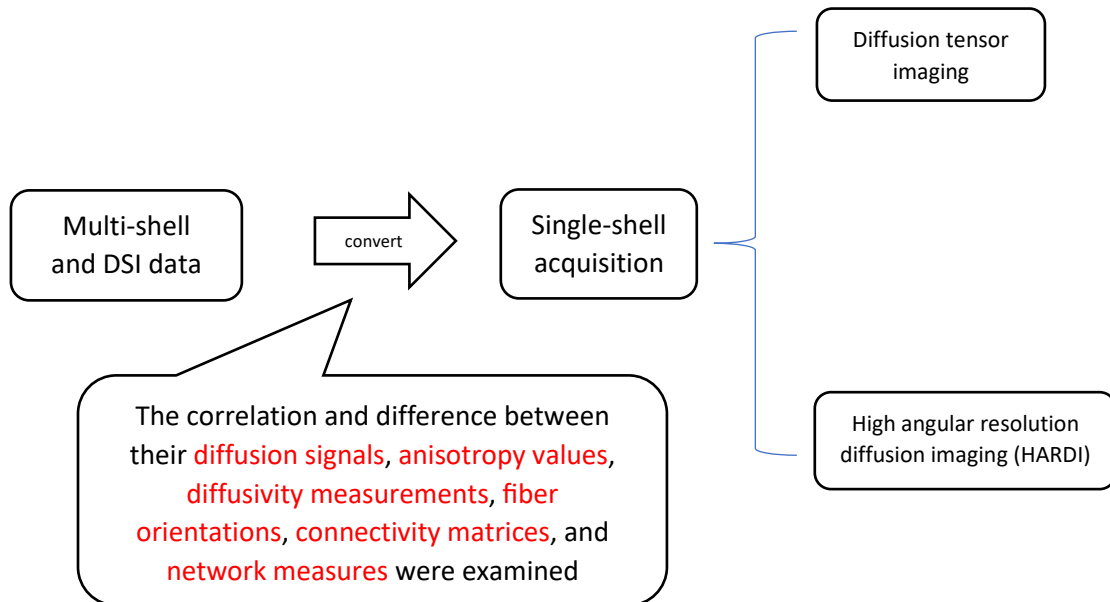
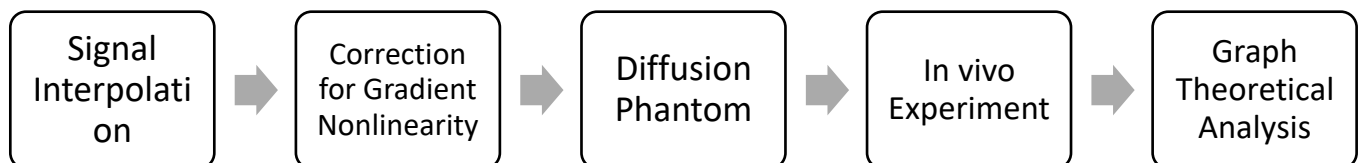


Summary

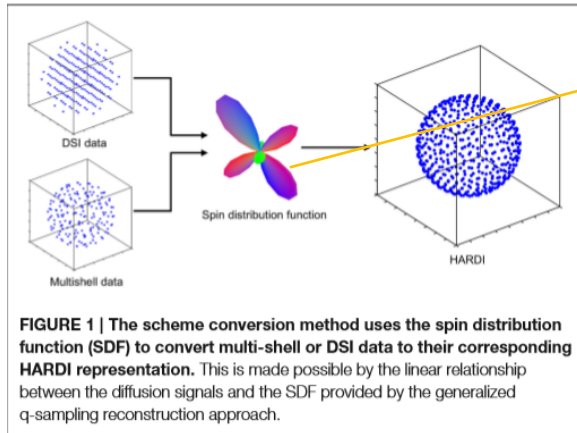
Converting Multi-Shell and Diffusion Spectrum Imaging to High Angular Resolution Diffusion Imaging



