# Literature Report

**Reporter: Guangying Wang**

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# Literature Source

# Nile Red fluorescence spectroscopy reports early physicochemical changes in myelin with high sensitivity

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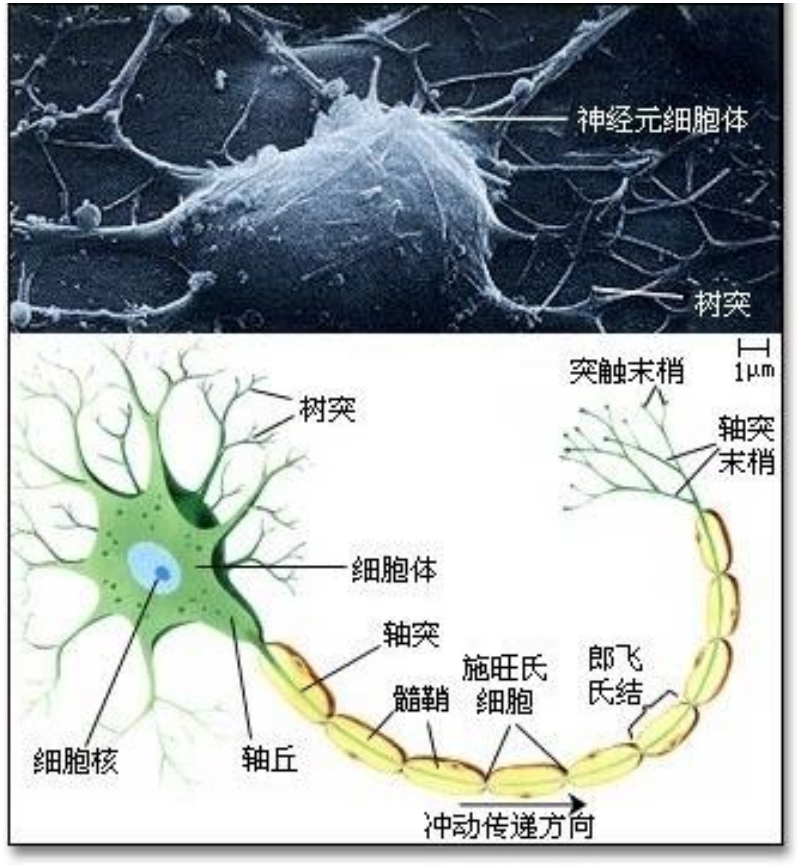
**研究领域**

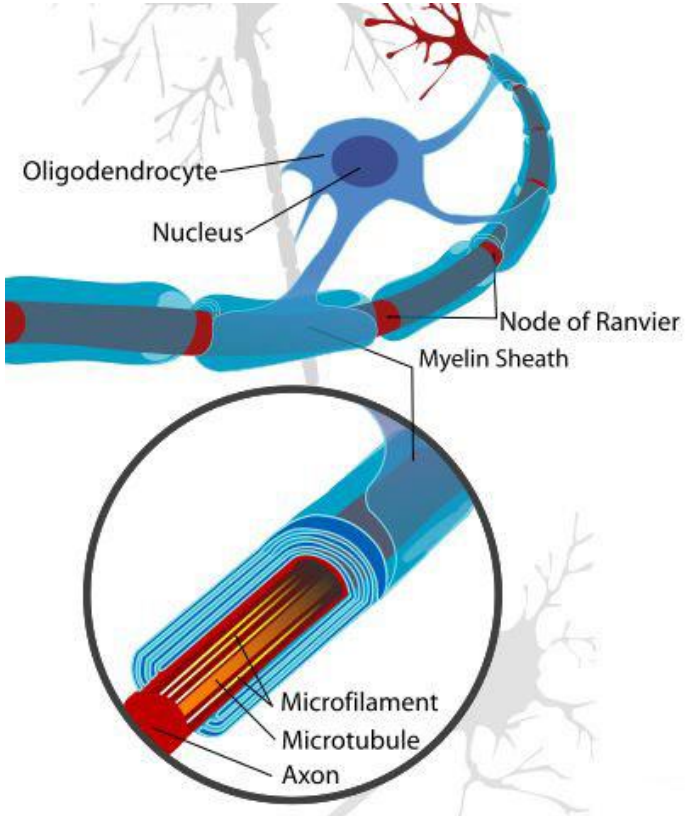
痴呆症和认知障碍
运动障碍
多发性硬化症
脊髓/神经损伤和疼痛

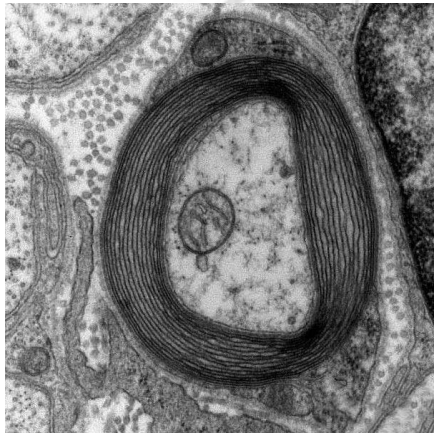
**研究活动**

了解哺乳动物神经系统中轴突、髓鞘和神经胶质细胞的正常生理学和细胞/分子损伤机制。 利用各种先进的激光扫描显微镜方法（其中许多是定制设计和构建的）、生化技术和电生理学来研究轴突功能和损伤机制。

