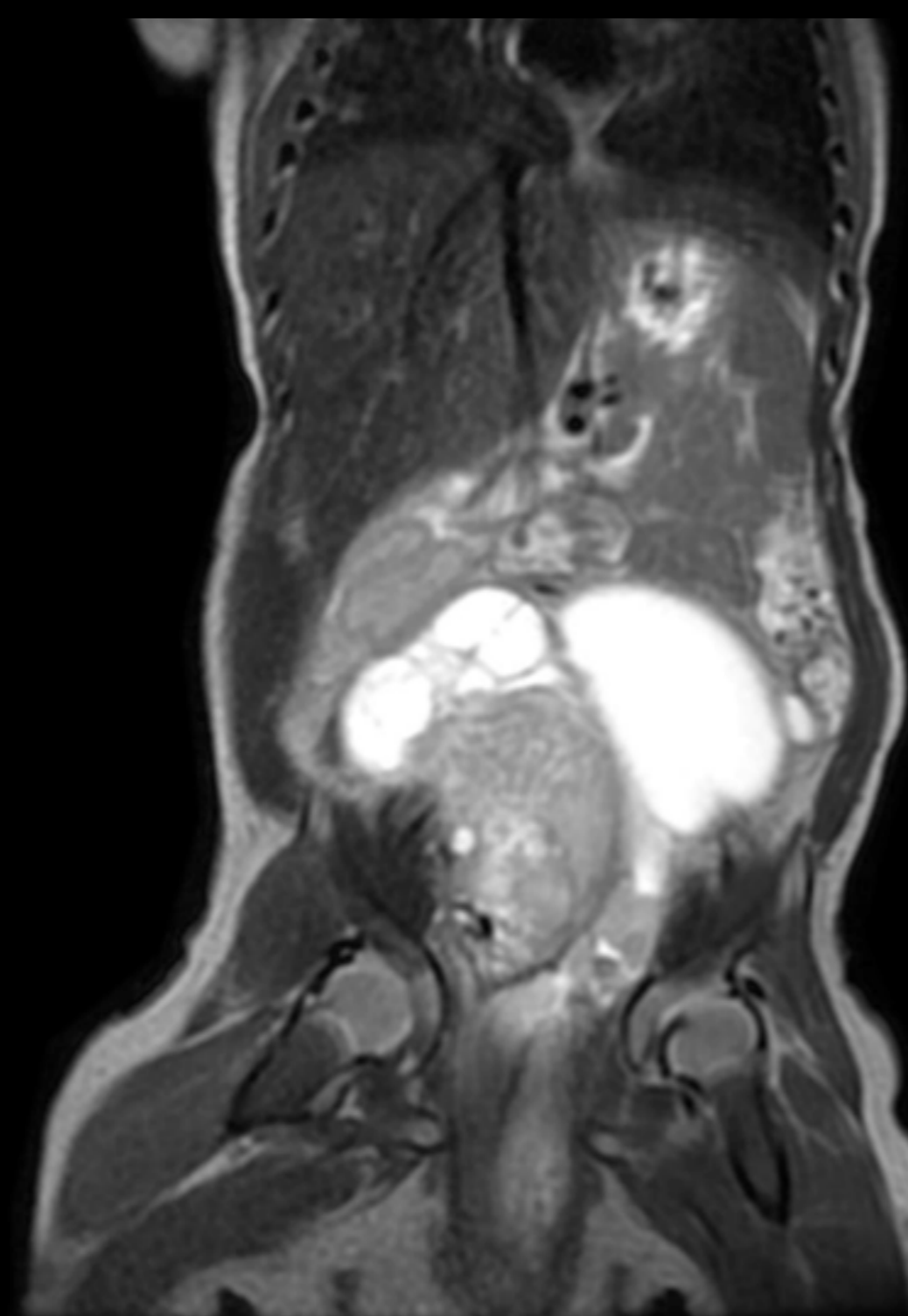
PROPELLER Multi-Blade (MB) is a multi-shot approach that preserves tissue contrast regardless of weighting while also reducing motion artifacts and providing a more signal-rich image. Additionally, this technique allows for all contrasts for 2D FSE: T1, T2, STIR and PD weightings.

Clinical benefits:

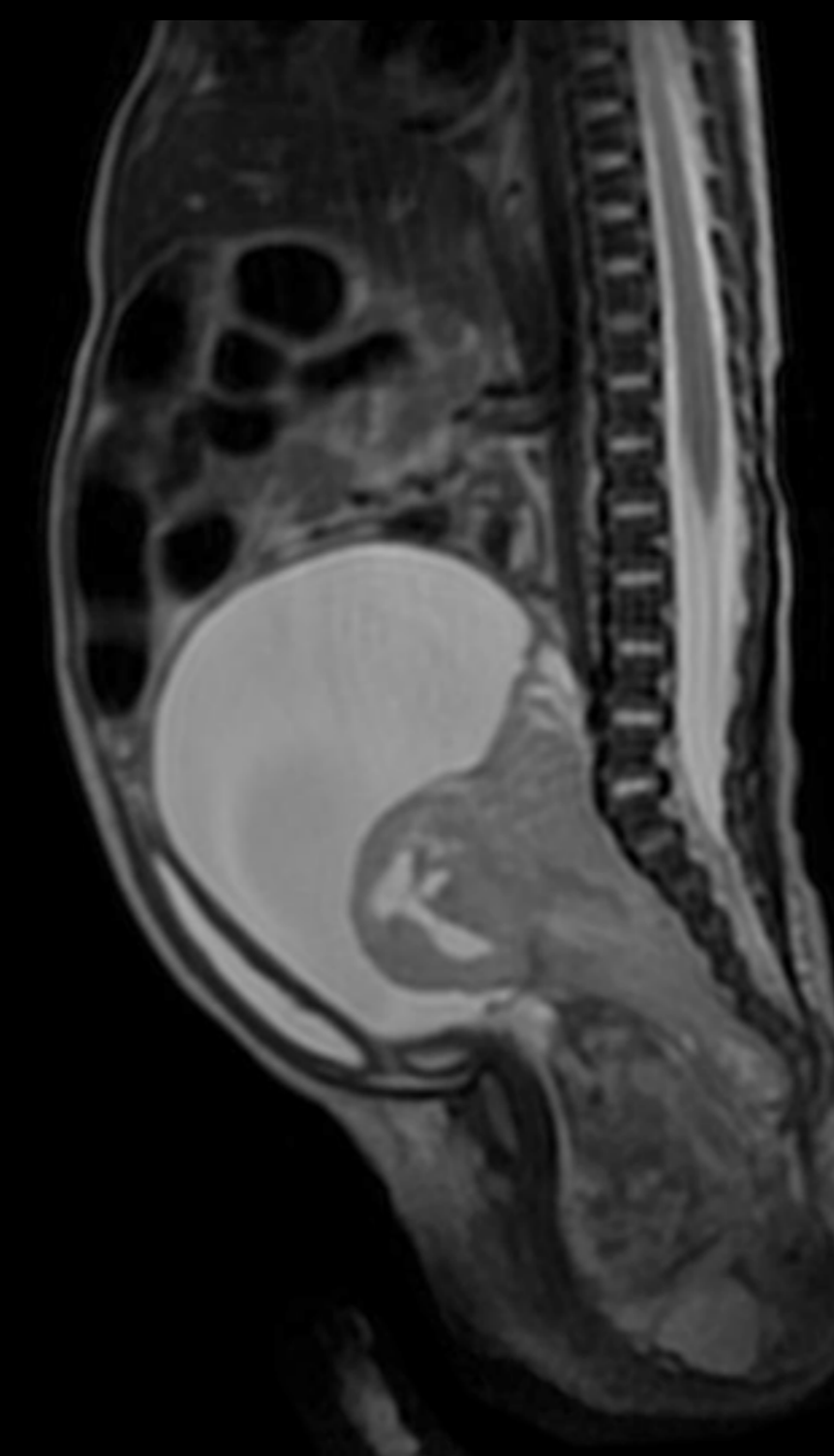
- Delivers motion-artifact-free diagnostic images for voluntary and involuntary patient motion.
- Increases productivity and decreases the number of repeated scans
- Enables sedation-free scanning and increases patient tolerance

9-day-old, 3.5kg, non-sedate, free-breathing exam with 16-channel Large GEM Flex Coil

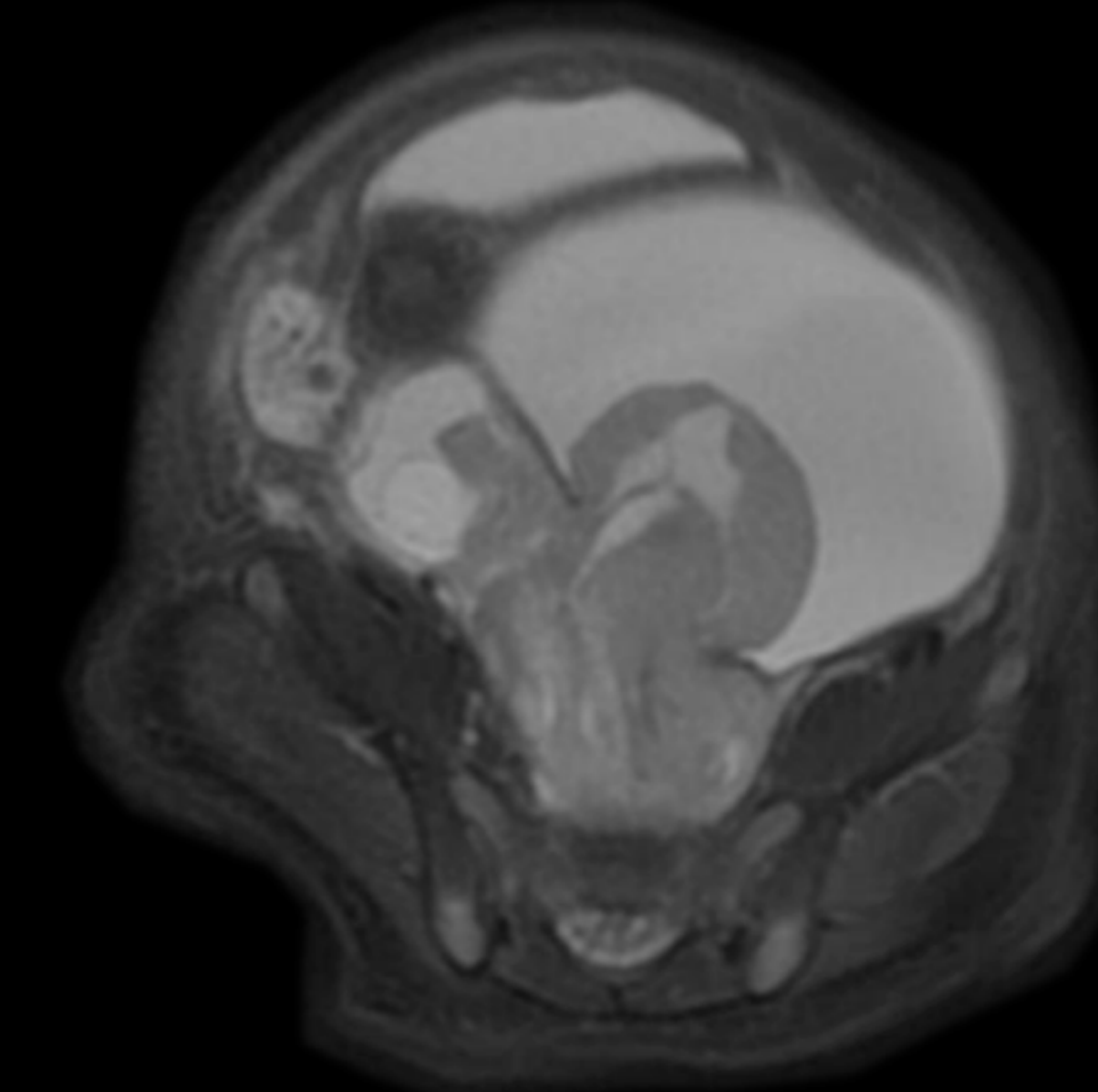
Coronal T2 frFSE with
Auto Navigator, FOV 20cm



Sagittal T2 PROPELLER with
Auto Navigator, FOV 20cm



Axial T2 PROPELLER,
FOV 20cm



case study

PaedWorks

Standard Applications

Case Study: Assessing a Retroperitoneal Tumor with PROPELLER

Clinical solutions

System: Optima™ MR450w GEM

Protocols used

Coronal and Sagittal T2 PROPELLER,
Axial T2 FatSat, Axial T2 PROPELLER,
eDWI free-breathing LAVA Flex

Patient history

A 9-year-old child presented with a suspected retroperitoneal tumor.

Procedure

A combination of PROPELLER sequences, respiratory triggering and Auto Navigator enabled the clinician to perform a Navigated, full free-breathing exam that resulted in sharp images with minimal respiratory ghosting artifacts.

MR findings

Physician diagnosis determined a retroperitoneal tumor, which was most likely ganglioglioma.

Coronal & Sagittal T2 PROPELLER



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Standard Applications

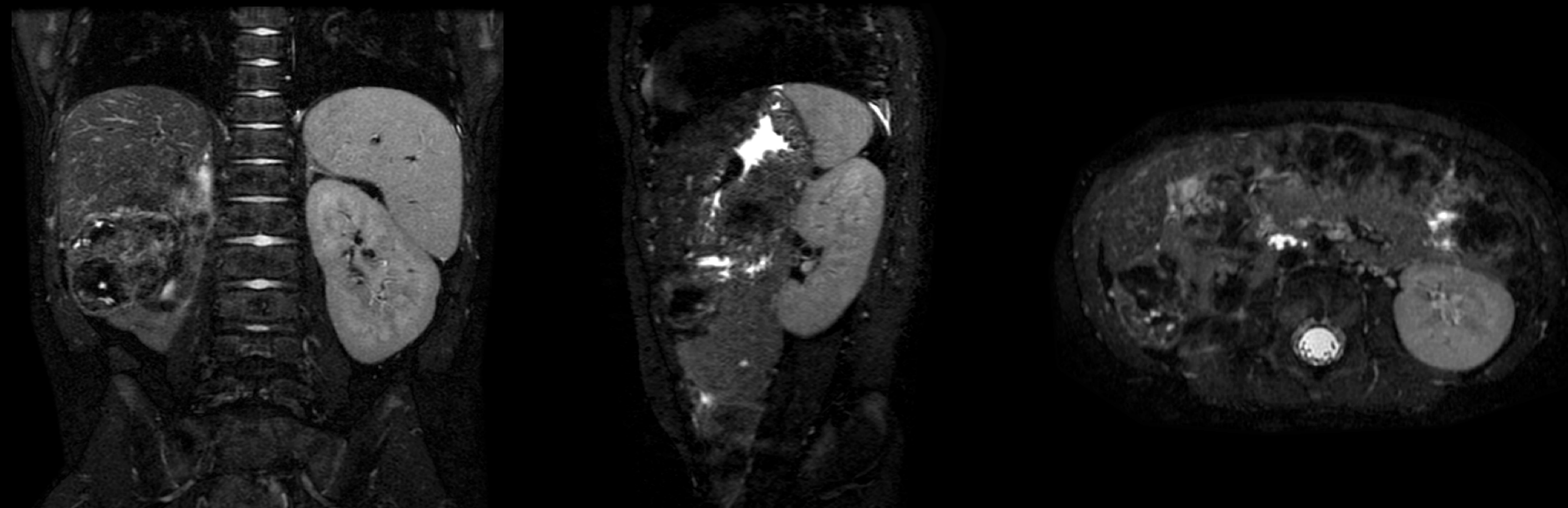
Cube

Cube is our 3D volumetric imaging technique that can easily be reformatted into any plane. The SNR-rich, submillimeter slices can provide partial volume averaging effect which helps to visualize even small and subtle abnormalities.

