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Lipid and protein composition as driving force for multiple sclerosis ROY BECK, RONA SHAHARABANI, Tel Aviv University — Physical models and experiments often reduce the number of components aiming to address the fundamental mechanisms. Nevertheless, the inherent heterogeneity is an essential ingredient in the biological context. We present our recent efforts to model and understand the development of multiple sclerosis (MS) from a biophysical perspective. Myelin sheath is a multilamellar complex of various lipids and proteins that surround axons and acts as an insulating layer for proper nerve conduction. In MS the myelin structure is disrupted impairing its function. Previous studies showed that MS is correlated with small lipid composition variation and reduction in the adhesive myelin basic protein. We found that such alterations result in pathological phase transition from a lamellar to inverted hexagonal that involve enhanced local curvature .[1] Similar curvatures are also found in vivo in diseased myelin sheaths. Since the etiology and recovery pathways of MS are currently unclear, these findings delineate novel functional roles to dominant constituents in cytoplasmic myelin sheaths, shed new light on mechanisms disrupting lipid-protein complexes, and suggest new courses for diagnosis and treatment for MS.

[1]Shaharabani et al., **J. Am. Chem. Soc.** 138, 12159 (2016)

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