Demyelination and remyelination in MS

Claudia A M Wheeler-Kingshott, PhD
University Reader in MR Physics
NMR Research Unit
Queen Square MS Centre
Department of Neuroinflammation
UCL Institute of Neurology
Queen Square, London, UK
Overview

- Myelin: what is it?
- How to measure myelin with MRI?
- Examples of studies in MS
- Conclusions
neuron
oligodendrocyte
axon

normal myelination

demyelination

remyelination

Courtesy of Dr Robin Franklin
What happens in MS?

Courtesy of David Paling, UCL
Can we measure demyelination and remyelination with MRI?

Two methods:

• Magnetization transfer ratio (MTR):
  – It is a quantitative measure that relates to tissue macromolecular structure;
  – MTR is feasible to implement and is available on most clinical scanners.

• Radial diffusivity (RD):
  – It is a quantitative measure that relates to the water diffusion across the axons;
  – RD is feasible to implement and is available on most clinical scanners.
Magnetization transfer ratio
= MTR