Clinical benefits:

- Scan once, then reformat to any plane with high sub-millimeter resolution
- Combines with ARC acceleration to reduce scan times
- Can decrease flow artifacts
- Spatial anatomical localization for abnormalities
- Higher slice resolution compared to 2D imaging

Free-breathing Cube, 1mm



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Standard Applications

eDWI

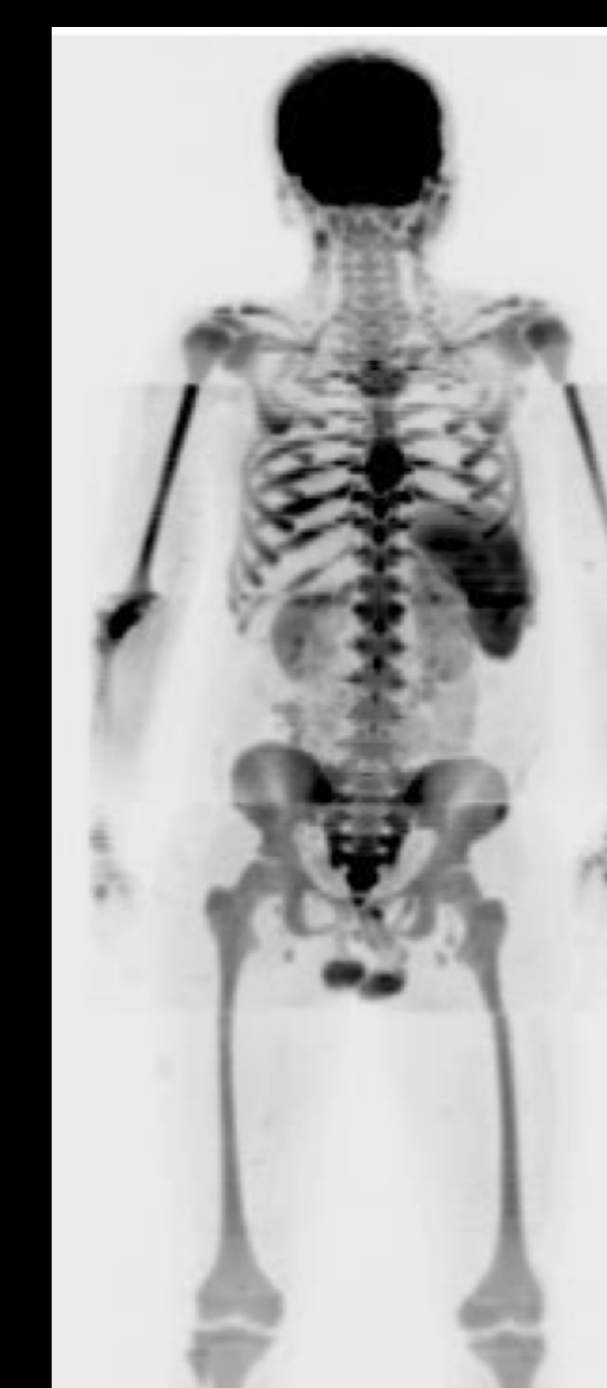
Diffusion Weighted imaging (DWI) is used to image diffusivity of water molecules (Brownian motion). This enhanced Diffusion Weighted Imaging (eDWI) technique is designed to provide high signal-to-noise-ratio (SNR) diffusion images, with short-acquisition time and shortest possible Echo Time (TE). Its multi-b feature is designed to provide measurement of apparent diffusion coefficient (ADC) map with reduced effect of perfusion.

Clinical benefits:

- Helps to improve patient tolerance with shortened breath-hold time or free-breathing Auto Navigator
- Decreases overall exam sequences and time



DWI
b800



Synthetic DWI
—
(left) b600
—
(right) b1200

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Standard Applications

BRAVO

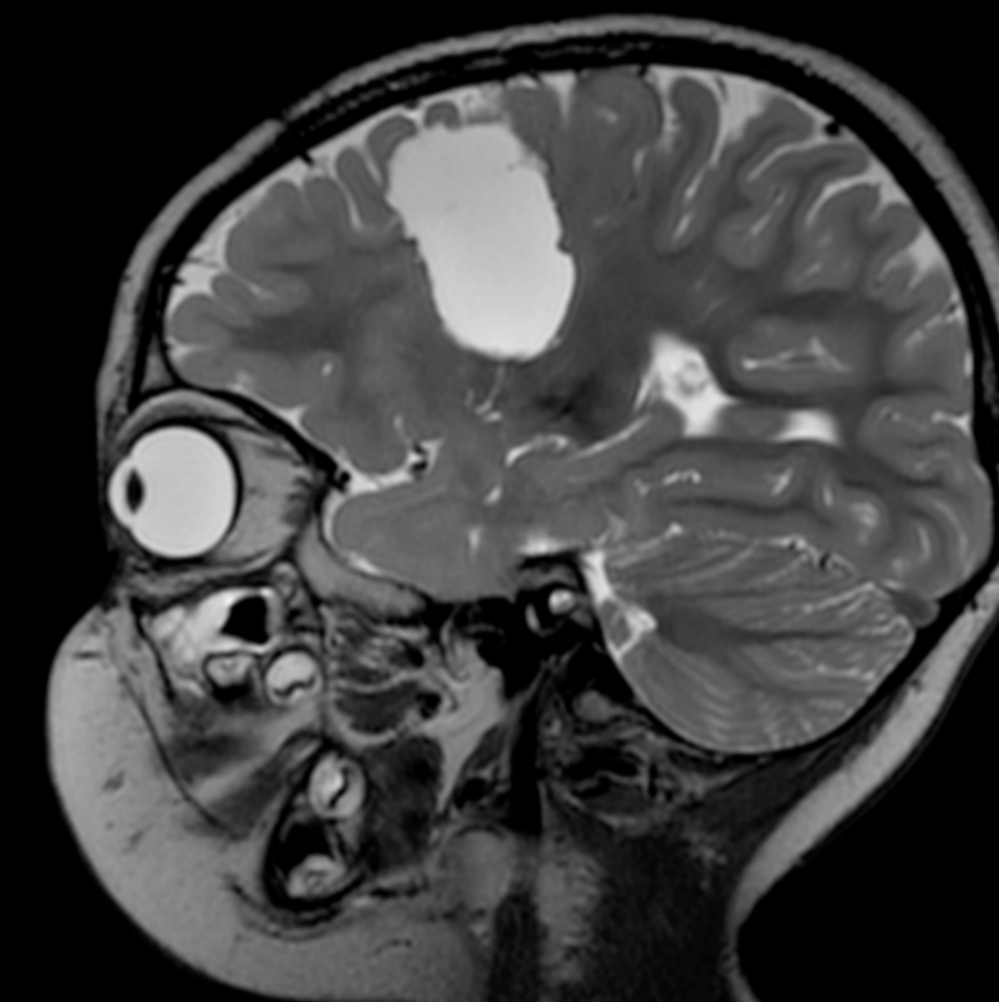
A neuro imaging solution that produces excellent T1-weighted contrast between gray and white matter in a fast, high-resolution 3D acquisition.

Clinical benefits:

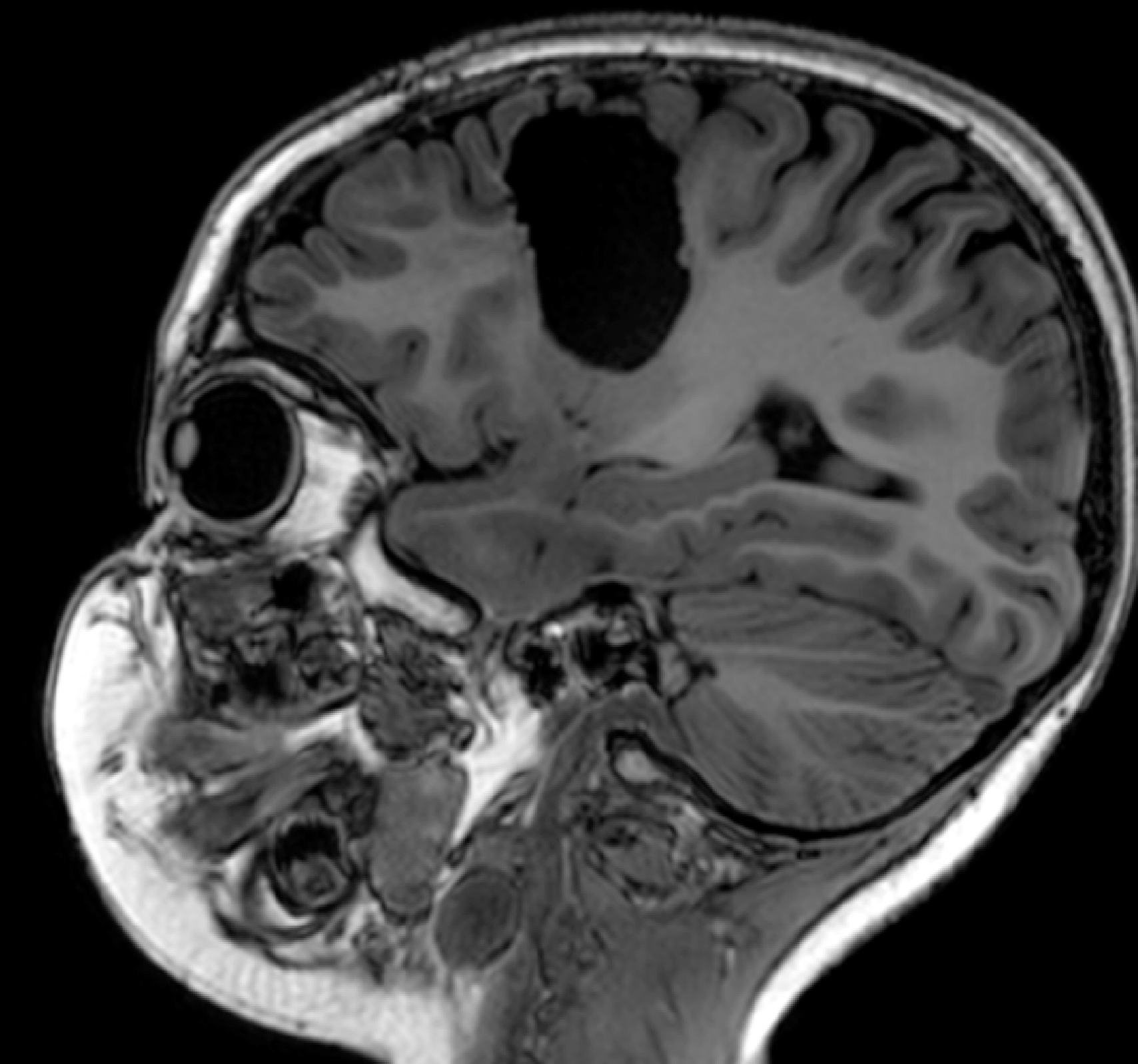
- Higher slice resolution compared to 2D imaging
- Scan once, then reformat to any plane with high sub-millimeter resolution
- Spatial anatomical localization for abnormalities
- Combines with ARC acceleration to reduce scan times

