



Nanoscale Lipid Methylprednisolone Conjugates: Synthesis, Characterization, and Therapeutic Efficacy in Retinal Pigment Epithelial Cells Inflammation

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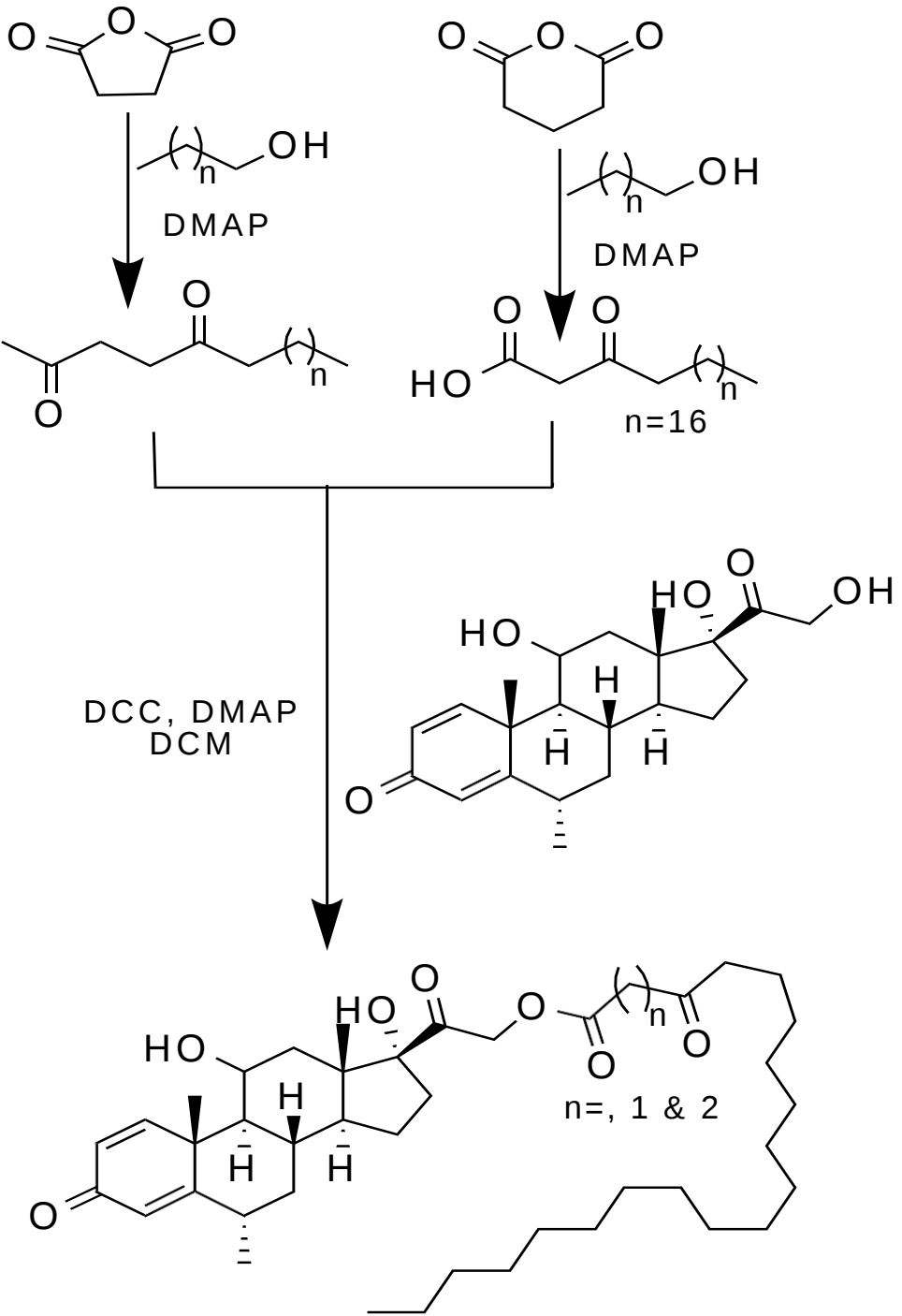
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Introduction

The study evaluates new nanoscale lipid-methylprednisolone conjugates (NLMCs 1-2) designed to precisely modulate inflammation and pain-related gene expression in RPE cells. The synthesized spherical nanoparticles demonstrated optimal physical size, high drug entrapment efficiency, a prolonged release profile, and safe, concentration-dependent cellular uptake. *In-vitro* testing confirmed that the NLMCs significantly suppressed pro-inflammatory genes and pain markers while successfully upregulating anti-inflammatory responses.

