

Case Study

# Boost Your Clinical Confidence in Pediatrics with Quantitative Data from SyMRI

// SyMRI aids in the transition from diagnosis based on tissue contrast to intrinsic tissue characteristics. Quantitative information can be helpful in verifying visual assessments of structures and tissues against a normal quantitative standard //

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Dr. Miller is a member of the American Society of Neuroradiology (ASNR), the International Society of Magnetic Resonance in Medicine (ISMRM), and the American Society of Pediatric Neuroradiology (ASPNR).

He is also a member of the Industry Relations and Research Award Committees of the American Society of Pediatric Neuroradiology.

He received the ASPNR Pediatric Neuroradiology Research Grant Award in 2007 and was awarded to the Best Doctors database in 2010.

## About Phoenix Children's Hospital

Phoenix Children's is Arizona's premier hospital for family-centered, pediatric care for patients with complex medical needs. With a medical staff of nearly 1,000 specialists, Phoenix Children's is one of the largest pediatric healthcare systems in the United States, and the most comprehensive children's care facility in the state of Arizona. They provide inpatient, outpatient, trauma, and emergency care across more than 75 subspecialties.

In 2022, U.S. News ranked Phoenix Children's among the nation's "Best Children's Hospitals" for 2022-2023 for the twelfth consecutive year.

## SyMRI NEURO in Pediatrics

SyMRI NEURO provides 12 contrast-weighted images in a single fast scan. This quantitative data can drastically reduce scan and sedation time within pediatrics.

The pediatric brain is in constant development and requires various scanner settings in order to distinguish brain features during the child's maturation. Assessing the appropriate brain maturation is an especially hard challenge. This aspect of interpretations of pediatric brain MRI's easily causes subjective assessments, which can vary from one radiologist to another. SyMRI NEURO provides the radiologist with an objective decision support through quantitative measurements and reduce unwanted variations in the assessment. Based on quantitative multi-parametric maps that provide the absolute physical properties of the patient, SyMRI creates robust segmentations and volume calculations. These segmentations work for very young children and even neonates. The synthetic contrast images are also independent of scanner settings, making it easier to retrospectively create new contrasts which are specific for the patient.



Objective decision support in a single fast scan

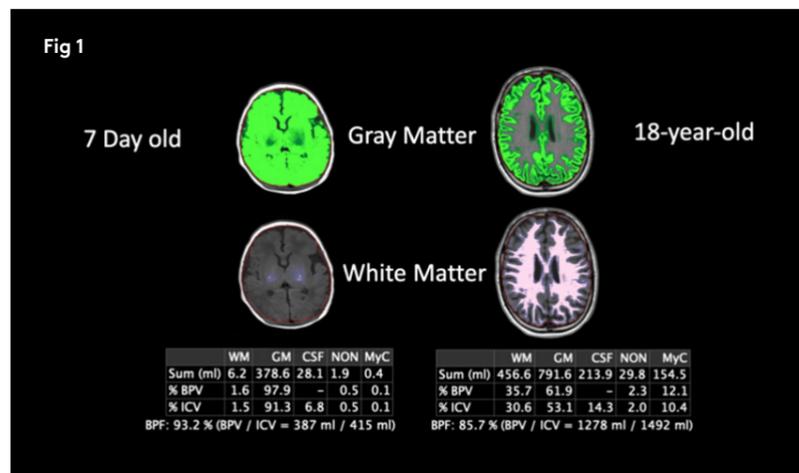


Rapid visualization of reliable quantitative data

## Case 1

A 7-day-old patient and an 18-year-old patient with normal conventional brain MRIs.

SyMRI maps of gray and white matter show the expected developmental changes, which are visible on imaging during brain maturation and development (Fig 1).



In the 7-day-old patient, white matter is only visible within the posterior limbs of the internal capsules. In the 18-year-old patient, the distribution of white matter is widespread in the expected locations of the brain. Quantitative metrics of the volume and percentages of the most evaluated different tissue classes (white matter, gray matter, and cerebrospinal fluid), as well as their percentage contribution to the total individual brain parenchymal and intracranial volume is presented in tabular form.