Optimized 3D acquisitions based on quantitative information

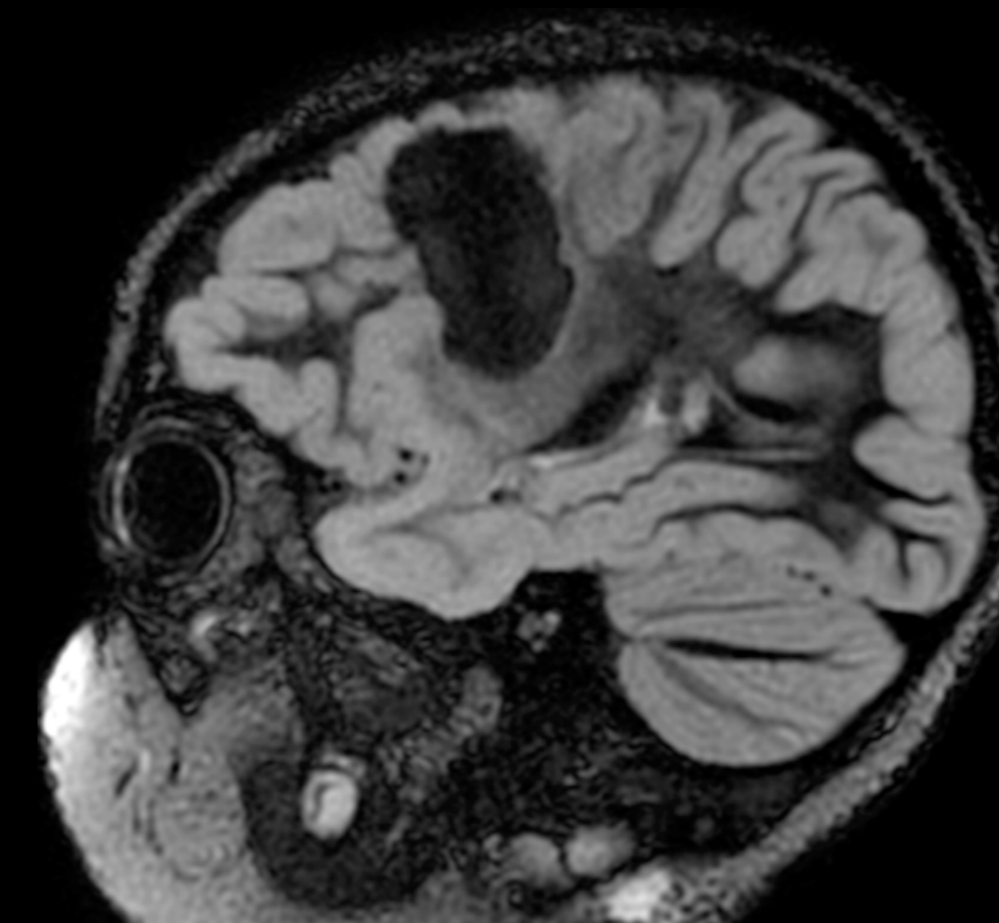
T2 Cube 1mm³



T1 BRAVO 1mm³



Cube DIR 1.4mm³



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Elective Applications

PROMO

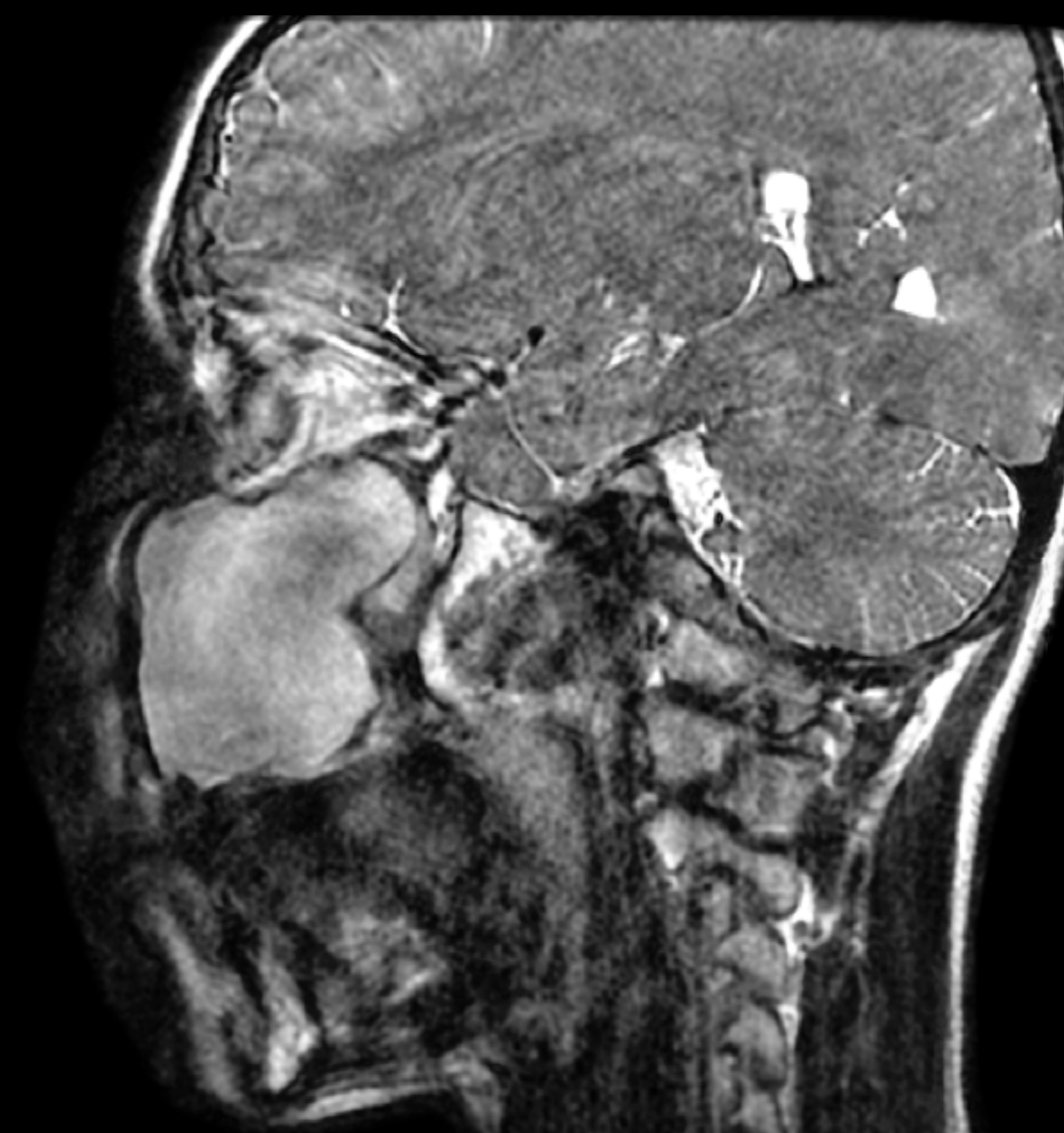
PROspective Motion correction (PROMO) is an imaging technique that delivers prospective motion correction for rigid 3D brain imaging.

Clinical benefits:

- Produces motion-free images in patients with involuntary movements or non-sedated pediatrics
- Can assist with spatial anatomical localization for tumor evaluation
- Increases productivity by reducing the series of scans and repeats

Dentigerous cyst on a 13 y/o patient

T2 Cube



T2 Cube PROMO



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Elective Applications

Case Study: Assessment of Dentigerous Cyst with T2 Cube PROMO

Clinical solutions

System: Discovery™ MR750w

Protocols used with PROMO

With PROMO: Sagittal T2 Cube, Coronal T2 Cube reformat, Axial T2 Cube reformat

Without PROMO: Sagittal T2 Cube, Coronal T2 Cube reformat, Axial T2 Cube reformat

Patient history

A 13-year old child presented with swelling over the right cheek and palate. Patient also had allergic rhinitis with high mucosal discharge which made immobilization difficult.

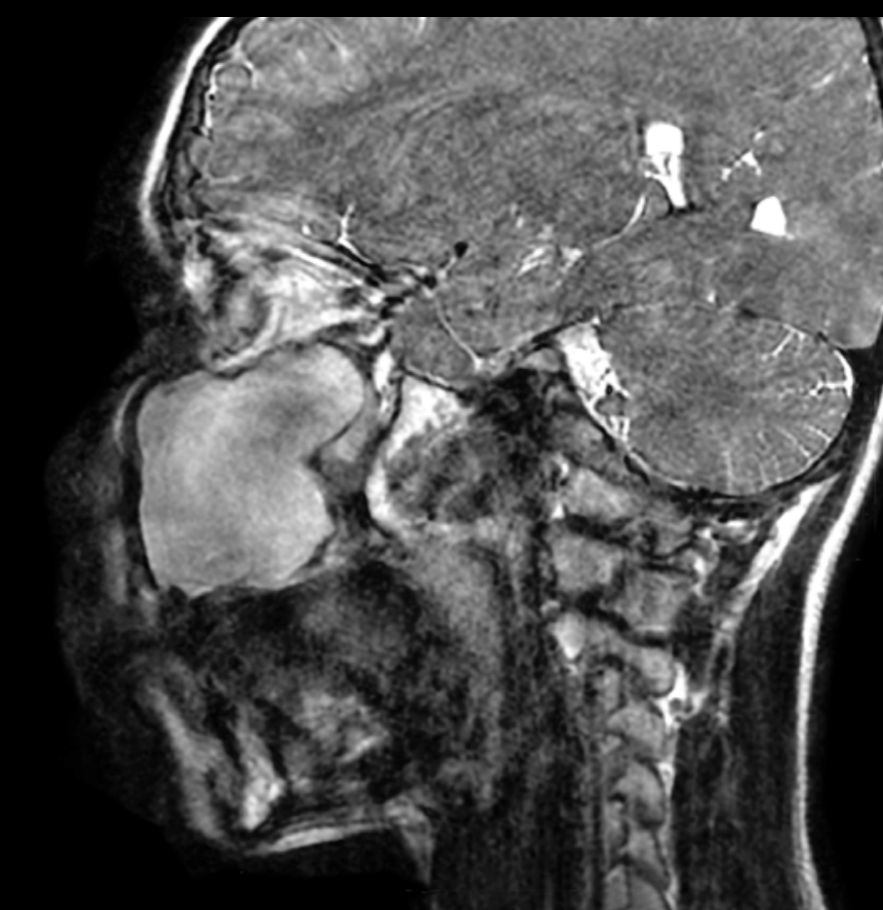
Procedure

A 3D FSE-based application that uses a long echo train and modulated flip angles helps to reduce scan time, SAR and flow-related artifacts. Sagittal T2 Cube combined with PROMO can help track head motion to potentially reduce motion artifacts during imaging. These techniques also help to reduce sedation rates for distressed pediatric patients.

MR findings

T2 hyper-intense lesion is seen from the right upper canine tooth level extending into the maxilla. Superiorly the lesion extends up to the inferior wall of right orbit. The crown of two teeth are seen within the lesion. Clinician suspects a dentigerous cyst.

Sagittal T2 Cube



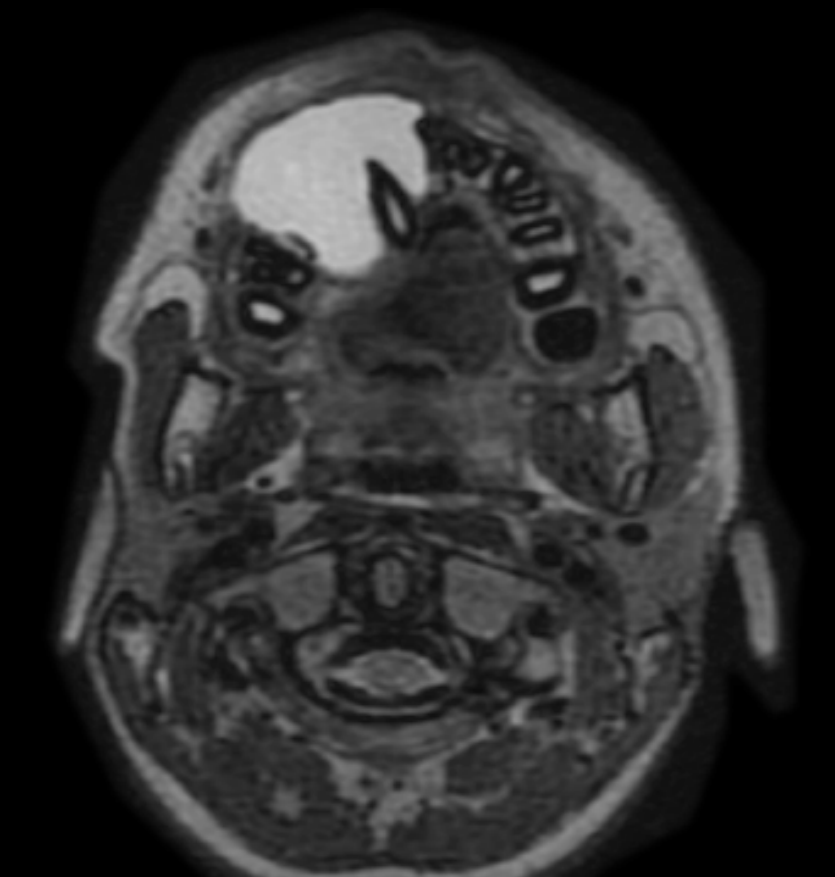
Coronal T2 Cube Reformat



Coronal T2 Cube Reformat



Axial T2 Cube Reformat



back to app

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Elective Applications

Inhance Suite

The Inhance Suite improves your workflow with easy setup by allowing visualization of blood flow in diverse anatomies with an advanced array of powerful pulse sequences – with no need for gadolinium.

The suite includes:

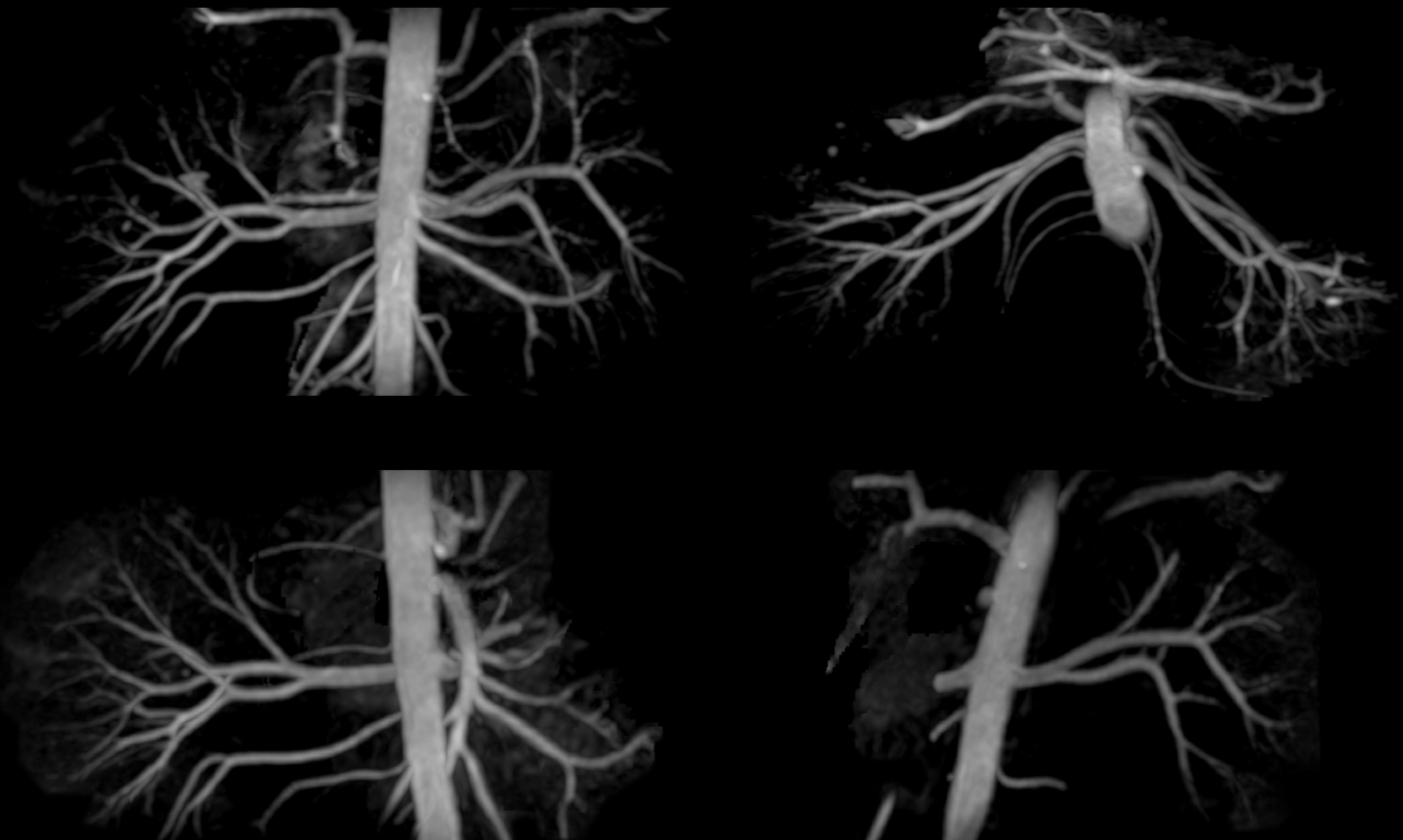
- 3D IFIR
- 3D Velocity
- 2D InFlow
- 3D DeltaFlow

Clinical benefits:

- Enhances evaluation of renal conditions and lower extremities
- Eliminates bolus timing
- Uses peripheral gating instead of full cardiac gating for easy setup
- No injection needed, which eliminates potential contrast reaction



Inhance Inflow-IR with oblique reformats



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Elective Applications

Inhance Suite

Inhance 3D Velocity
384x256 4:40 min



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Elective Applications

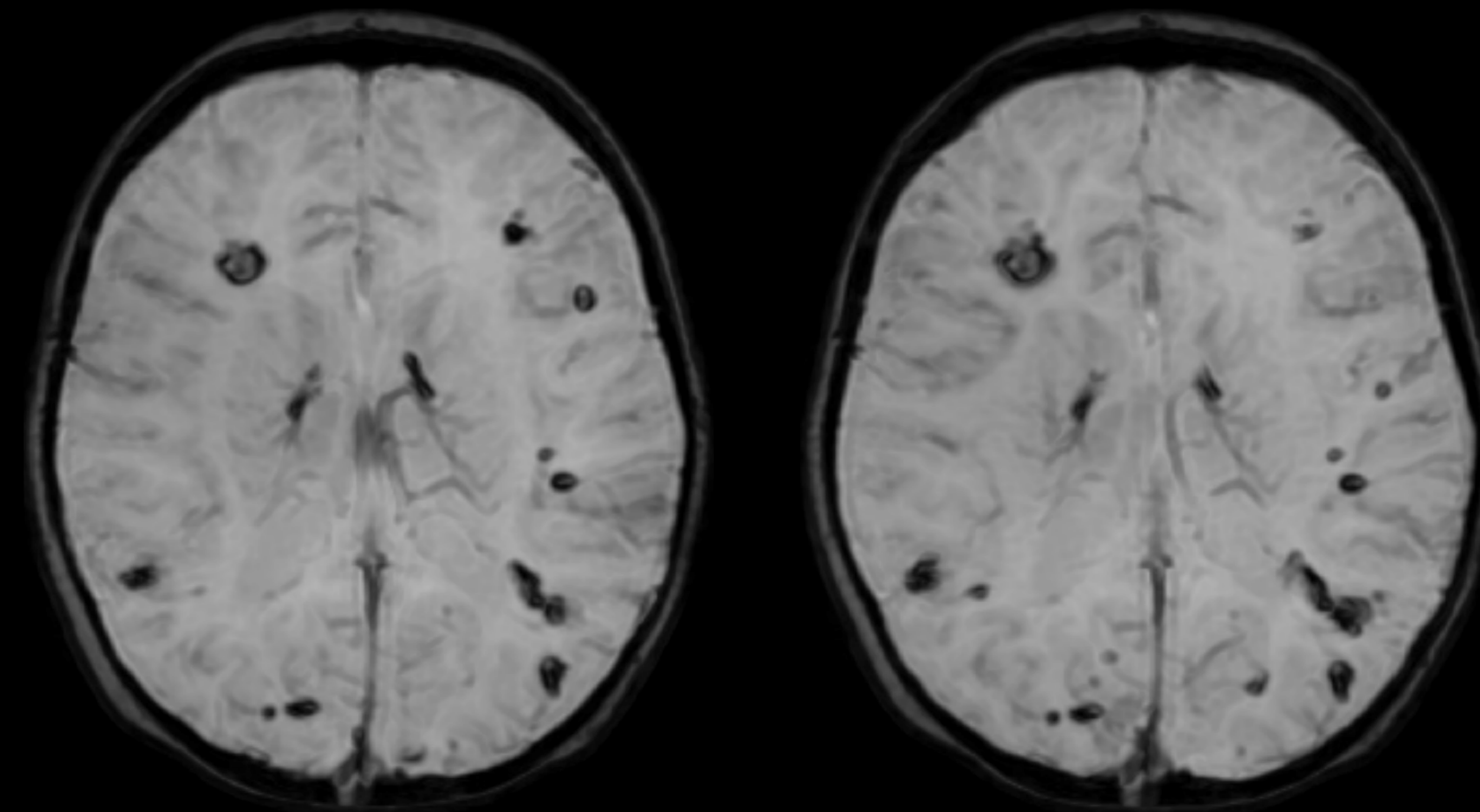
SWAN

T2 Star Weighted ANgiography (SWAN) is a high-resolution 3D multi-echo gradient echo sequence that produces weighted averaging across images with different TE's to achieve higher susceptibility weighting. It provides minimum intensity projections over neighboring slices, enhancing tissue contrast for tissues containing iron, venous blood and other substances with susceptibilities that are different than the background tissue.

