Parallel Imaging Improves Diffusion Tensor Studies

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Diffusion tensor imaging is a powerful new technique to study white matter anatomy. However, it has several limitations in terms of SNR, image resolution, scanning time, and image distortion. Many of the limitations stem from the fact that it is extremely sensitive to physiological motions and has to resort to echo planar imaging.

In the first part of the talk, I will go over the mechanism of the limitations and explain how parallel imaging can break the bottleneck to improve the image quality.[1; 2] Advantages and disadvantages of high field (3T) magnets and impact of parallel imaging in this equation will also be discussed.[3]

In the second part, several application studies are introduced, in which parallel imaging could make a difference. The first application is high-resolution imaging of the brainstem and hippocampus/thalamus (Figure).[4] The second application is diffusion tensor imaging of pediatric cases, in which severe white matter injuries occur that conventional MRI often can't delineate clearly. Approaches for quantification will also be discussed.

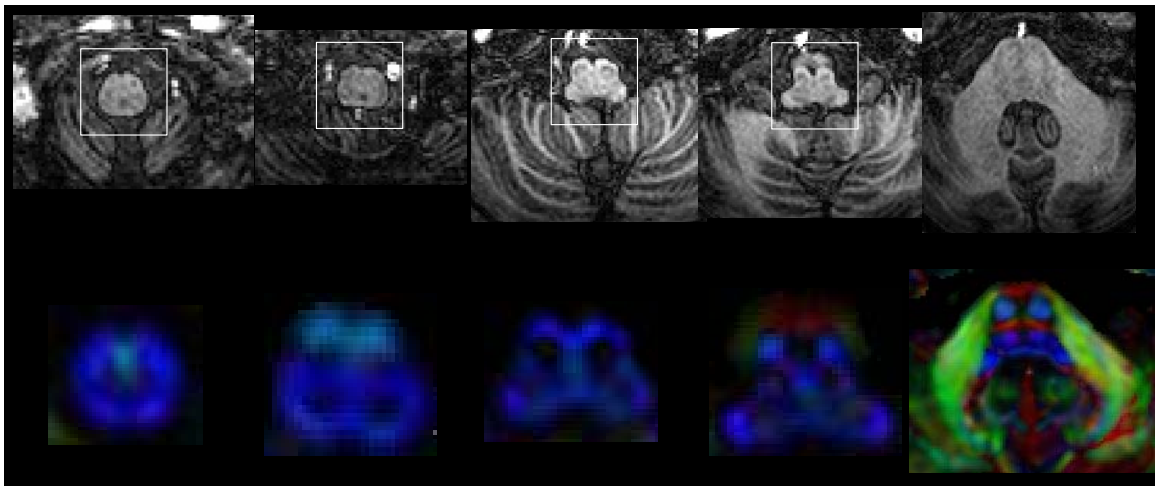

Figure: T_1-weighted images (top row) and DTI-based color-coded maps (bottom row) of the human brainstem. The areas inside the white boxes in the T_1-weighted images are magnified for the color maps, in which red, green, and blue indicate fibers running along the right-left, anterior-posterior, and superior-inferior orientations.

References:

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