

Diffusion MRI, MR tractography and potential applications in neurosurgical planning

Through diffusion MRI, questions regarding different aspects of tissue microstructure can be addressed. The classical tensor imaging approach, DTI based on a Gaussian model of diffusion, is key to perform tractography and follow the course of major white matter fiber tracts. More general approaches that also consider the presence of multiple fiber bundles within each voxel, and are model-free, are available but require longer measurement times. Clinically adaptable multi-shell approaches that represent an intermediate approach are emerging and can within certain limits be used to characterize fiber microstructure. In case specific disease induced changes of the MR-properties are taken into account, all these methods can open up novel possibilities for neurosurgical planning.