Clinical benefits:

- Helps determine blood products (paramagnetic) from calcium products (diamagnetic) in the brain
- Helps monitor calcified lesions, such as those found in MS patients or in infections
- Delivers CT-like imaging, without the ionizing radiation or contrast injection

Pediatric patient affected by Cytomegalovirus



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Elective Applications

3D ASL

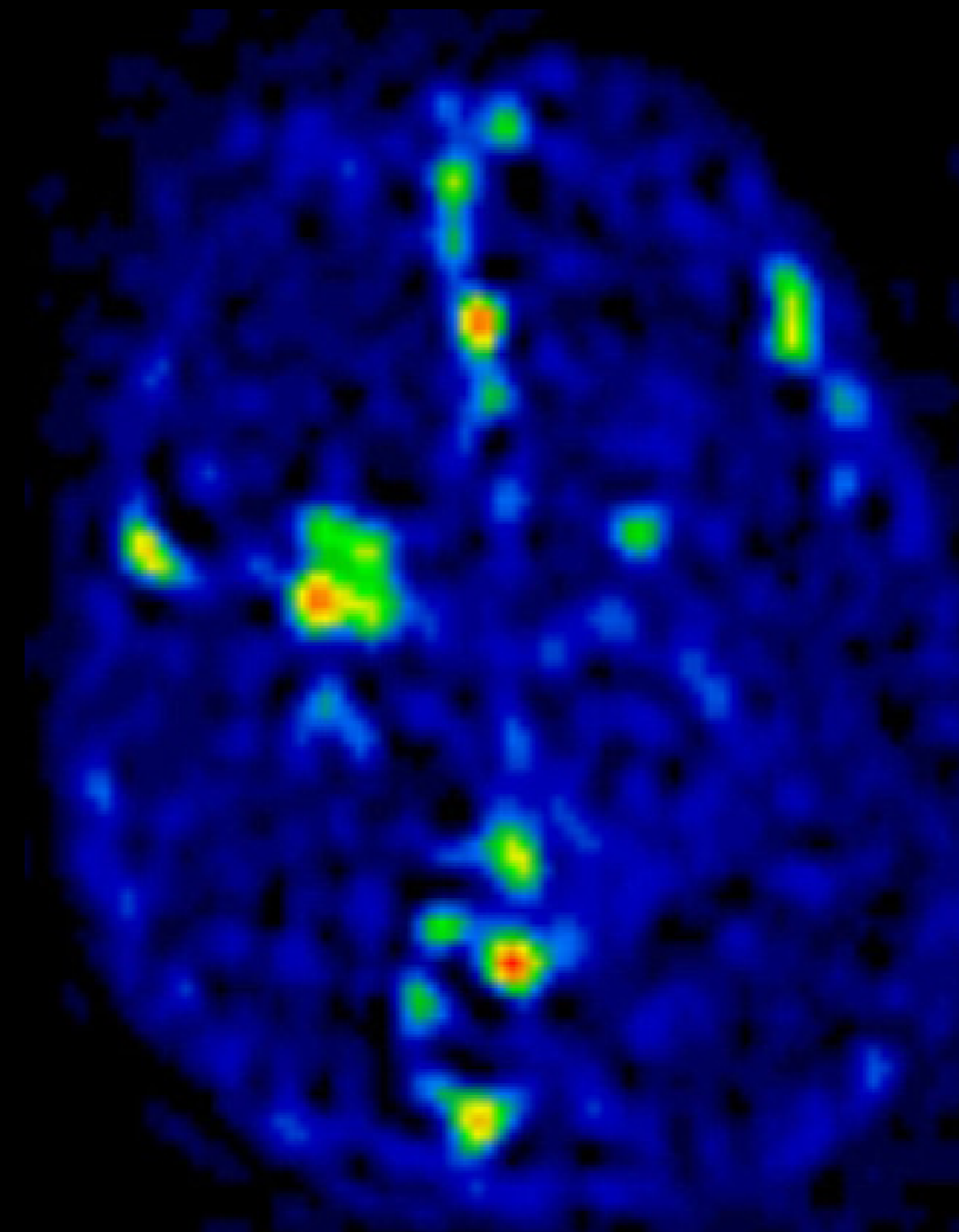
3D Arterial Spin Labeling (ASL) is a quantitative application that allows the assessment of blood flow of the whole brain using a non-contrast method of quantifying Cerebral Blood Flow (CBF), which eliminates needles and radiation.

Clinical benefits:

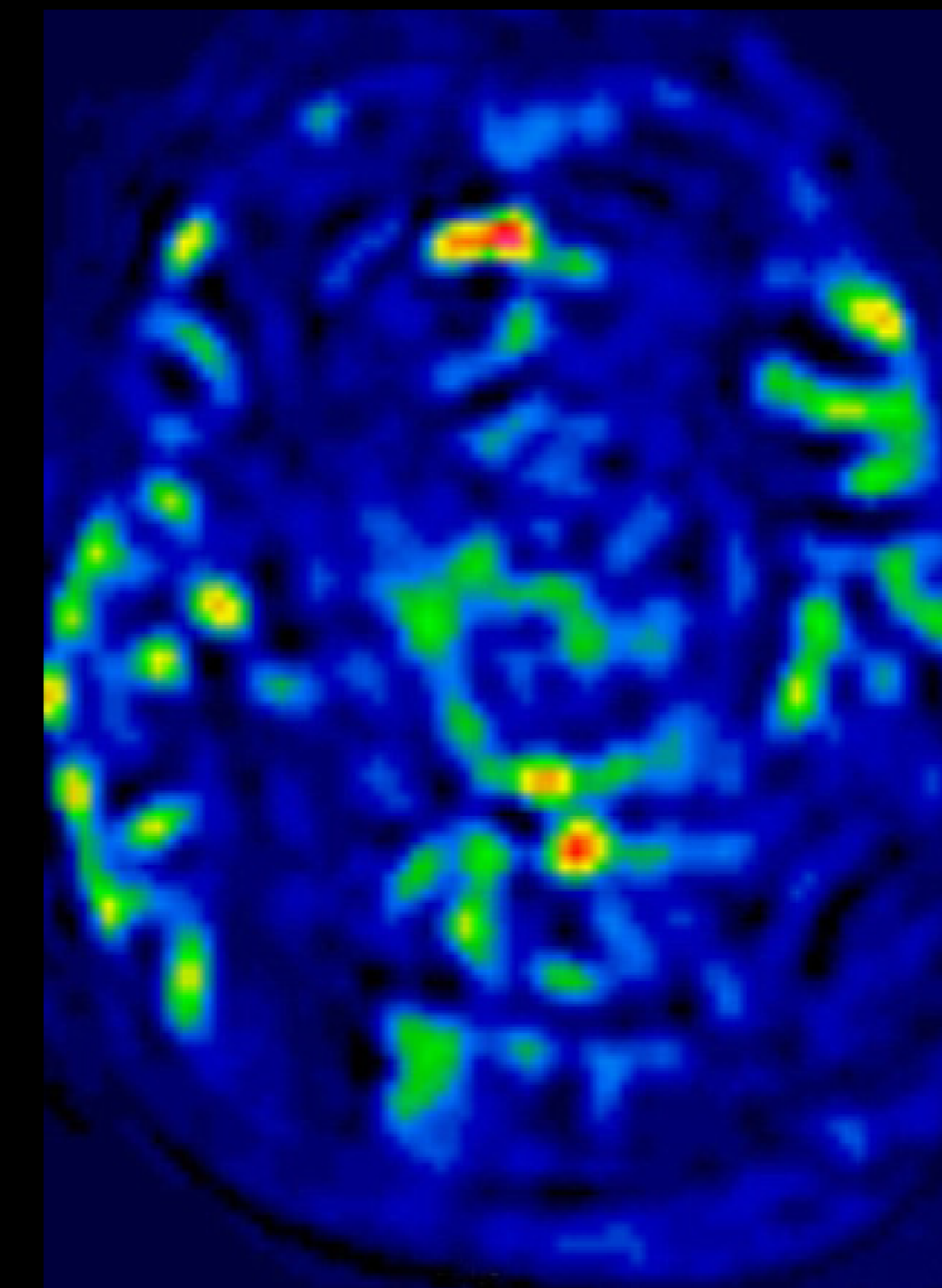
- Helps diagnose and monitor treatment with quantitative results
- CBF values aid to grade tumors
- Helps monitor therapy progression in treatment of infection or tumors
- Aids in assessment of stroke damage

Patient with Maya-Maya (Sickle-Cell)