# Introduction



髓鞘是包裹在神经细胞轴突外面的一层膜，即髓鞘由施旺细胞和髓鞘细胞膜组成。其作用是绝缘，防止神经电冲动从神经元轴突传递至另一神经元轴突。

髓鞘的构造，根据偏光显微镜的检查证明，脂质从轴索的中心向外排列成放射状，蛋白质形成同心圆层，一般推断，蛋白质和脂肪为相互排成层状的构造。

髓鞘包含约40%的水;干质量包含60%至75%的脂质和15%至25%的蛋白质。

髓鞘的蛋白质主要是白明胶一类的硬蛋白，脂质则包括磷脂质(卵磷脂、脑磷脂、鞘磷脂等)、糖脂质和胆固醇等。

# Introduction

The study of myelin lipid biochemistry

Traditional analytical methods

(1) Thin-layer chromatography and high-performance liquid chromatography

(2) Imaging lipid mass spectrometry

(3) Coherent anti–Stokes Raman scattering microscopy

J. Chromatogr. Sci. 13, 407–411 (1975).

Anal. Bioanal. Chem. 408, 6857–6868 (2016).

Chem. Sci.(Camb.) 9, 1586–1595 (2018).

# Results and discussion

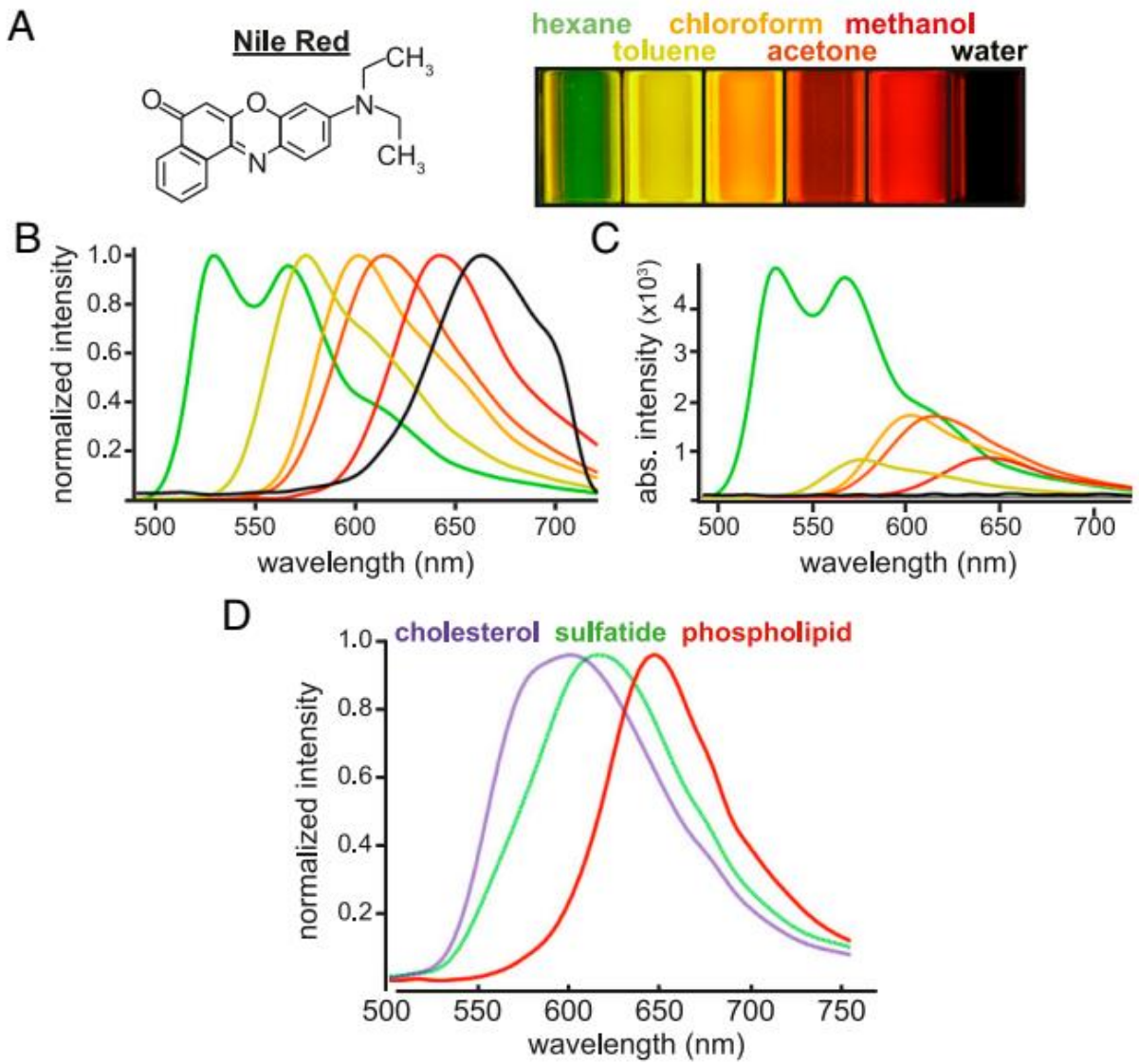



Fig. 1. NR fluorescence varies with polarity of its environment.