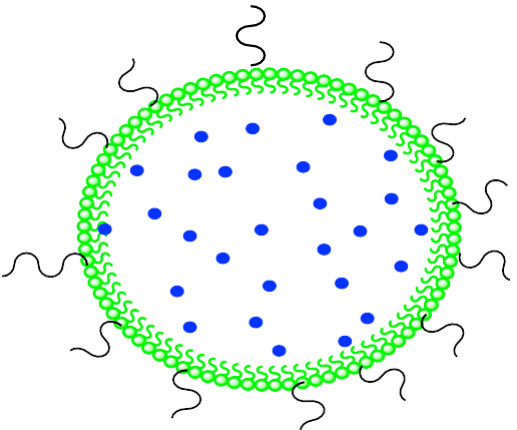
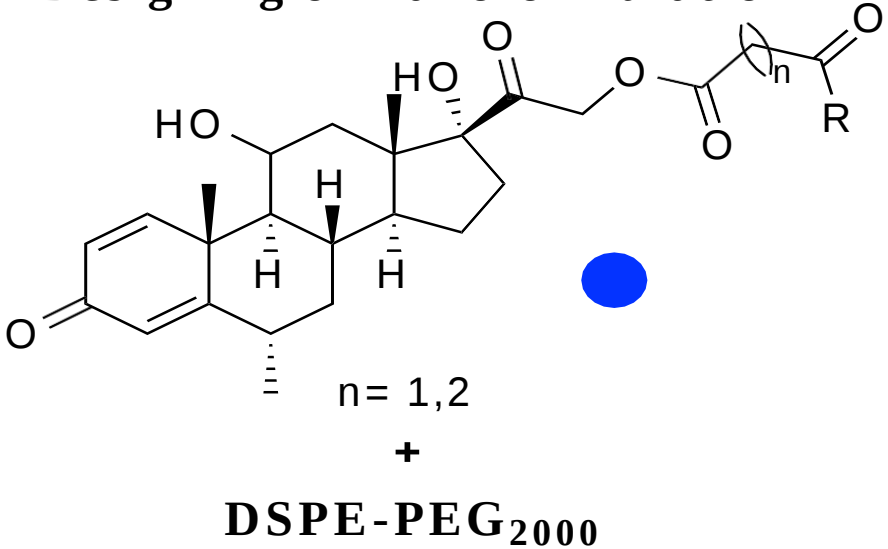
Synthesis of NLMCs



Objectives

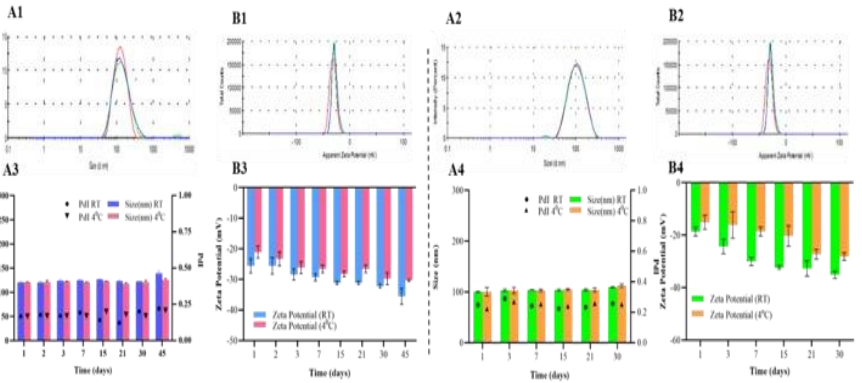
To evaluate new nanoscale lipid-methylprednisolone conjugates (NLMCs) for their ability to precisely deliver methylprednisolone to RPE cells
To synthesize, structurally analyze, and test these nanoformulations for their physical quality attributes, safety (toxicity), and biological efficacy
To precisely modulate inflammation and pain-related gene expression within those targeted RPE cells

Designing of Nanoformulation

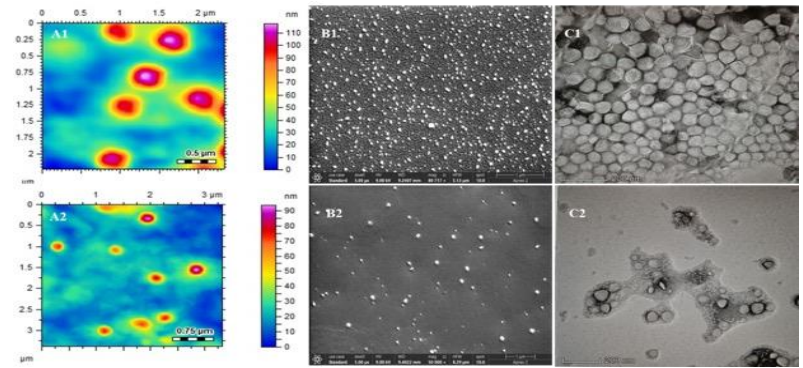


NLMCs (1-2)