The quantitative metrics demonstrating significant increased volume of white matter, percentage of parenchymal and intracranial volume is evident for the 7-day-old and the 18-year-old.

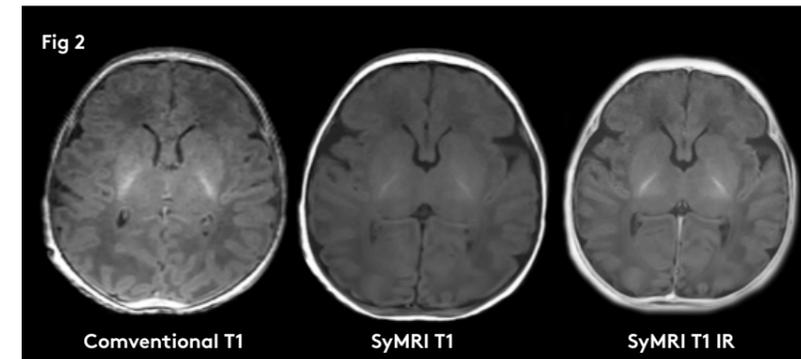
Assessing for appropriate brain maturation is one of the most challenging aspects of interpreting MRIs of maturing brains. This evaluation is often very subjective. Having an objective evaluation means to use SyMRI to improve accuracy and allow for quantitative determinations of deviations from normal in disease states.

## Case 2

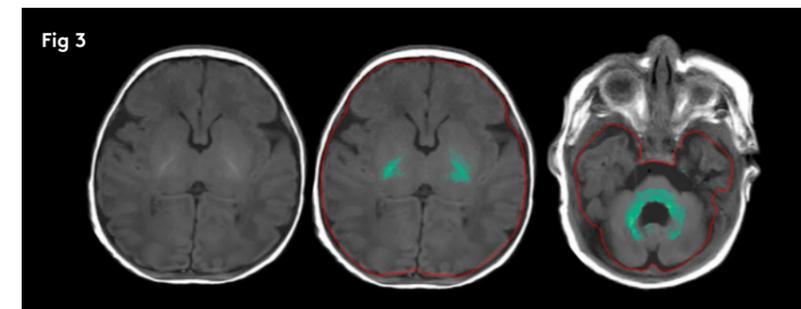
24-days-old newborn male.

Expected myelination is visible within the posterior limbs of the internal capsule on the conventional T1 MRI image (Fig 2).

SyMRI T1 and T1 Inversion Recovery images show normal myelination within the same internal capsule regions (Fig 2).



SyMRI T1 and the myelin maps show quantitative myelination within the posterior limbs of the internal capsules and at a lower level within the cerebellar peduncles and dentate nucleus (Fig 3).

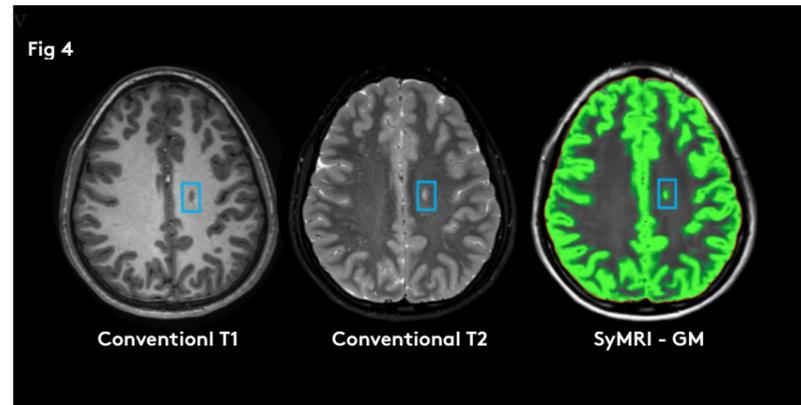


Having the myelin maps from SyMRI not only increases the conspicuity of the early developing white matter tracts, but it also confirms that the expected signal changes reflect the underlying process of myelination. Confirming the presence of these white matter structures and that the normal process of myelination is taking place is an important component of the evaluation of brain MRIs for patients as young as this boy.

## Case 3

12-year-old female with seizures.

Conventional T1 and T2 MRI show a suspected heterotopic gray matter nodule in the left deep white matter (Fig 4).