MO3.13 细胞：少突胶质细胞

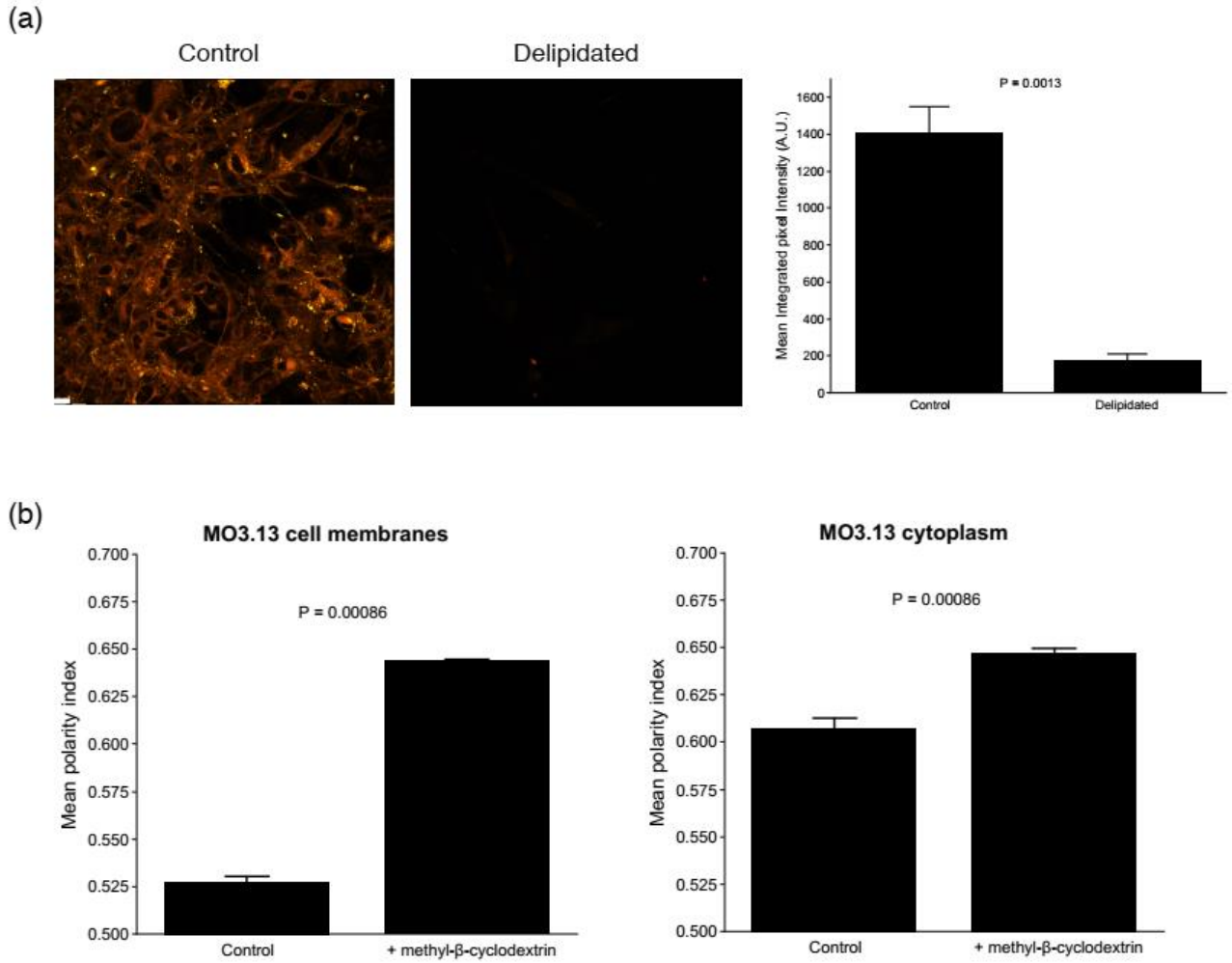



Fig. S1.