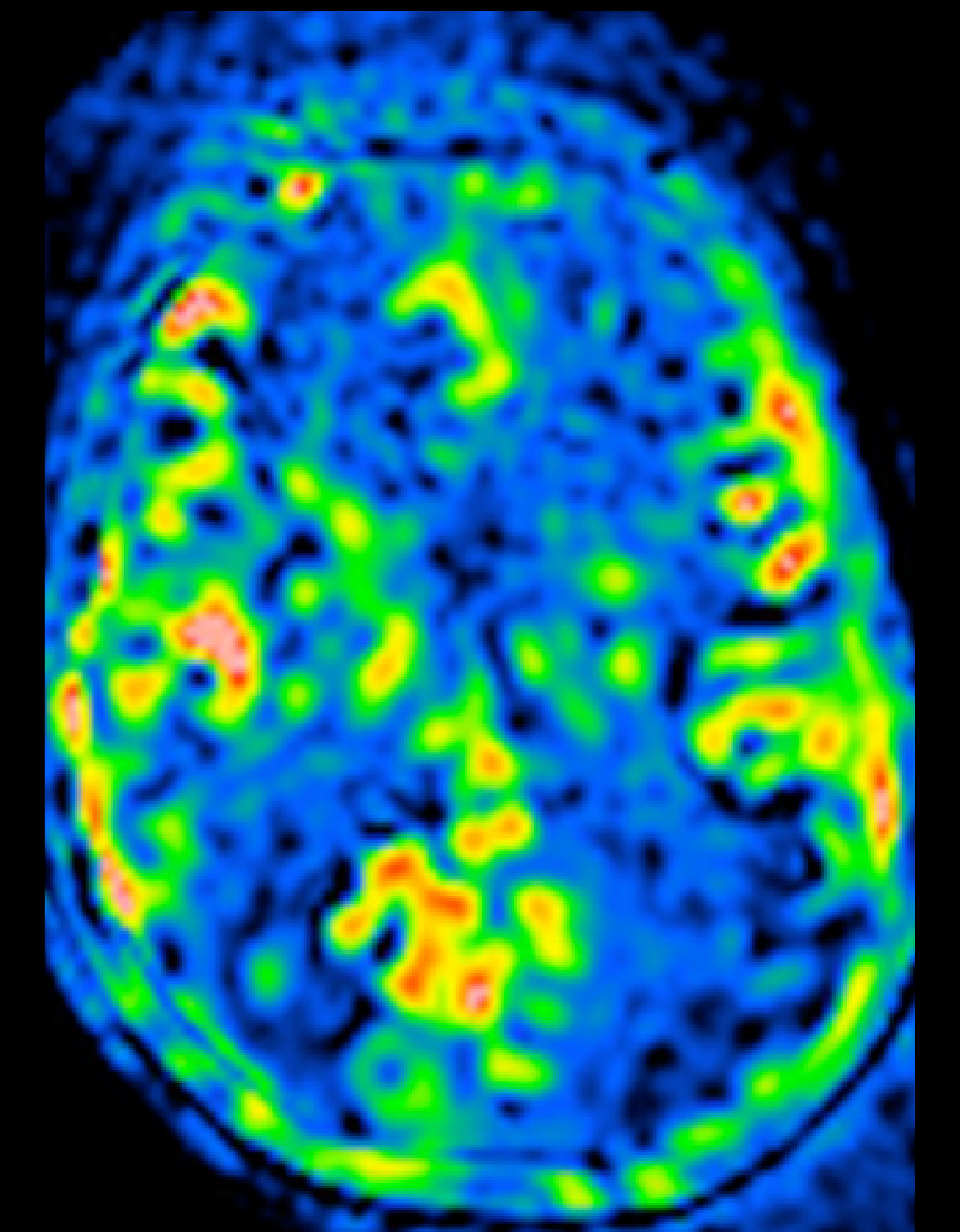
Before surgical revascularization



6 months post



18 months post



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Elective Applications

FOCUS DWI

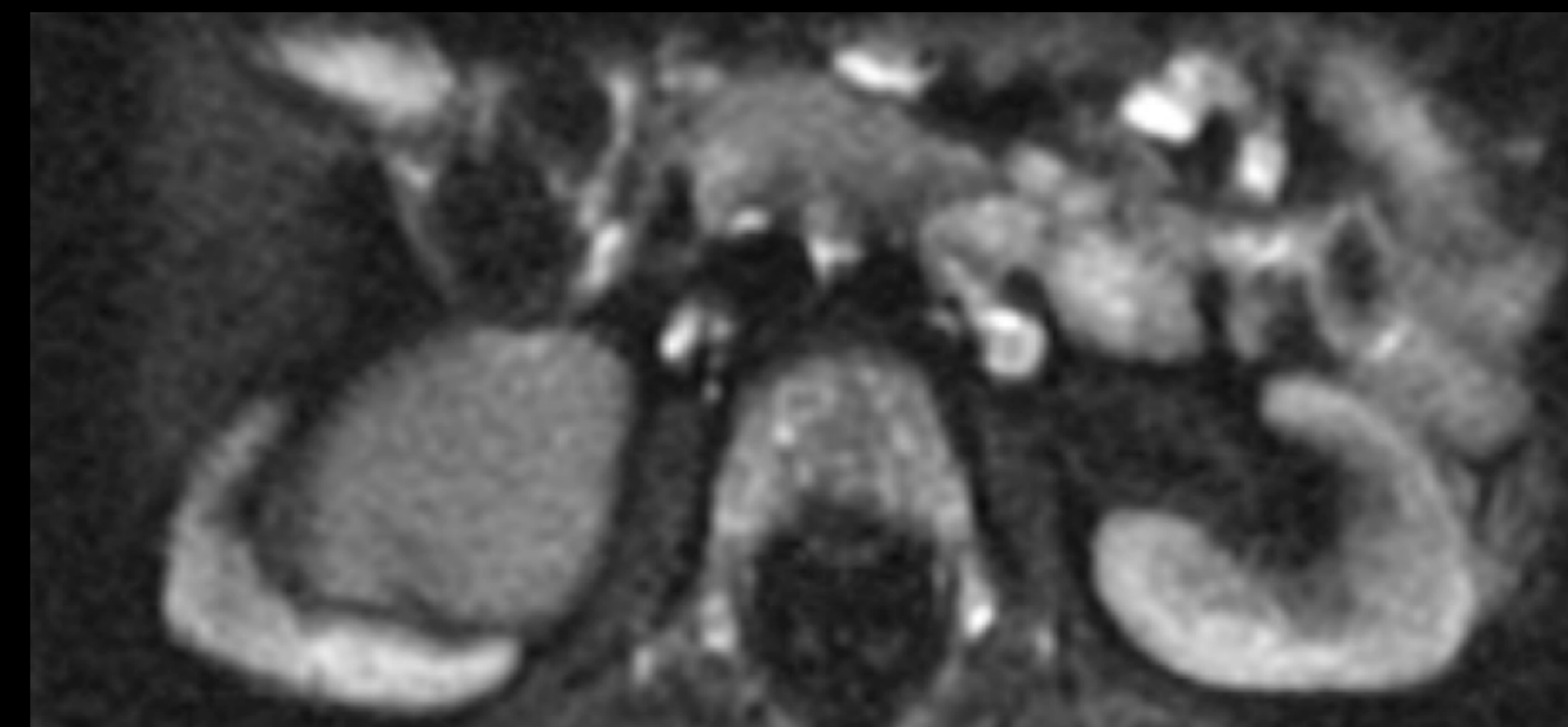
FOV Optimized & Constrained Undistorted Single-shot (FOCUS) is a 2D Spatially Selective RF Excitation method for DW-EPI and DTI. It reduces the FOV in the phase encode direction which reduces geometric distortion, eliminates phase wrap artifacts and increases image sharpness. It provides high-resolution DWI scans and is especially useful when the region of interest is small in the phase encode direction.

Clinical benefits:

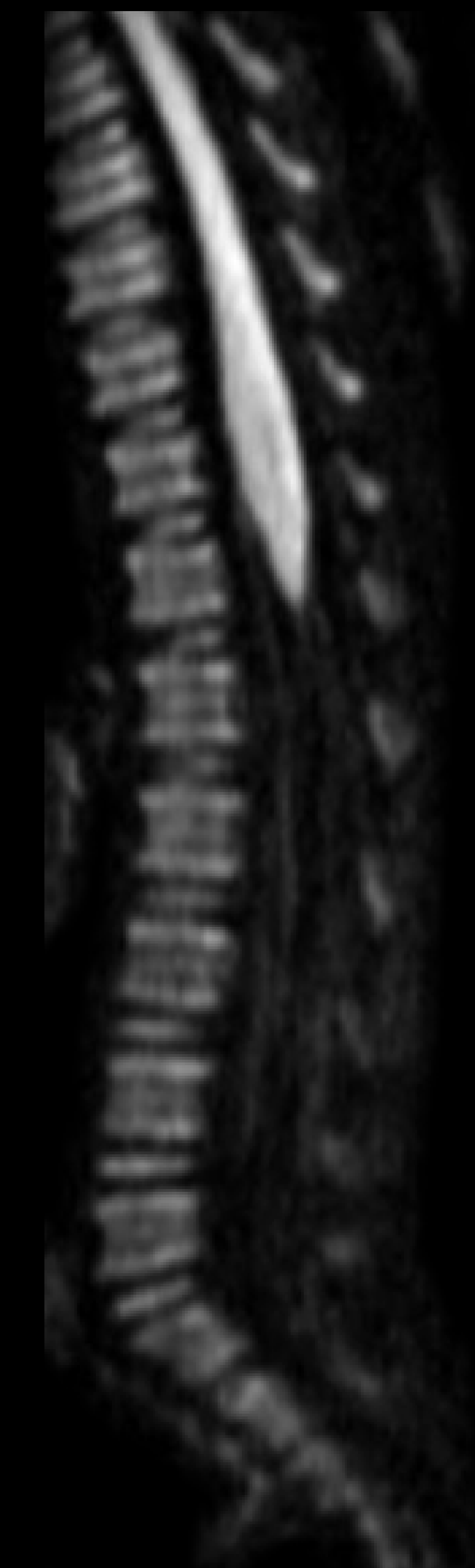
- Helps reduce distortion around air / tissue interfaces, e.g., bowel
- Provides a higher spatial resolution diffusion when compared to conventional EPI diffusion techniques
- Helps detect and evaluate small lesions that may be obscured by distortion

2D-selective RF excitation pulse enables small FOVs with less distortion

FOCUS DWI



FOCUS DWI



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Elective Applications

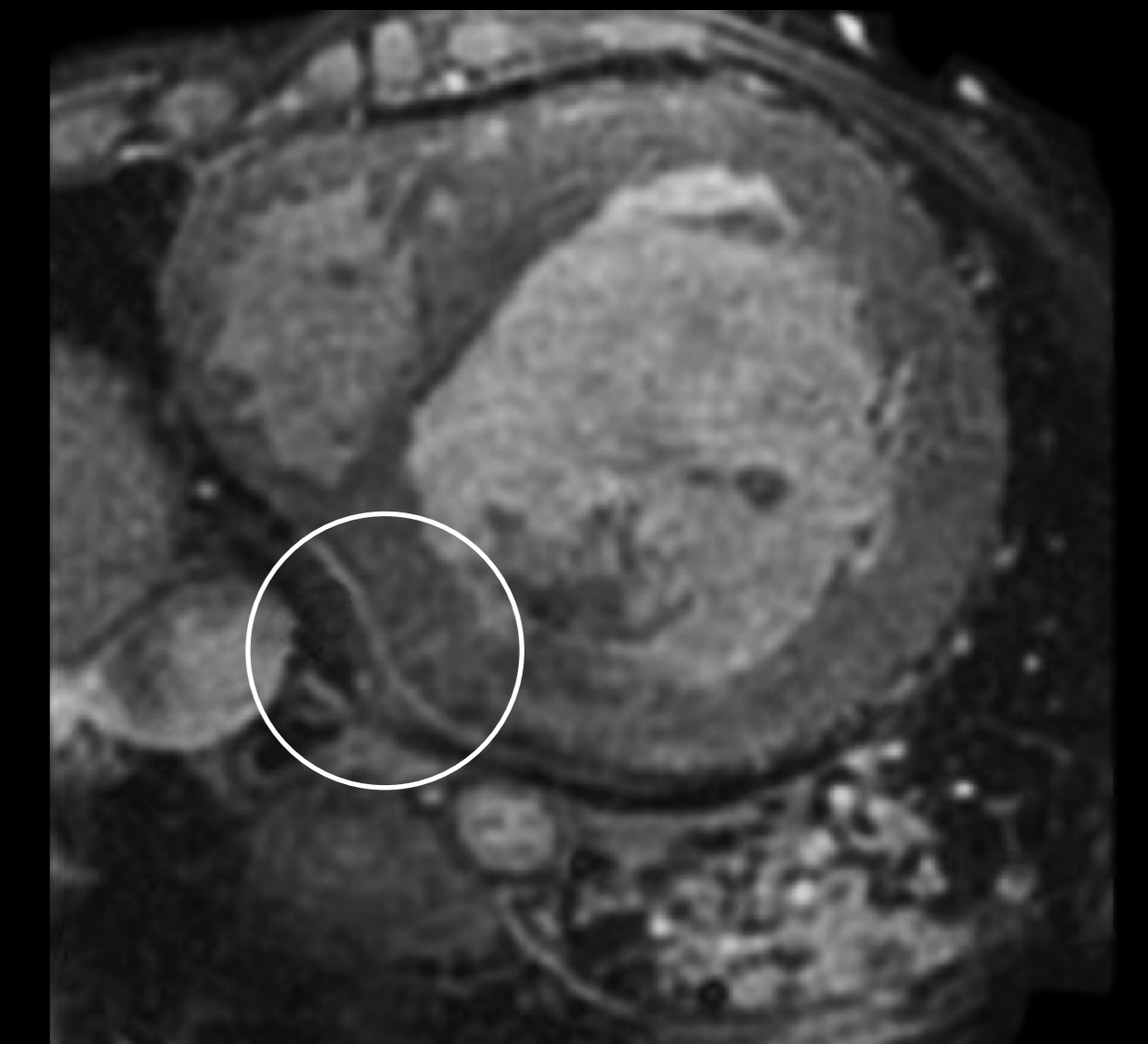
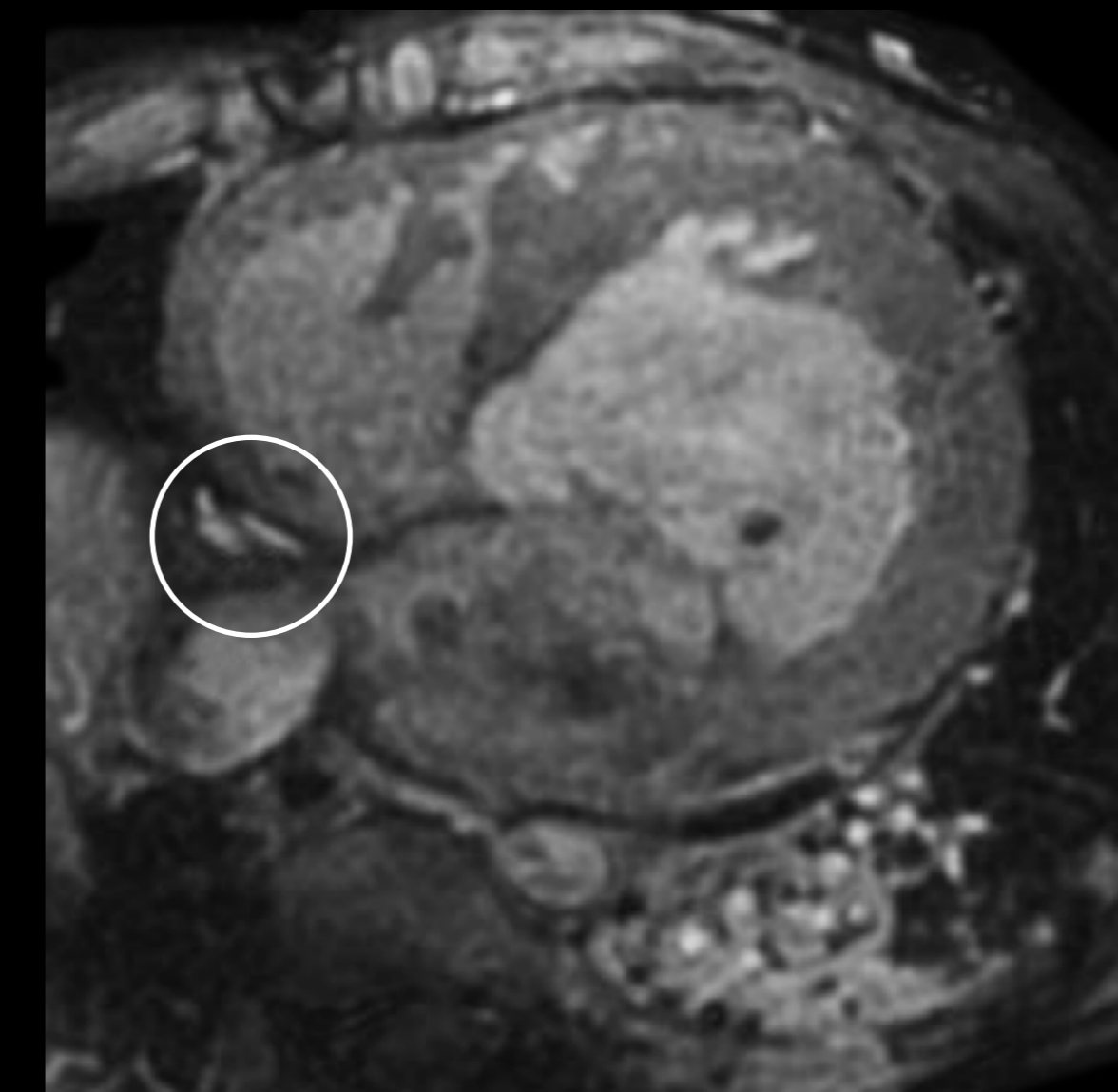
3D Heart

3D Heart is a 3D free breathing, non-contrast assessment of the whole heart. Two different sequences are used per system type; 1.5T uses a 3D FIESTA-based sequence and 3.0T uses a 3D FGRE-based sequence. Cardiac gating is required and uses a Navigator pulse to track respiratory motion.

Clinical benefits:

- Free breathing, non-contrast features help to increase patient tolerance
- Helps to evaluate congenital heart disease
- Aids in the assessment of coronary arteries and heart morphology

Free breathing 3D Heart with Auto Navigator



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Elective Applications

LAVA Flex

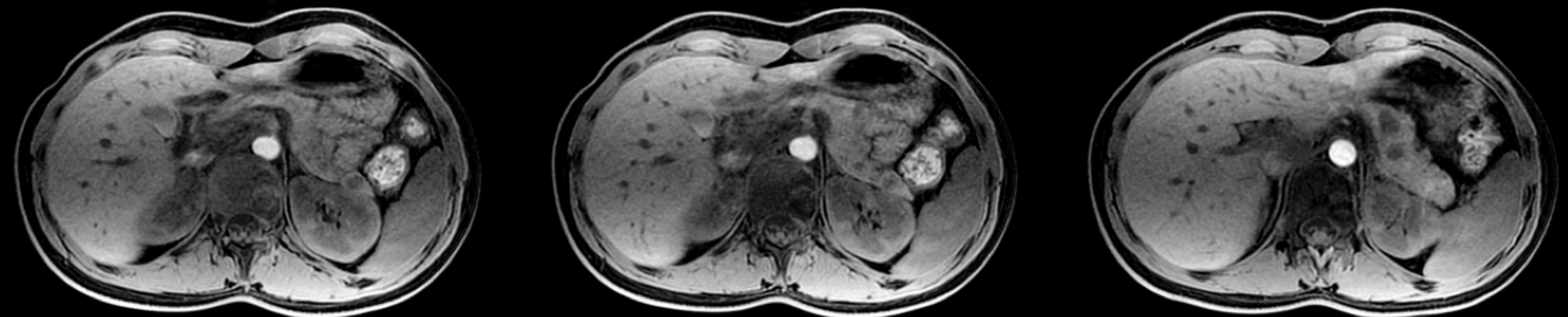
LAVA Flex is a T1-weighted 3D volume application for body imaging that uses a Dixon-based fat separation technique that provides an unparalleled exclusion of fat and the ability to acquire 4 data sets from one acquisition.

