

MR Diffusion Imaging: Getting Your Measures Right

Organizer:

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Diffusion Imaging is a very fast evolving neuroimaging field and today there are several advanced methods or complex analyses that can be performed using diffusion imaging data. But how can we get the best data for our study? How can we check if data is actually good or that we have chosen the right pre-processing and processing methods for our study? Sometimes, one of the problem faced by researchers coming from different fields or also students starting a PhD, is to start to use advanced methods and complex “high-level” analyses while still relying on poor acquisitions, simplified pre-processing or not adequate diffusion models. The aim of this educational course is to offer a practical overview about optimal strategies available today for both acquisition and processing of diffusion imaging data.

By following an ideal diffusion imaging pipeline, 5 lectures will review the current state of the art of diffusion imaging methods and the possible pitfalls and limitations that need to be taken in account before getting to the final results.

Learning Objectives:

1. To learn the optimal acquisition strategies available today for diffusion imaging and how to pre-process and quality control diffusion data.
2. To learn which diffusion models and tractography methods are available and can be applied in neuroimaging and neuroscience research.
3. To understand what are the main limitations today for diffusion imaging and the risks behind each step of the diffusion pipeline.

Target Audience:

The target audience for this course is the broad neuroscience and neuroimaging community either with technical or clinical background, interested to learn and apply diffusion imaging in research. This course will offer a good opportunity for students and researchers new to this field to learn the basics of diffusion imaging and will also provide practical guidelines how to directly start to work with diffusion imaging data.

Course Schedule:

13:00-13:15

Introduction to MR Diffusion Imaging: Getting Your Measures Right

Flavio Dell'Acqua, Dr.

13:15-13:50

Diffusion MRI data acquisition

Karla Miller, University of Oxford, Oxford, United Kingdom

13:50-14:25

Data Processing and Quality Control of DTI data

Alexander Leemans, University Medical Center Utrecht, Utrecht, Netherlands

14:30-15:00

Diffusion Imaging Models 1: from DTI to HARDI models

Flavio Dell'Acqua, Dr., King's College London - Institute of Psychiatry, Neuroimaging, London, United Kingdom

15:00-15:30

Break

15:30-16:05

Diffusion Imaging Models 2: from DTI to microstructure quantification

Gary Zhang, PhD, University College of London, London, United Kingdom

16:05-16:40

Diffusion Tractography

Maxime Descoteaux, Université de Sherbrooke, Sherbrooke, Québec, Canada

16:40-17:00

Questions and Discussion