# Results and discussion

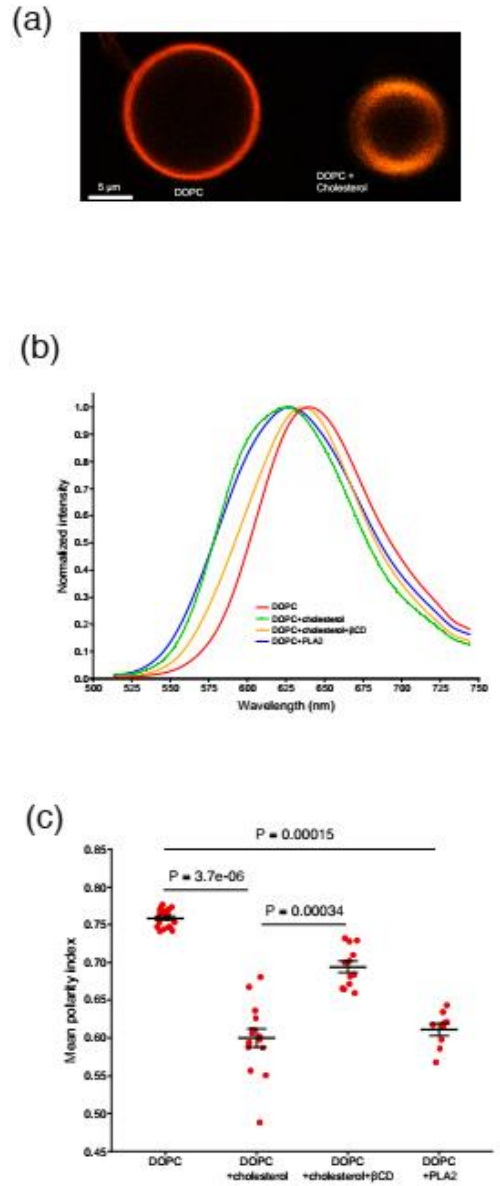



Fig. S2.

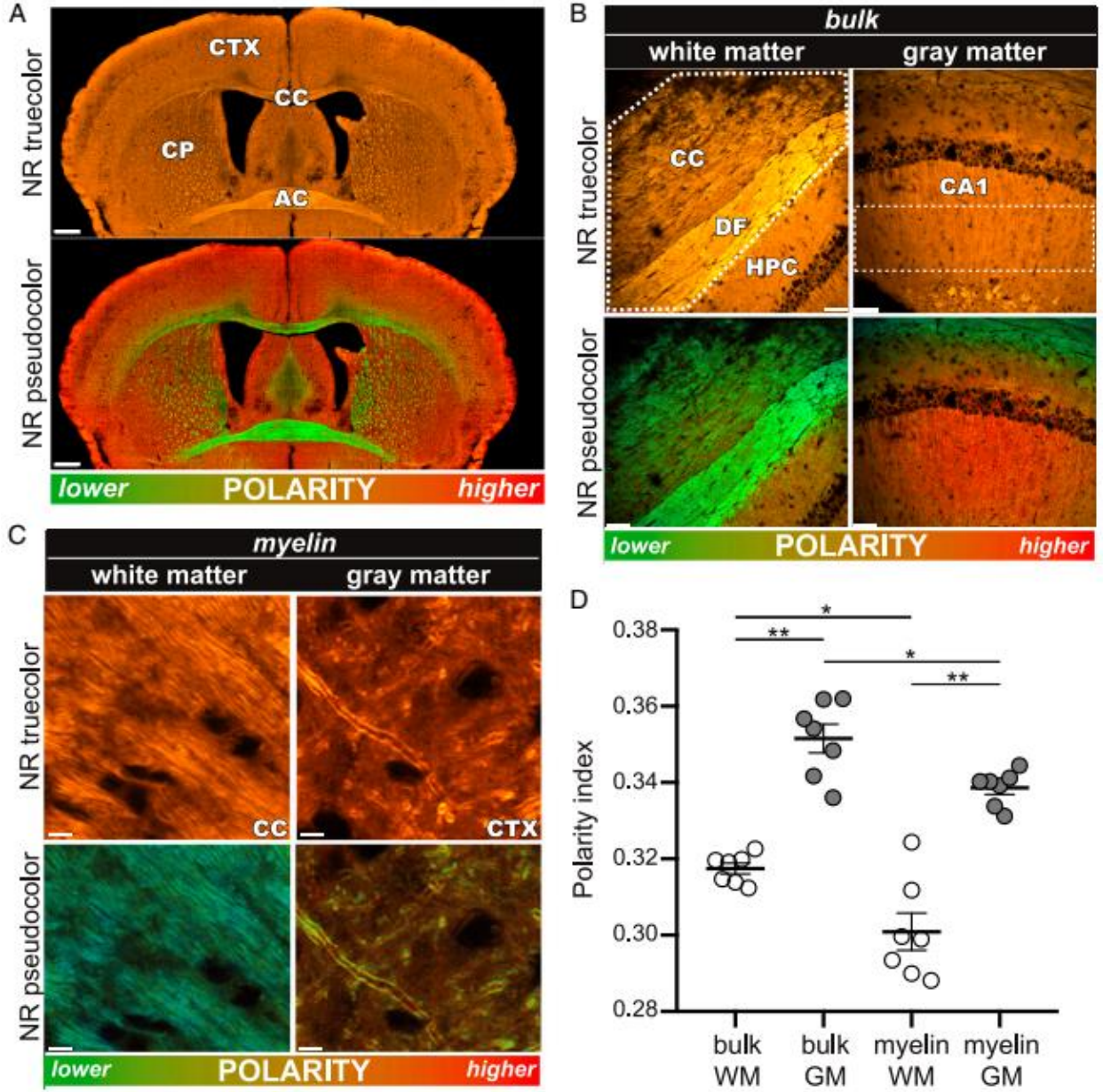



Fig. 2. NR fluorescence spectroscopy illuminates the physicochemical state of healthy rodent myelin in white versus gray matter