Clinical benefits:

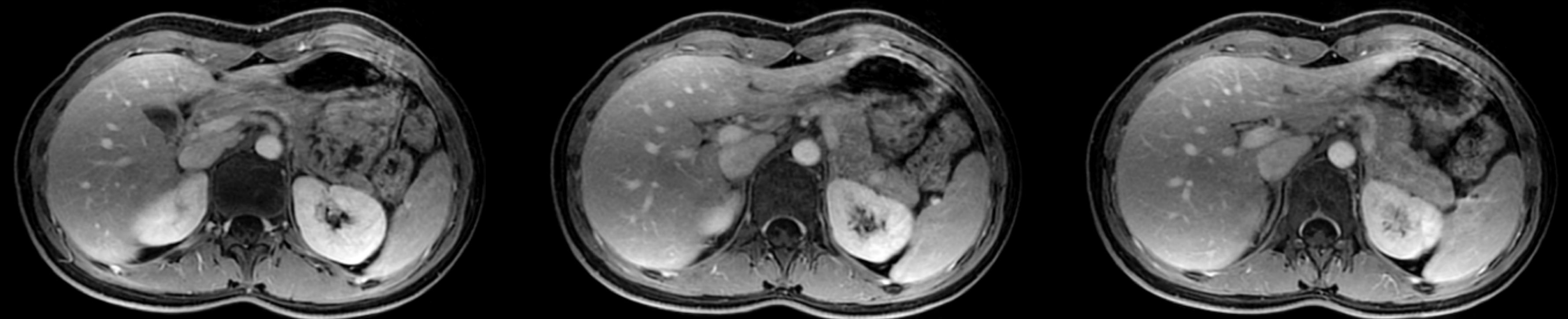
- Produces homogenous image quality in a large, full-coverage FOV
- Shortens exam time due to fewer rescans
- More comfortable for patients undergoing abdominal exams
- Compatible with free-breathing

Pediatric study of pancreas, LAVA Flex with free-breathing Auto Navigator

Pre contrast, 1.4mm, 256 x 300 1:26 min



Post contrast, 1.4mm, 256 x 300 1:26 min



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Elective Applications

Case Study: Free-breathing Pediatric Kidney Exam with Turbo LAVA

Clinical solutions

System: Discovery™ MR750 3.0T

Coil: 32 channel Cardiac

Protocols used

Axial DWI b50/1000 with RT; Coronal LAVA post IV arterial, venous and late phases with Auto Navigator; Coronal LAVA Flex high resolution with Auto Navigator

Patient history

Ultrasound at 22 weeks of pregnancy showed an intra-uterine cyst, diagnosed as multicystic renal dysplasia (both kidneys). MR was performed on 9-month-old infant to characterize the inter renal-splenic lesion.

Procedure

Complete free-breathing examination with Body Navigator and Respiratory Trigger is useful for pediatric patients. Turbo LAVA Flex with Auto Navigator allows for correct timing without breath-hold. This is crucial to clearly detect the arterial phase for lesion characterization. DWI with high b-value shows clear delineation between the cyst and the lesion.

MR findings

The MR exam confirmed the presence of bilateral renal dysplasia and showed a lesion at the level of the left adrenal gland which was not seen on the previous ultrasound exam. Enhancement was noted after gadolinium injection at arterial phase; clinician suspicious of a neuroblastoma.



Turbo LAVA Flex with Auto Navigator without contrast
3.6mm, FOV 30cm
204x204, 4 phases
1:22 min



Turbo LAVA Flex with Auto Navigator, with contrast
2.8mm, FOV 30cm
224x300
1:58 min

[back to app](#)

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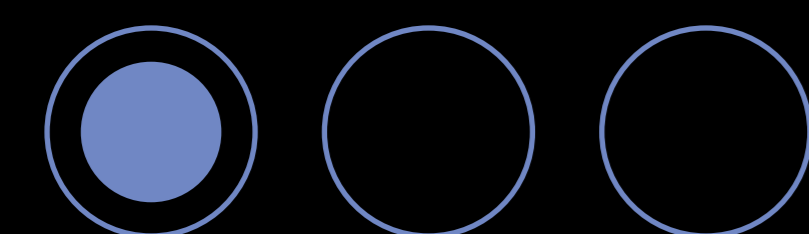
Innovative Applications

HyperSense

HyperSense is an acceleration technique based on sparse data sampling and iterative reconstruction that delivers high image resolution or reduced scan time, without the typical penalties of conventional parallel imaging. It can be combined with other acceleration methods (ARC) to achieve high SNR with shorter acquisition times.

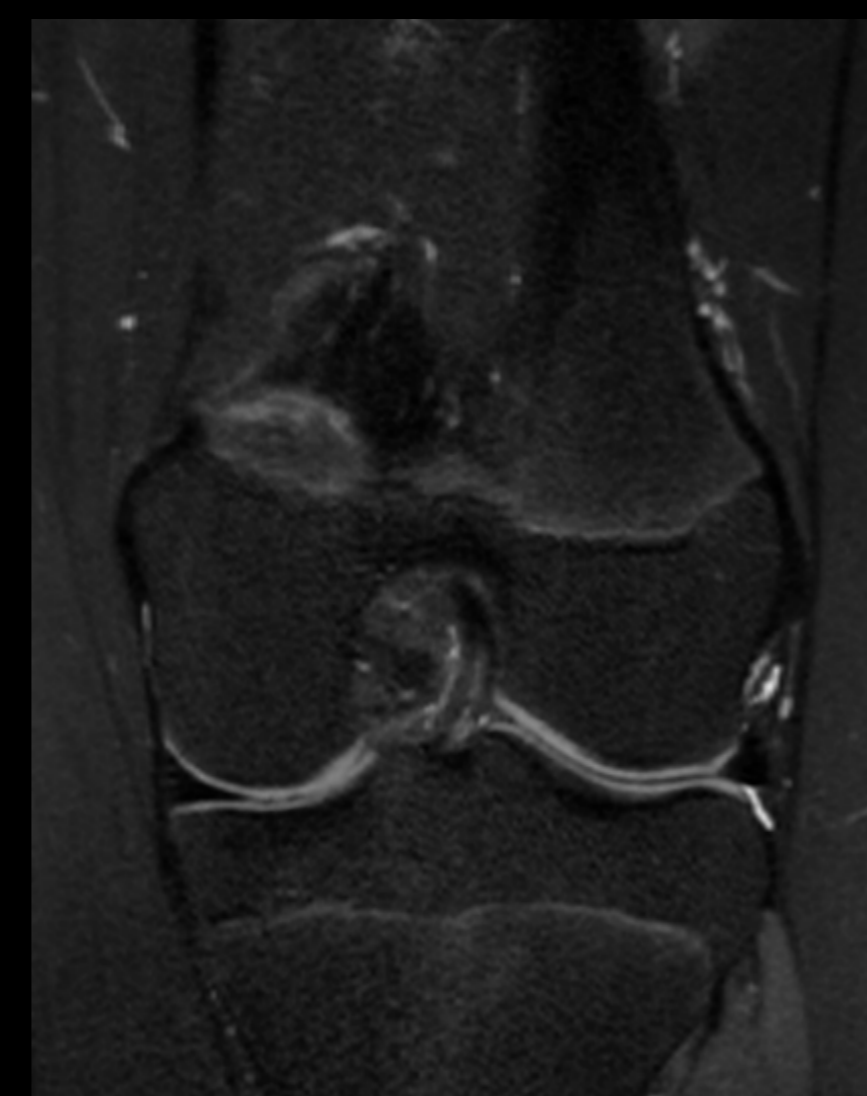
Clinical benefits:

- Lowers scan time, without reducing SNR
- Helps achieve outstanding resolution in the same amount of time
- Provides faster 3D imaging acquisitions
- Combines with ARC for higher acceleration



Cube with HyperSense

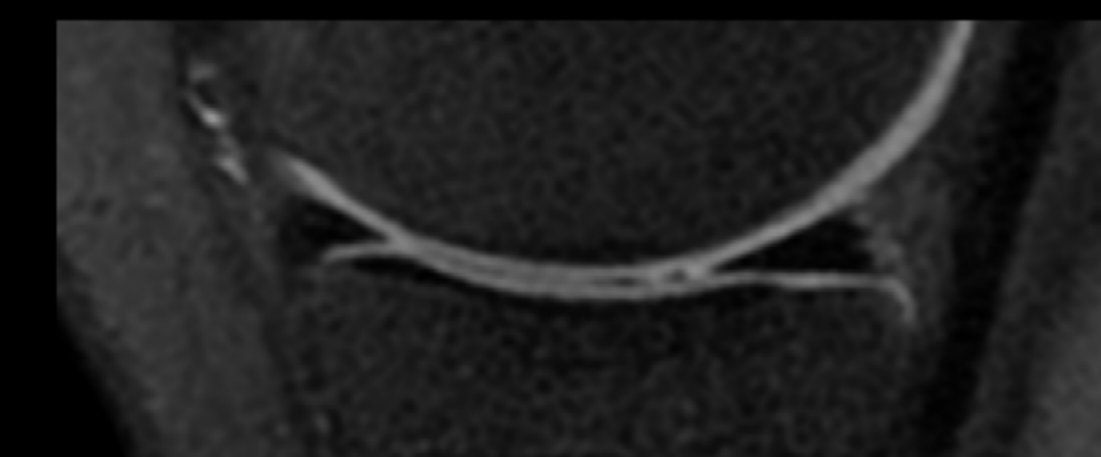
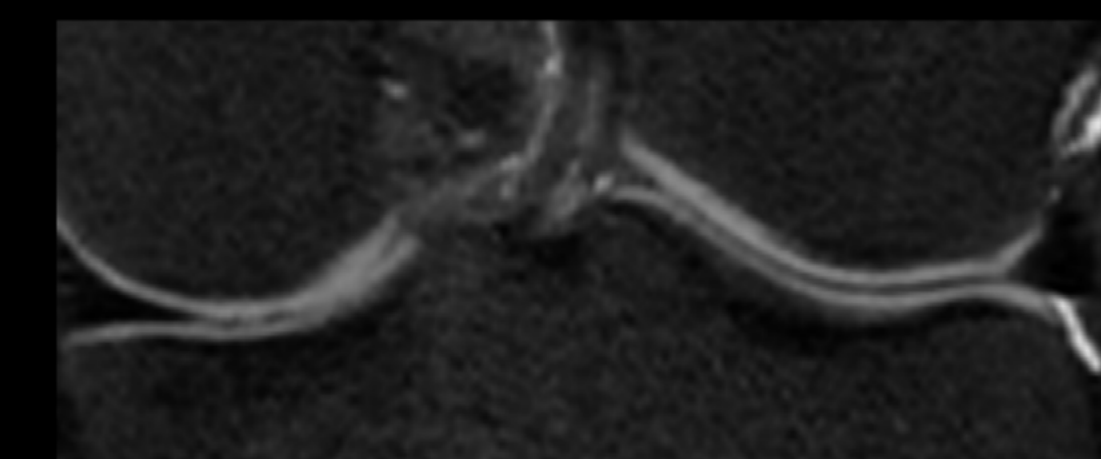
Cube



