# Protocol: Rat Spine DTI-Spiral

Purpose

Diffusion tensor imaging (DTI) can be used to determine preferred directions for diffusive water motion and to trace ordered structures like axons and fiber bundles. Further, all common diffusion parameters (e.g. FA) can be calculated from DTI data.

Example Images

Images of a severed rat spine after some regrowth and repair were generated from DTI data using TrackVis.

Regrowth of a Severed Rat Spine
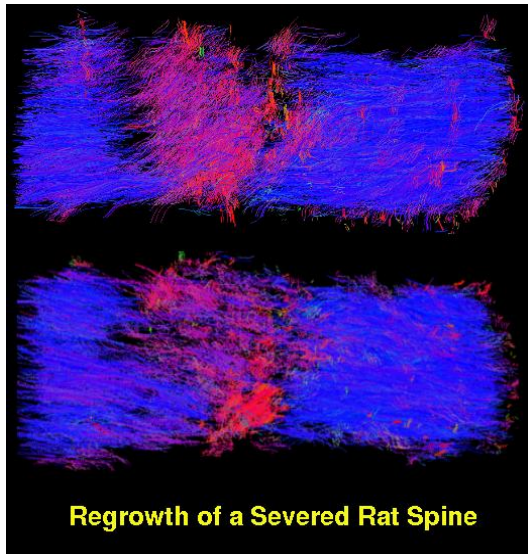
Scan Protocol

Type	Protocol Name	In-plane resolution, slice thickness	FOV	Slices	Scan time
Localizer	C_DTI-RatSpine/1_TripilotRatSpine				0.5 min
FLASH 3D Anatomical Reference Scan	C_DTI-RatSpine/2_FlashRatSpine_17m	60µmx60 µm, 500µm	1.54cm x 1.54cm	10	17m
DTI-Spiral	C_DTI-RatSpine/ 3_DTIRatSpine_60umx60umx1.0mm_10sl	60µm X 60 µm, 500µm	1.54cmx1.54cm	10	10m4s

Instructions

1. **Schedule a time to use the gradient insert.** The gradient insert requires special setup steps which cannot be performed by the user.
2. **Prepare your sample**. Place sample on a plastic card centered in a 15 mL Falcon tube. Add Galden, cap and parafilm to seal.
3. **Run the spine localizer scan.** The localizer scan will give you 10 axial slices to find the appropriate positioning of your sample and prescribe your other acquisitions.
4. **Run DTI-Spiral**.
5. **Set up additional repetitions in queued acquisition.**

Notes

- Use Coil D with sample loaded into a 15 mL Falcon tube.
- Number of repetitions = 3 reps minimum, 6 reps better.

Post-Processing Support

Tractography can be done using TrackVis and Diffusion Toolkit which are freely available across Windows, Mac and Linux OS.