Workflow



Signal Interpolation

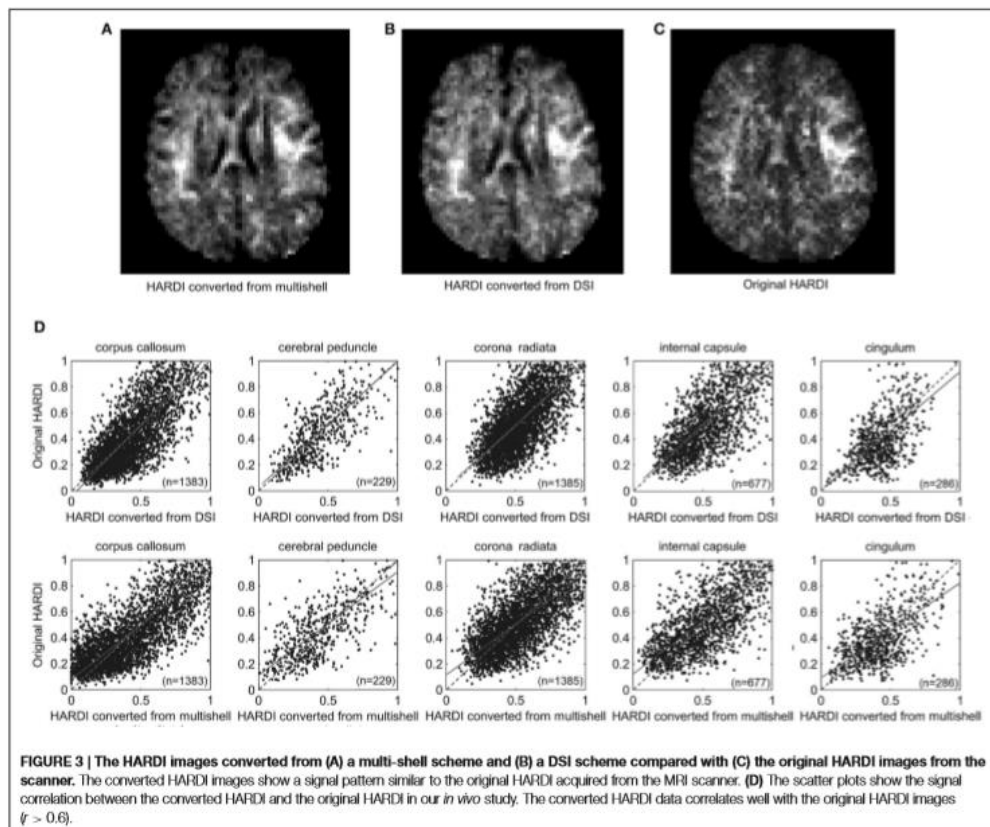


SDF measures the density of diffusing water at different orientation and is thus a measurement of spin density.

DSI or multi-shell data can be converted to a common SDF and the linear relation between SDF and the HARDI signals will allow for estimating the corresponding HARDI representation by solving the inverse problem using constraint optimization

Results:

The converted HARDI data are strongly correlated with the original acquired HARDI data in the phantom. The high correlation coefficient (>0.9) suggests that the converted HARDI is a good predictor of the original HARDI.



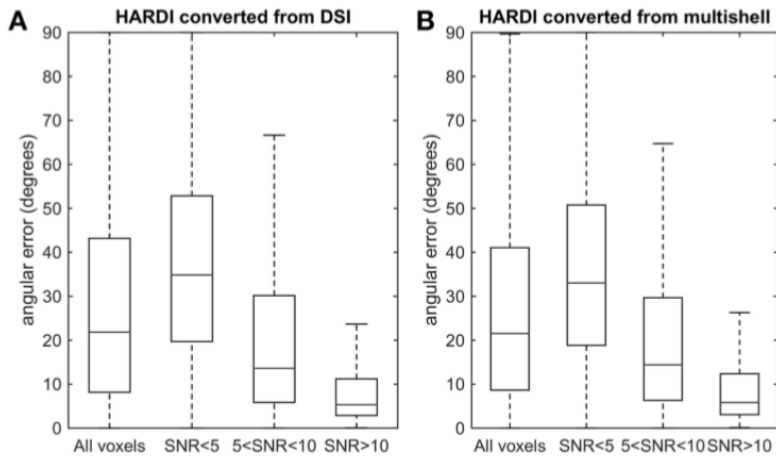


FIGURE 7 | Boxplots showing the angular error between (A) HARDI converted from DSI and the original HARDI and (B) HARDI converted from multishell and the original HARDI. Overall, the median of the angular error is around 20°. At voxels with SNR greater than 5, the angular error is substantially lower than the limit an orientation distribution function, suggesting that the fiber orientations calculated from the converted HARDI are sufficiently close to those of the original HARDI.

Conclusions

Conclusion1:

Here we show that schemes with multiple b-values have conversion flexibility. The diffusion signals converted from DSI and multi-shell acquisition strongly predict those of the original HARDI in our phantom and in vivo experiment.

Conclusion2:

The high predictive power was also observed for common diffusion indices, such as fractional anisotropy and diffusivity.

Conclusion3:

The fODF, connectivity matrix, and network measures all show a highly similar profile between converted HARDI and the original HARDI.

