History DT-MRI Software at BWH

Westin  DT-MRI in Matlab  1997-
O'Donnell  DT-MRI in Slicer  2001-
Eskew  DT-MRI in Slicer  2003-
Guimond  DT-MRI Registration, vtk  2002
Park  DT-MRI Registration, vtk  2003
Caan  DT-MRI Registration, Slicer  2004
Isola  Interface Slicer, Protocols  2004
Boucher  B-splines, Runge-Kutta 4-5, Slicer  2004
Ruiz-Alzola  DT-MRI Registration, Matlab  2000-
Brun  Stochastic Tracing, Matlab  2001-
O'Donnell  Connectivity, Matlab  2002-
Haker  Connectivity, Matlab  2002-
Brun  Fiber Grouping, Matlab  2002-
Park  DoDTI, Matlab  2003-
Westin  Tensor Normconv, Matlab  2003-
Martin  Multivariate MRF, Matlab  2003-
Friman  Connectivity, Matlab  2003-
Peled  Multicomponent, Matlab  2004-
Kindlmann  Visualization, C, teem, nrrd  2004-

1998

$x_{k+1} = x_{k} + \alpha v_{k}$
$v_{k+1} = T(x_{k+1})v_{k}$

1999

Geometric diffusion tensor measures

ISMRM 1997

Three crossing fiber tracts

1999

DT-MRI in Slicer

2001

Provided by O'Donnell, et al.

Carl-Fredrik Westin, Ph.D

Director Laboratory of Mathematics in Imaging
Department of Radiology, BWH.
**Multimodal Imaging, DT-MRI, fMRA, ..**

- Brigham and Women’s Hospital, Harvard Medical School
- Laboratory of Mathematics in Imaging

**Diffusion Tensor MRI in Neurosurgery**

- Brigham and Women’s Hospital, Harvard Medical School

**Fiber Bundle Color Coding**

- Laplacian Eigenmaps: Map the three smoothest eigenvectors to colors Red, Green, and Blue

**Grouping fibers into meaningful bundles**

- Uncinate fasciculus (green), inferior occipito-frontal fasciculus (red)

**Fibers to bundles: Splenium of Corpus Callosum**

- Splenium of the corpus callosum interconnecting different regions: occipital lobes (green), temporal lobes (red) and thalamus (blue).
Fiber Bundle Segmentation 2004

Fiber bundle clustering using Normalized Cuts
Provided by A. Brun

Statistical Atlas of Diffusion Quantity

Generation of DT-MRI Template
DT-MRI from Healthy Subjects N=32
Registration using Tensor Information to a Tensor Template
Average/Median of Registered Tensor Images
Fiber Tracking
Park HJ et al. Neuroimage, 2003

Gray Matter Parcellation

Provided by Hae-Jeong Park

END