CC，胼胝体； CP，尾壳核； CTX，皮层； DF，背穹隆； HPC，海马体； CA1，海马的放射层区域。

# Results and discussion

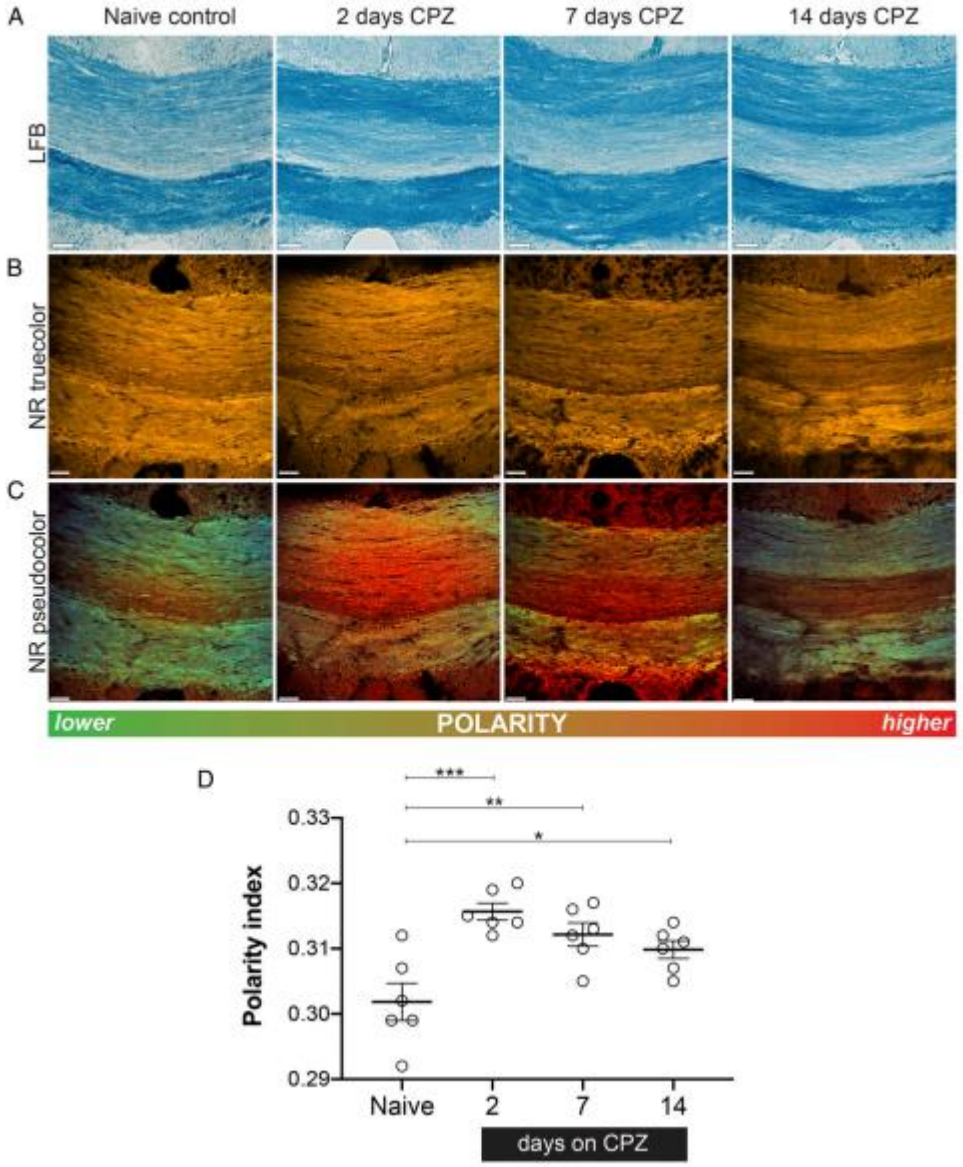



Fig. 3. Early myelin changes revealed by NR spectroscopy precede overt demyelination in the CPZ mouse model.

