



The brainstem and the cerebellum are tricky brain regions to get magnetic resonance images (MRI) of because of their location and complex structure. Images of white matter microstructure are low-resolution and often distorted near these regions. Added to this is the challenge of imaging the brain of kids with and without developmental differences, who may find it more difficult to stay still for periods of time long enough to allow for crisp brainstem images.

Postdoctoral fellow José Guerrero-González, PhD, came up with a new technique called TiDi- Fused (Transformation-based high-resolution Diffusion MRI) that combines two modalities, using each image's best features for a better-quality image of the white matter of the brainstem and cerebellum.

One image comes from diffusion weighted MRI, which measures white matter microstructure in the brain, providing essential information, but in a lower-quality format. The second image is a T1-weighted image, which has high-resolution and contrast of the major tissue types in the brain. "The technique that we implemented takes a higher resolution image from the same participant that is not distorted. And this low-resolution diffusion weighted image is distortion-corrected and spatially aligned to that other image," Guerrero-González describes. "So, it's sort of all packaged into one and at the end we have a high higher resolution image that is aligned and undistorted."