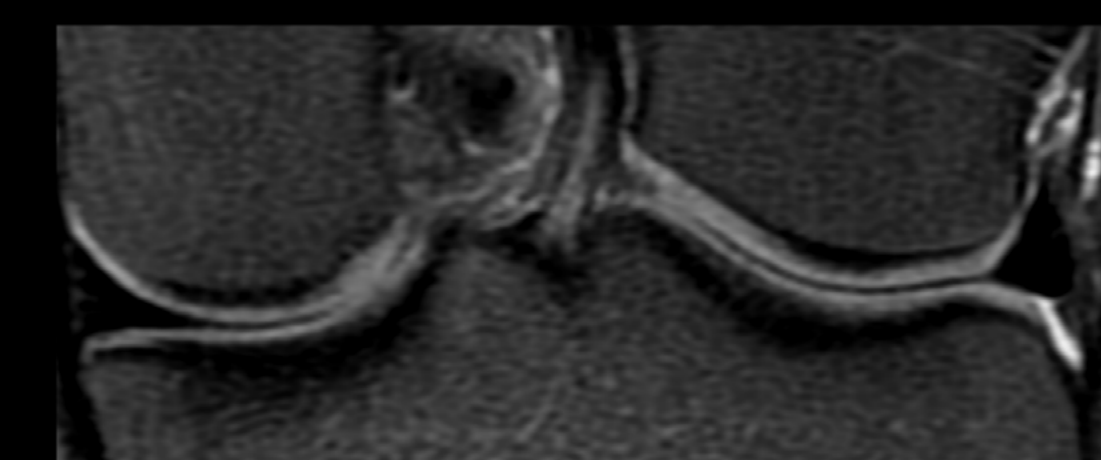
2D FSE



Cube



2D FSE

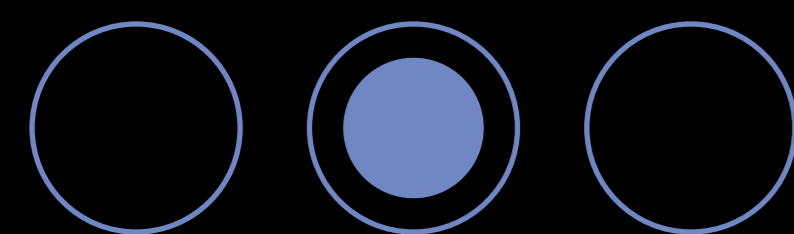
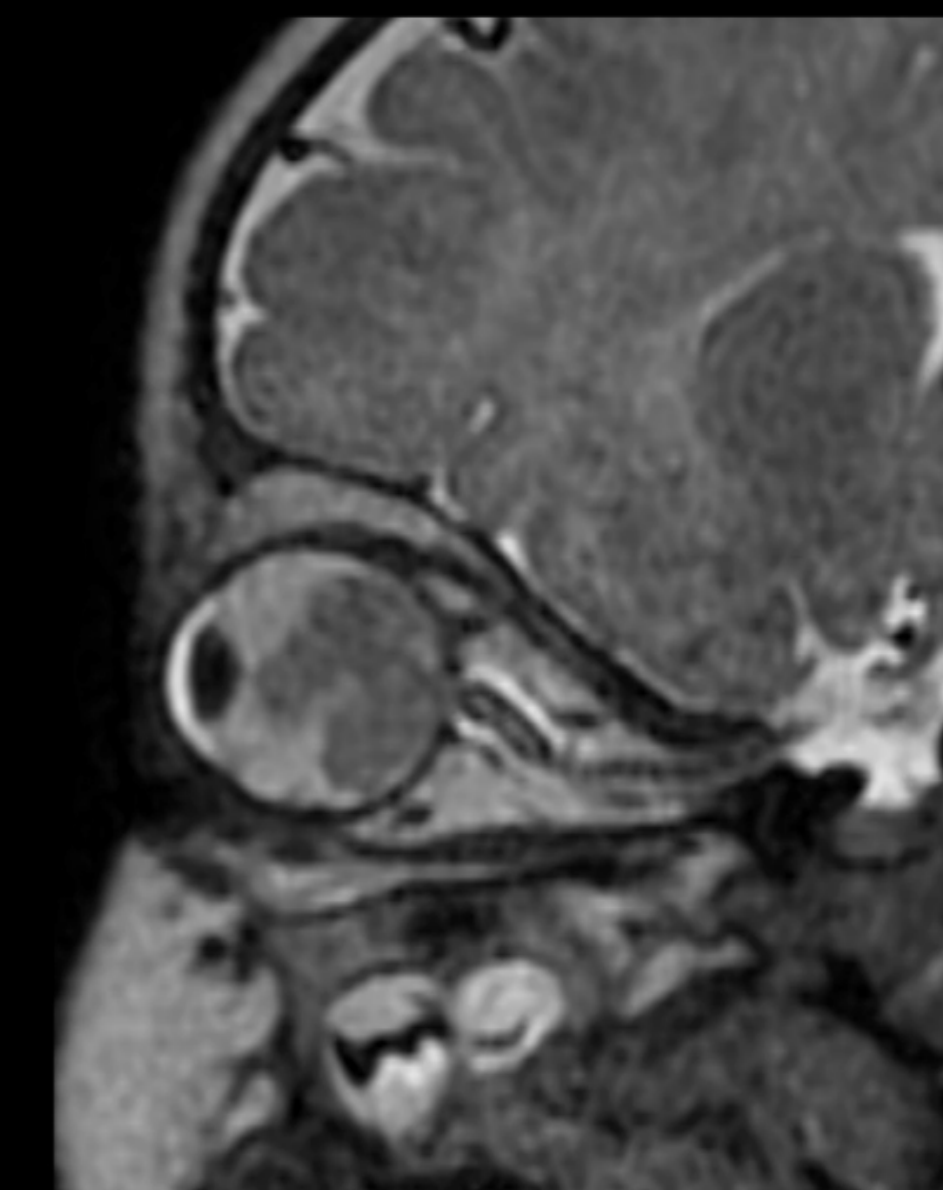
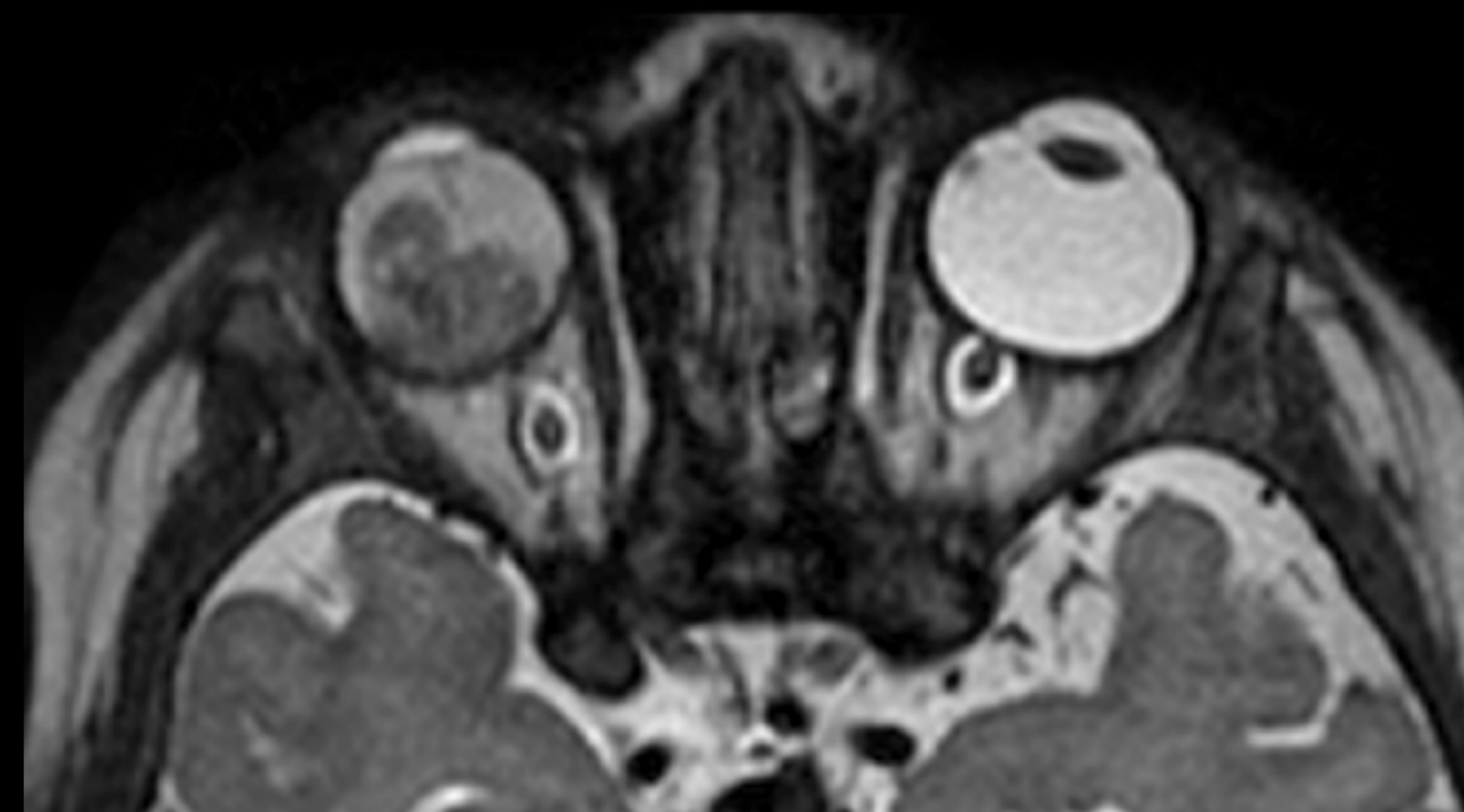
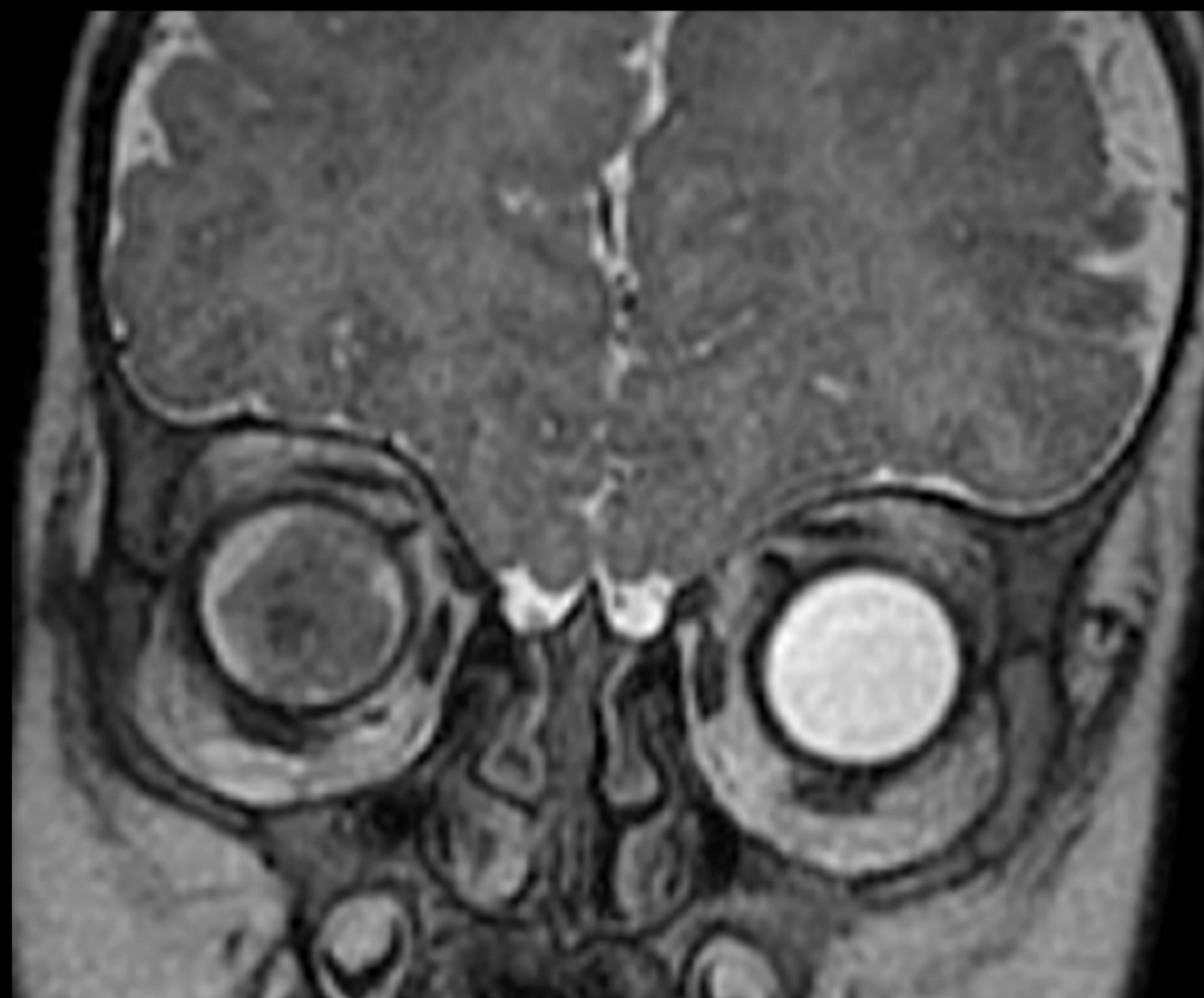


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Innovative Applications

HyperSense

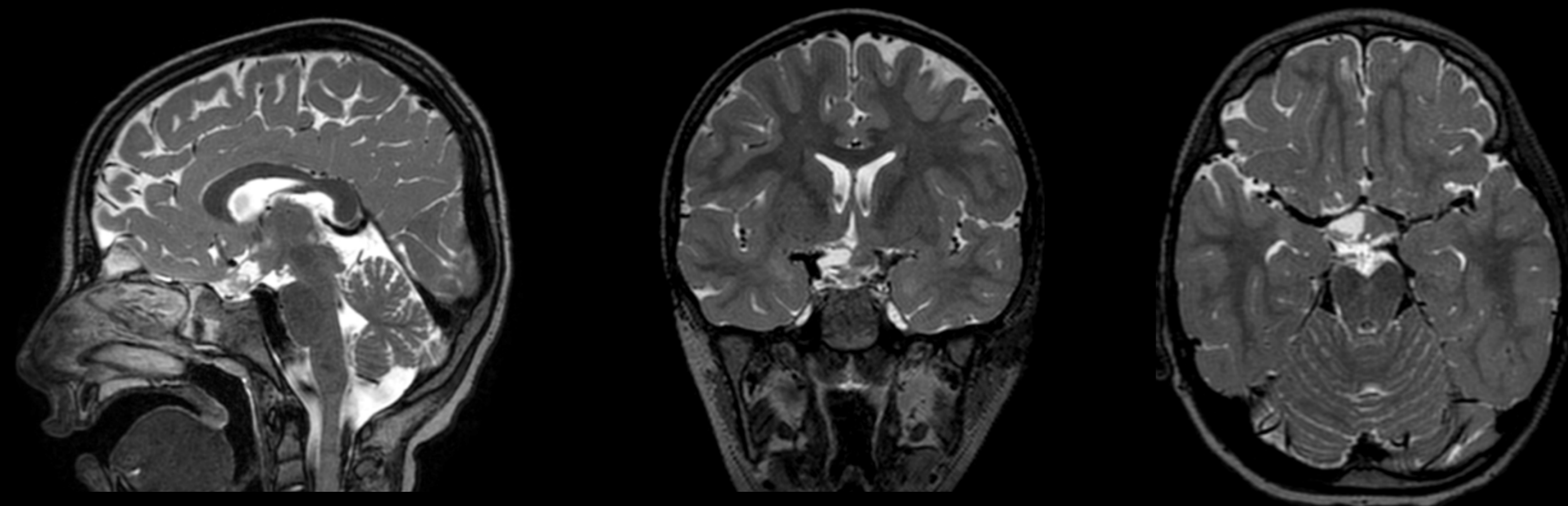
HyperCube with HyperSense factor = 1.3
4:40 min



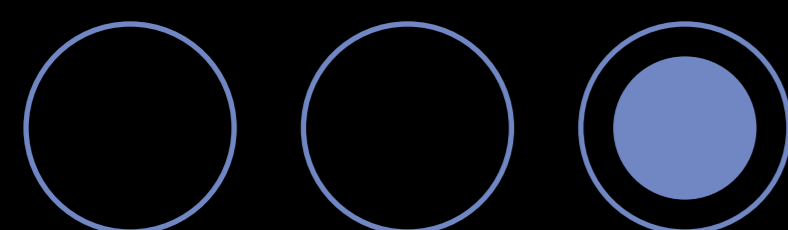
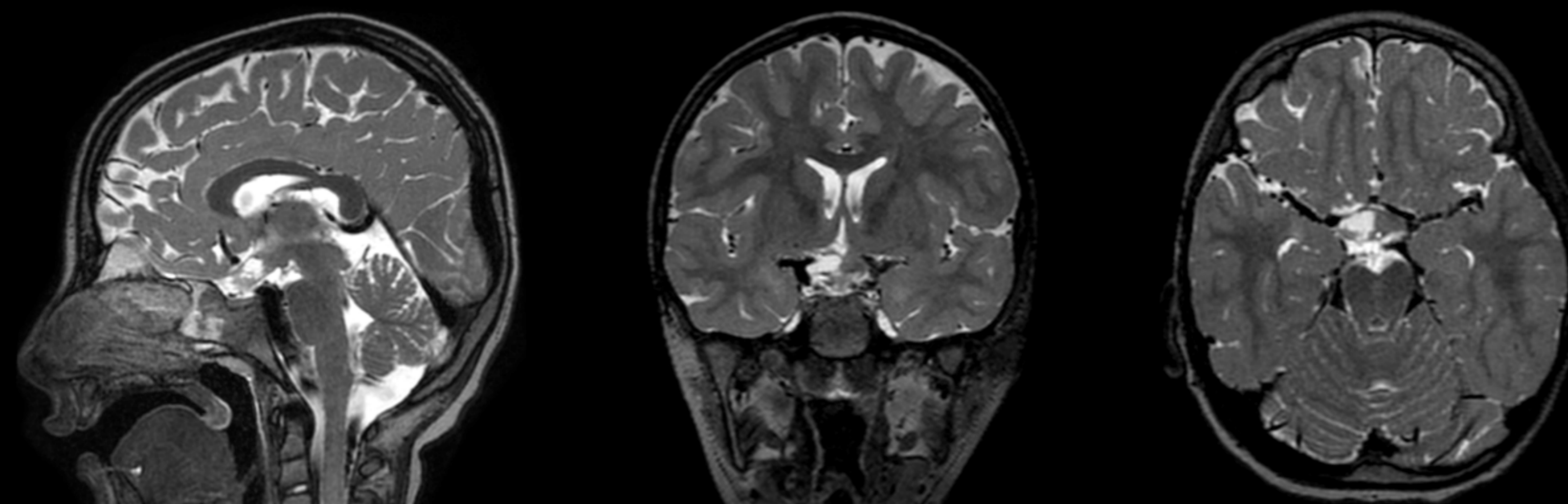
PaedWorks
Innovative Applications