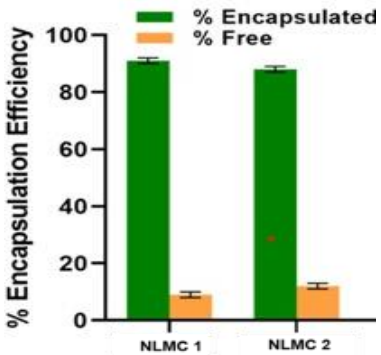
Physicochemical Characterisation



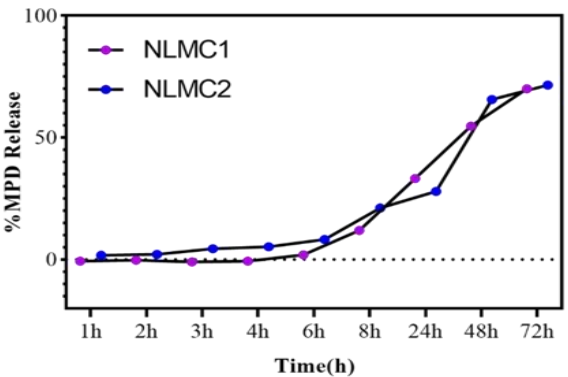
Size, PdI and ZP of NPs



AFM, SEM & TEM Micrographs

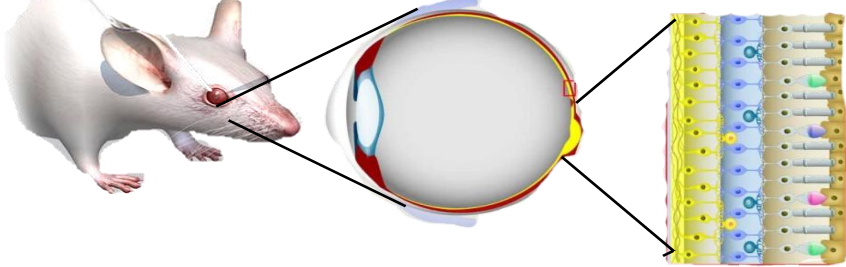


Entrapment Efficiency (% EE)



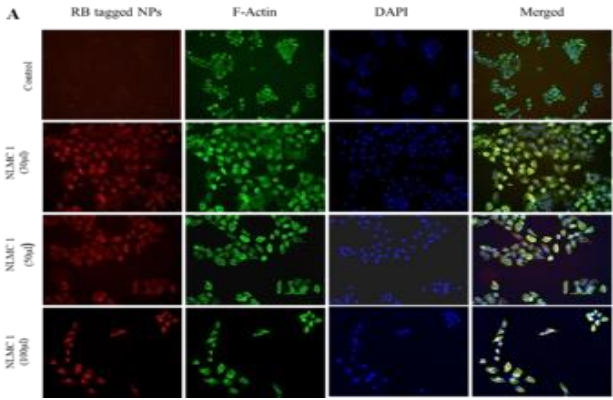
In-Vitro release studies

Biological Evaluation



RPE Cells

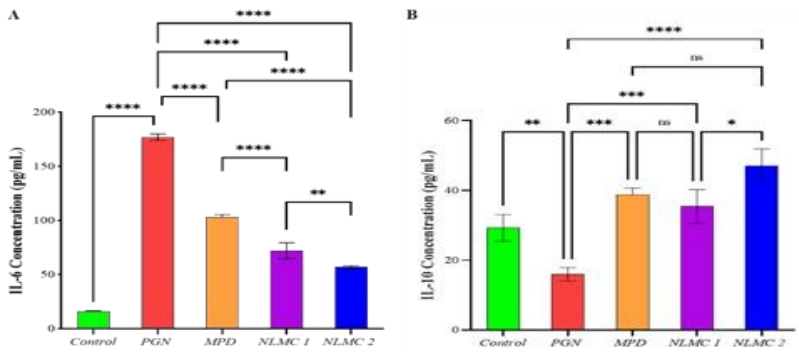
Isolation of RPE Cell Lines



Cellular Uptake Studies

- ↓ **Pain Marker** (CxC12, PDYN)
- ↓ **Anti Inflammatory** (IL-10, IL-4)
- ↑ **ProInflammatory** IL6, IL-8, IL-17

Gene Expression Analysis



Protein Expression Analysis