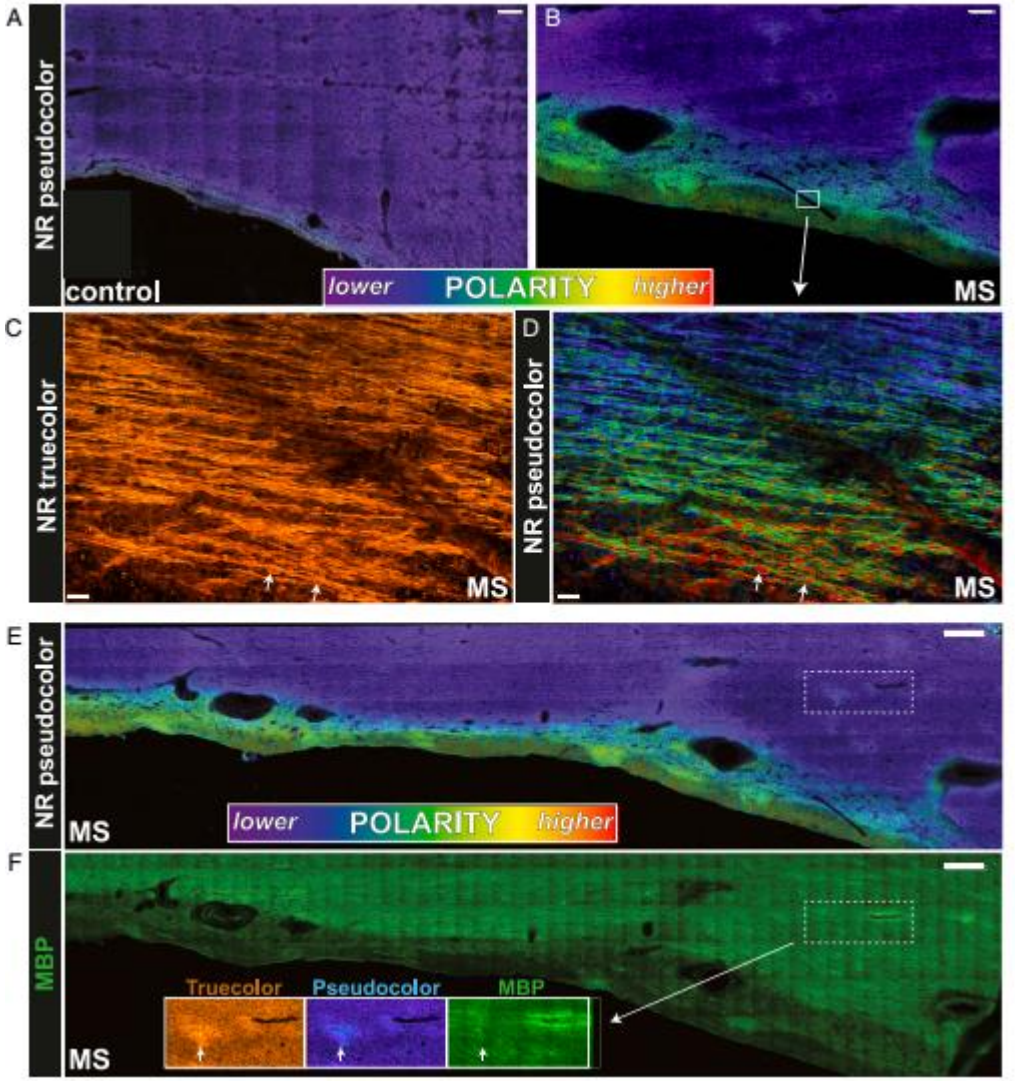



Fig. 4. Myelin in NAWM from human MS autopsied tissue exhibited significant spectroscopic changes.