HyperSense

Cube without HyperSense 5:59 min



Cube with HyperSense factor = 1.3 4:36 min



PaedWorks

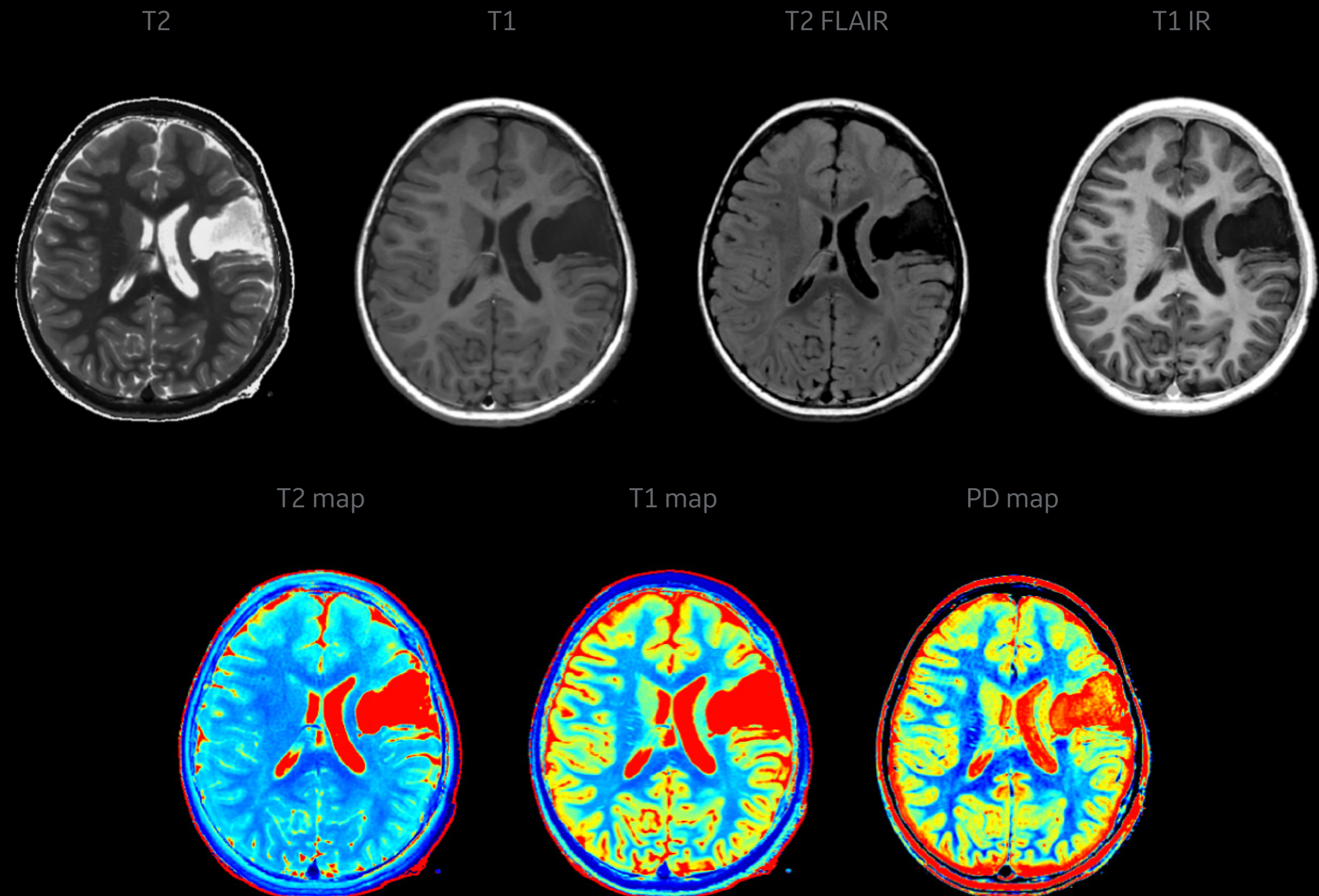
Innovative Applications

MAGiC

MAGnetic resonance image Compilation (MAGiC) delivers multiple contrasts in a single scan, including T1, T2, PD and Inversion Recovery-weighted images (T1 FLAIR, T2 FLAIR, STIR, Dual IR white or gray matter suppression and PSIR with PSIR vessel view), reducing scan time by up to 50% compared to acquiring all contrasts separately.

Clinical benefits:

- Scans up to 8 contrasts in one 5½ minute scan
- Allows for contrast change after acquisition
- Enhances image slice registration
- Provides quantitative parametric maps: T1, T2, R1, R2, PD
- Includes quantitative mapping to determine tissue type
- Provides more diagnostic information without extra time



It is recommended to acquire conventional T2 FLAIR images in addition to MAGiC

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Innovative Applications

SilentScan

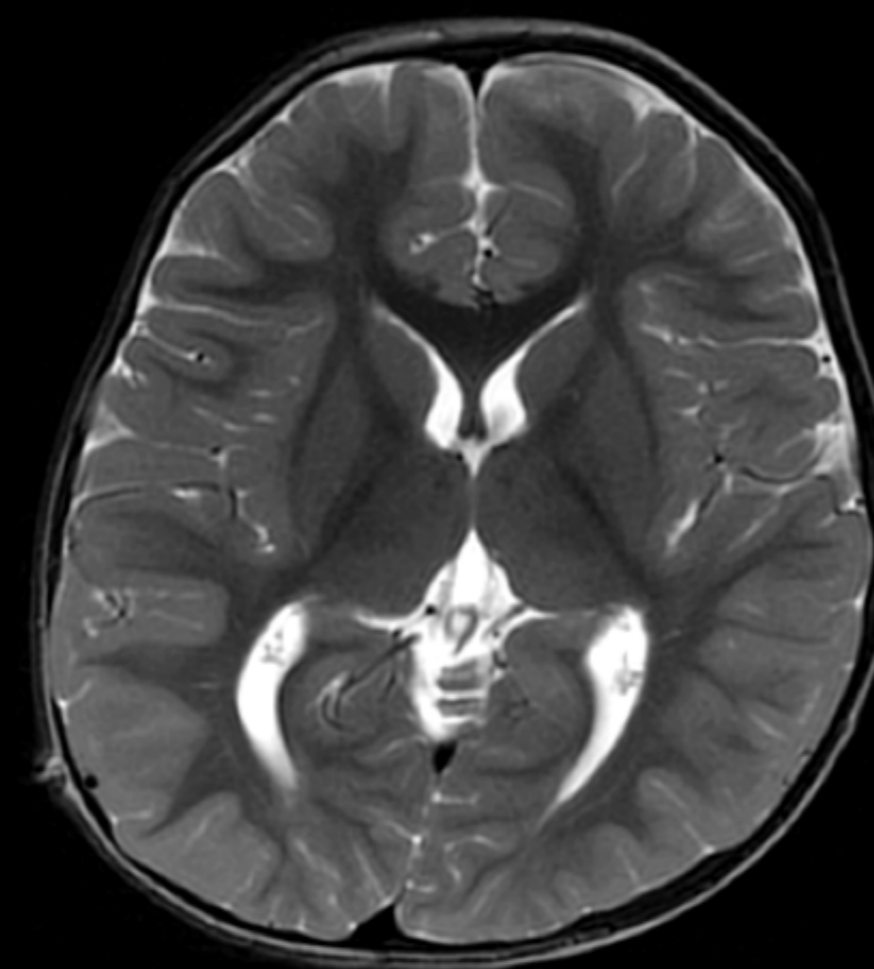
SilentScan helps deliver excellent image quality with an optimized patient experience. Patients are exposed to an ambient level of noise which eases anxiety and helps to minimize disruption in productivity workflow.

Clinical benefits:

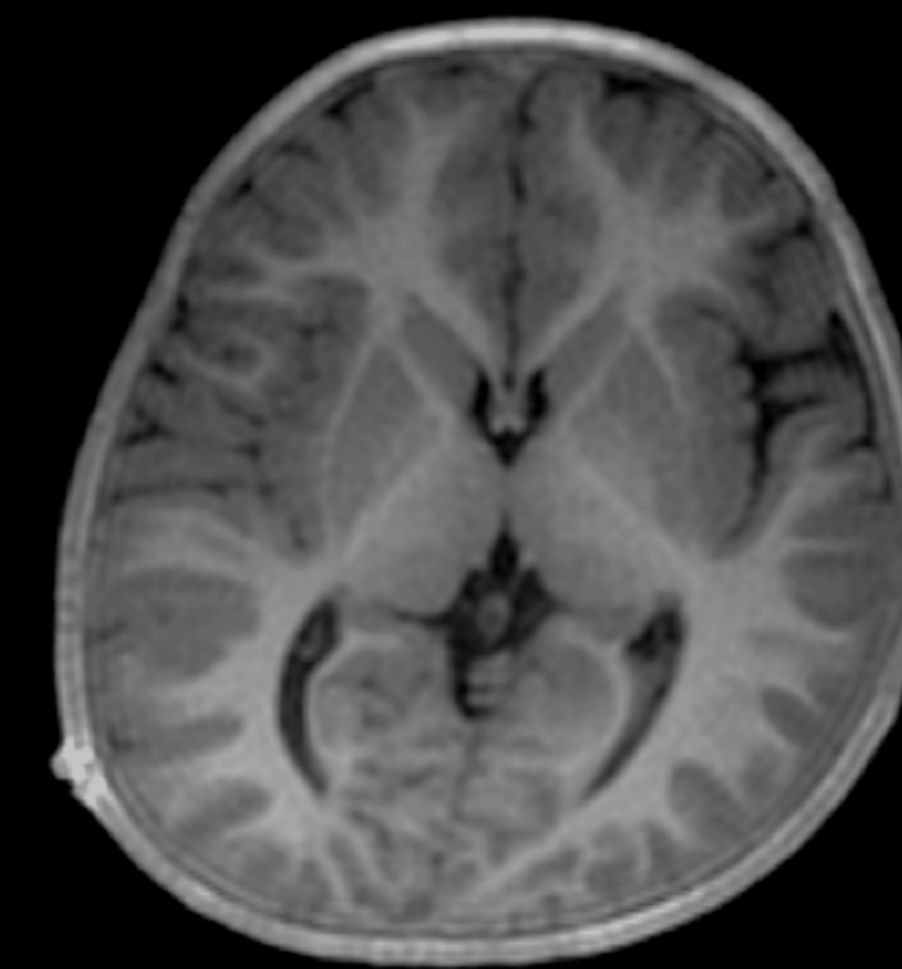
- Eases patient anxiety to improve patient care and overall experience
- Easier to communicate with patients during sequences
- Quiet environment can lead to faster throughput and less repeats
- Can be used across all anatomies using multiple weightings and coils
- Helps to reduce the sedation dosage in children

2-year-old patient

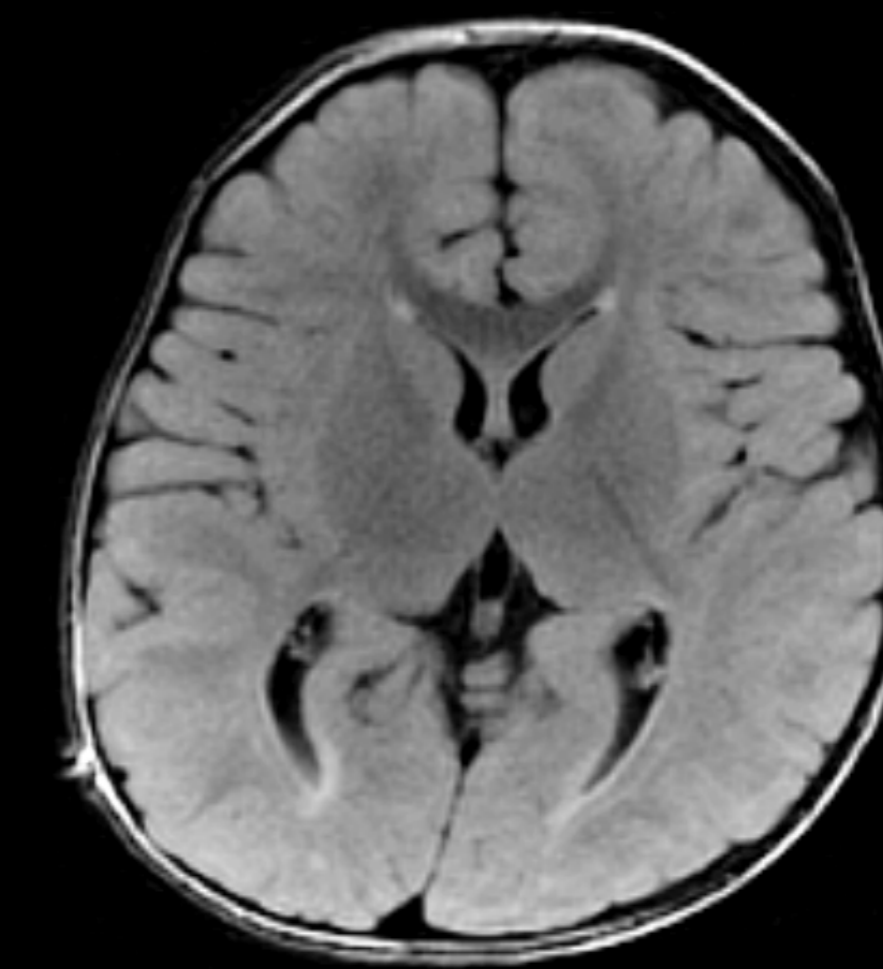
T2w SilentScan



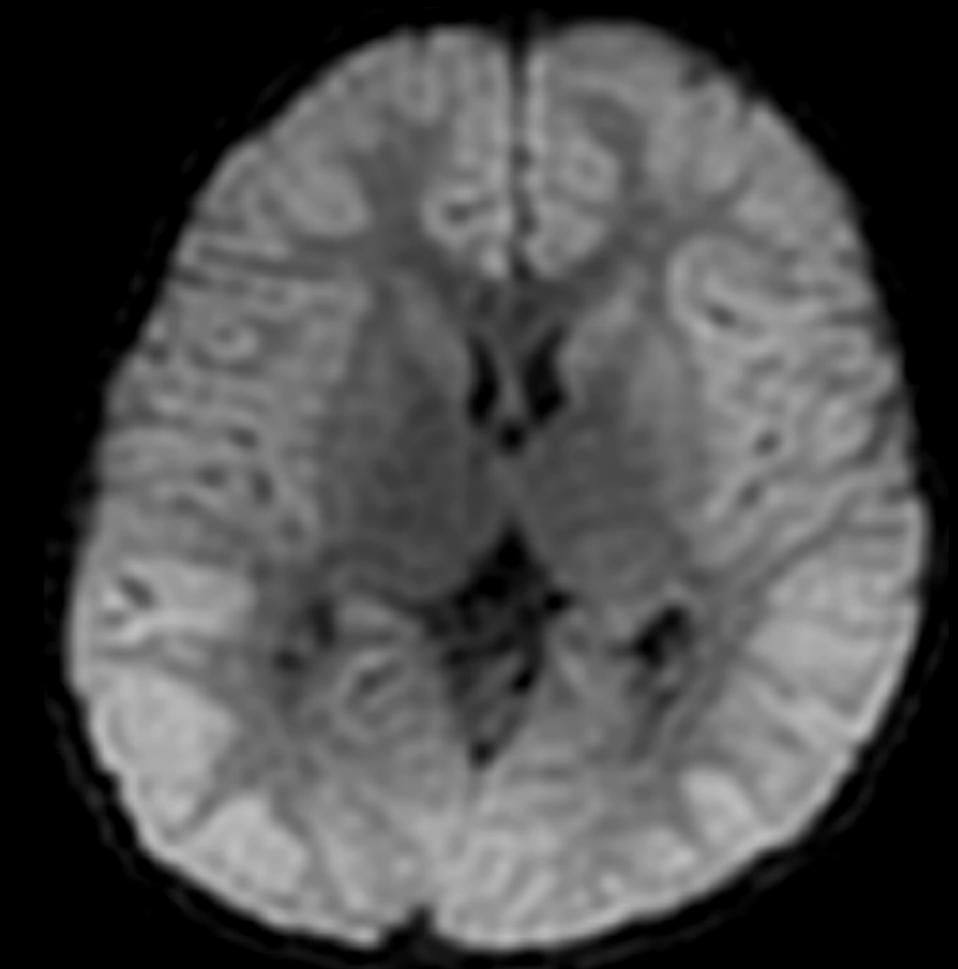
T1w SilentScan



T2 FLAIR SilentScan



SilentScan DWI



Images courtesy of: Necker & Sick Children's Hospital, Paris, France; Amrita Institute of Medical Sciences, Cochin, India; Queen Silvia Children's Hospital, Gothenburg, Sweden; Lucille Packard Children's Hospital, Stanford University, Palo Alto, CA, US; Cincinnati Children's Hospital, Cincinnati, US; NOVO Medical Center, Lviv, Ukraine; Keio University, Tokyo, Japan; Scanx, Mother and Child Center, Katowice, Poland



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