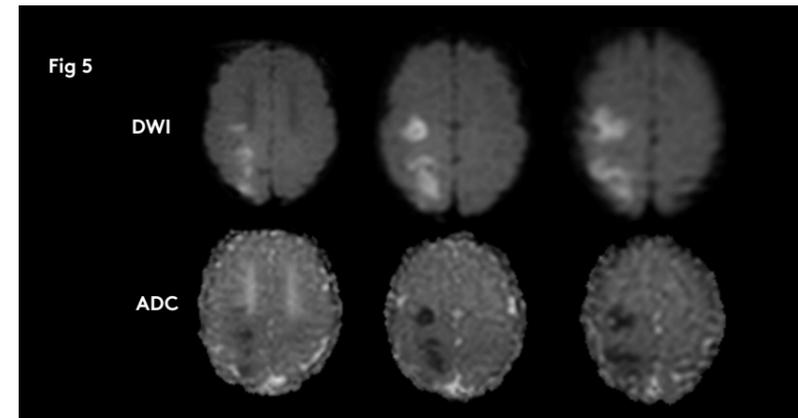


The SyMRI gray matter tissue map confirm that the nodule is gray matter, which provides tremendous diagnostic confidence in this case. This finding and abnormality is very small, which can lead to some uncertainty of the etiology if the reader is somewhat unfamiliar with its appearance. The gray matter map confirms the diagnosis for the radiologist.

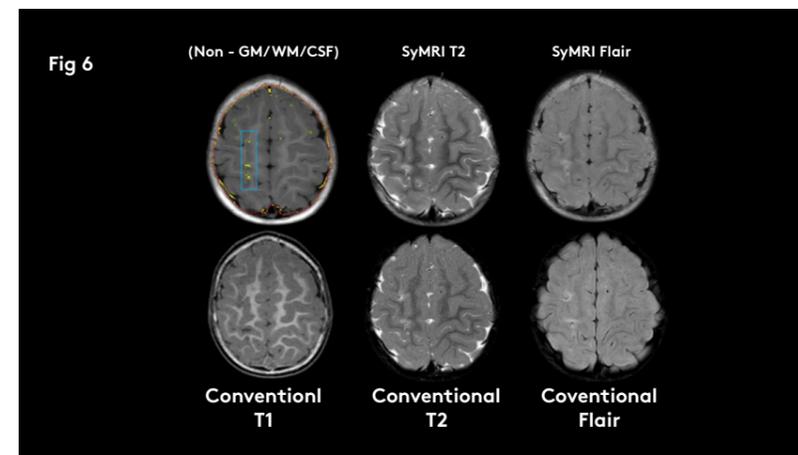
## Case 4

4-day-old female with conventional imaging findings consistent with hypoxic-ischemic encephalopathy (Fig 5).

Ischemia/stroke seen on diffusion images within the right frontal and parietal lobes (Fig 5).



A follow-up MRI brain at 2 years of age, show atrophy and gliosis within the parenchymal regions of prior ischemia/stroke (Fig 6).



On the SyMRI maps of non-GM/WM/CSF, the previously injured regions of atrophy and gliosis correlate with the same areas seen on the conventional, the SyMRI T1 and T2, and the FLAIR images. Reviewing the non-GM/WM/CSF image can be helpful for the radiologist to get a "preview" of where abnormalities could potentially show up on other sequences in the brain. Although the findings in this case are well seen on the T2 and the FLAIR images, their presence on the non-GM/WM/CSF image confirms that the signal changes are not related to normal tissue or cerebrospinal fluid, which give a level of clarity that goes beyond conventional.

## About SyMRI

SyMRI offers confident care through intelligent imaging. It combines an MR sequence with post-processing MR software, and includes multiple contrast-weighted images, fully adjustable for TE, TR, and TI values for optimal flexibility. Using only a single scan and with a post-processing time of less than 10 seconds, SyMRI enables automatic segmentations and volume measurements of tissues such as white matter, gray matter, cerebrospinal fluid, and myelin. This allow users to track disease progression or compare against control groups.

SyMRI which is FDA cleared for patients of all ages, is available both as a stand-alone solution or be fully integrated into the clinical workflow.

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