# Results and discussion

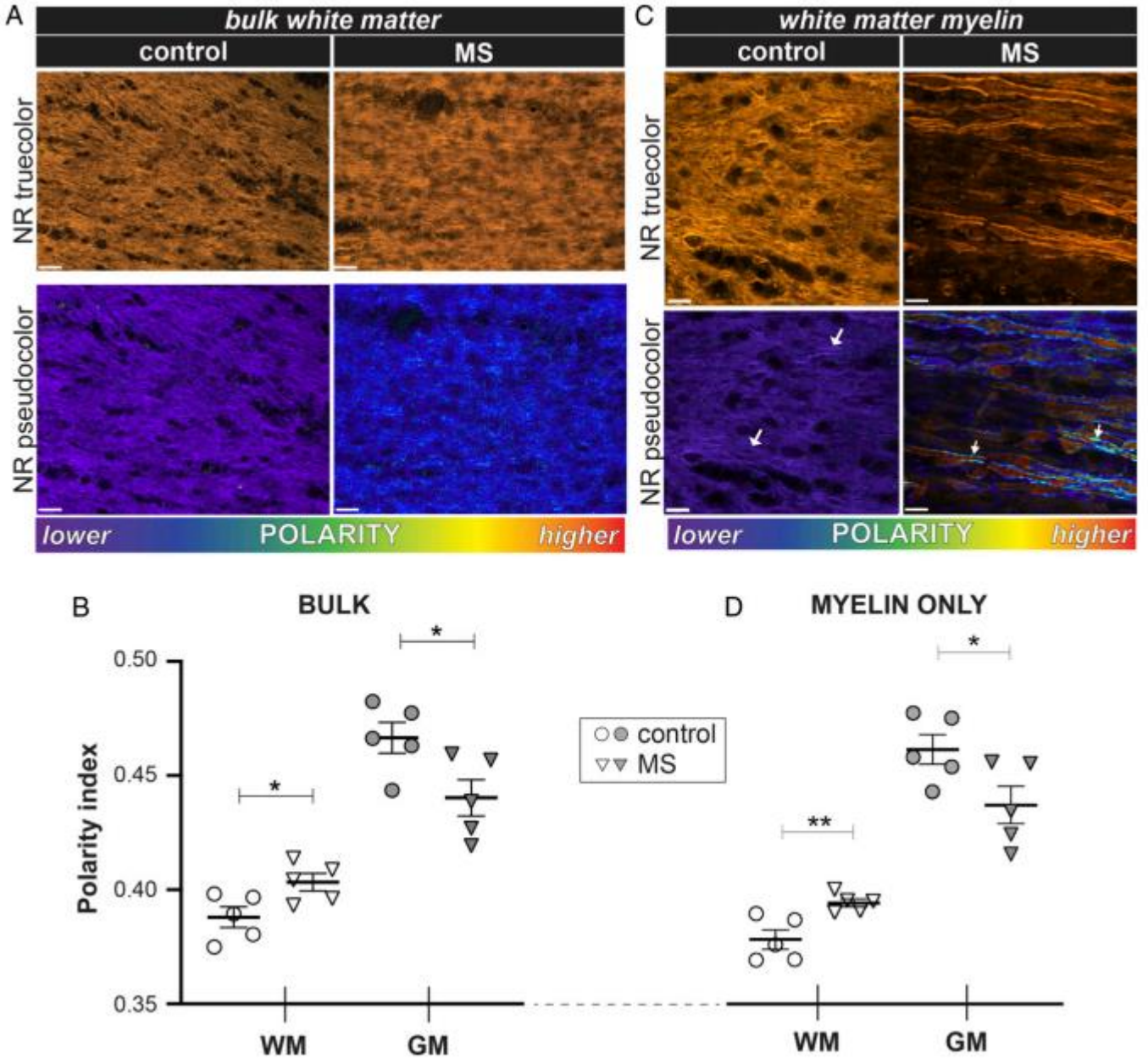
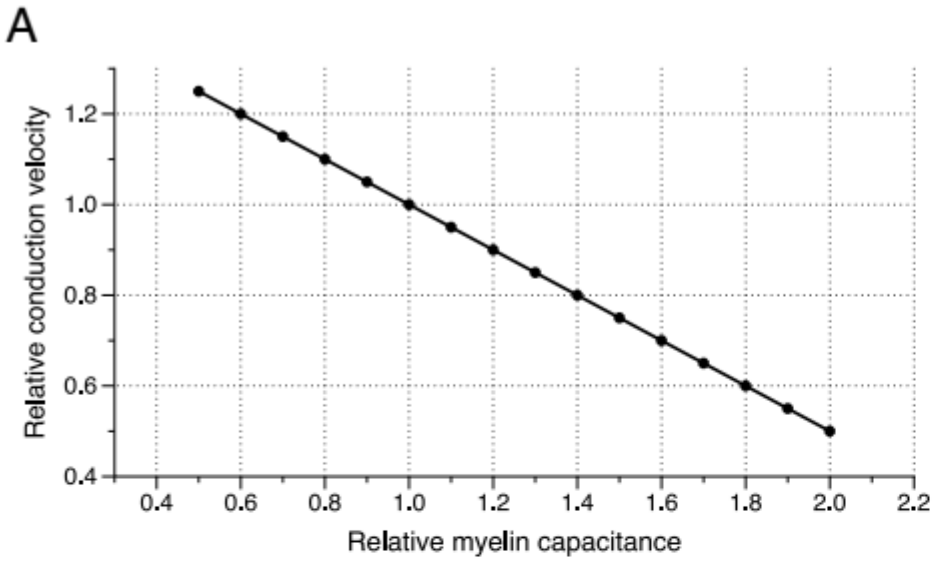
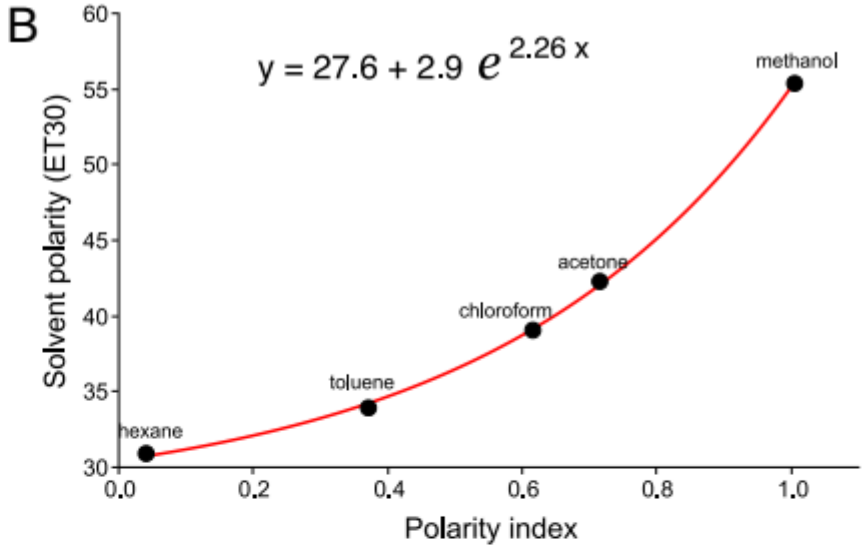
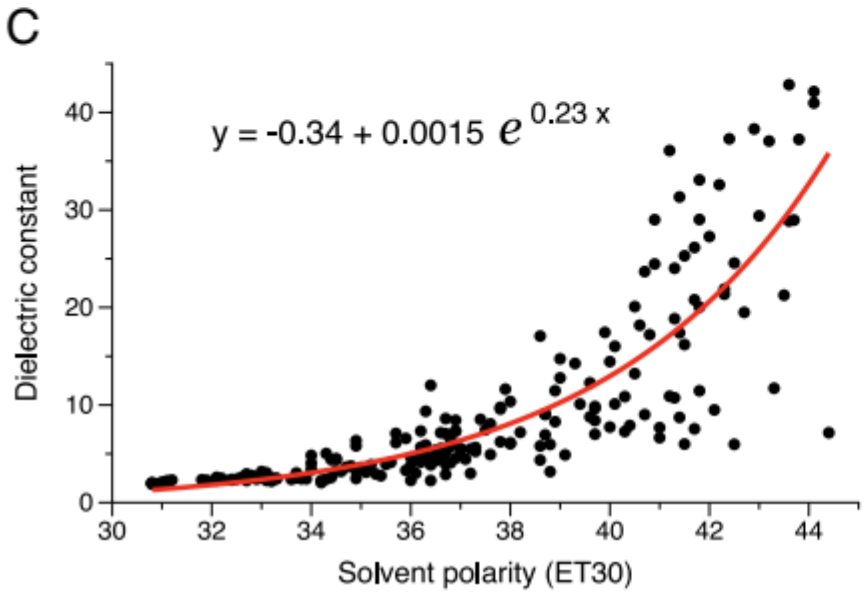


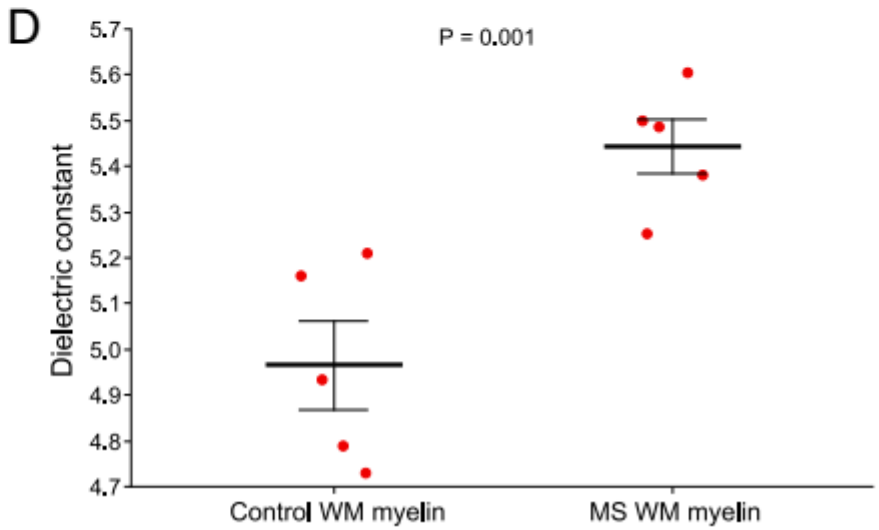

Fig. 5. Myelin in MS is diffusely abnormal in both normal-appearing white and gray matter.

# Results and discussion



# Results and discussion

E

$$C = \frac{K\,\varepsilon_0\,A}{d}$$

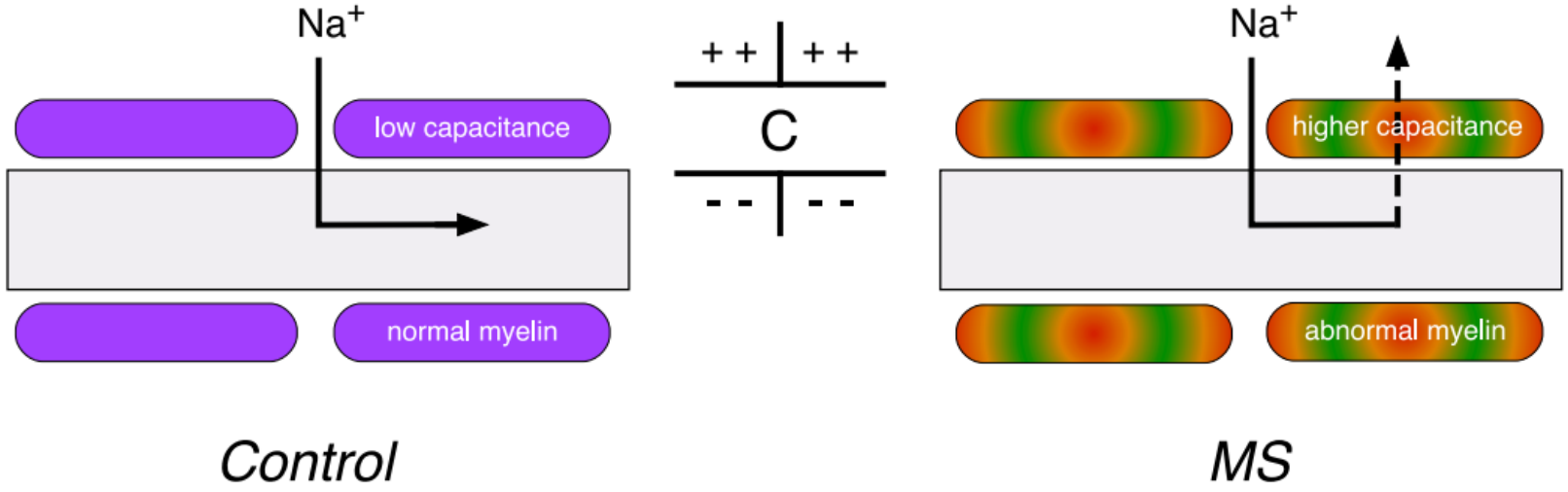



Fig. 6. Effects of altered myelin capacitance on axonal conduction velocity: theoretical calculations.

**Thank you!**