

Abstract Submitted
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Molecular Transport Studies Through Unsupported Lipid Membranes WILLIAM ROCK, SAPUN PAREKH, MISCHA BONN, Max Planck Institute for Polymer Research — Dendrimers, spherical polymeric nanoparticles made from branched monomers around a central core, show great promise as drug delivery vehicles. Dendrimer size, core contents, and surface functionality can be synthetically tuned, providing unprecedented versatility. Polyamidoamine (PAMAM) dendrimers have been shown to enter cells; however, questions remain about their biophysical interactions with the cell membrane, specifically about the presence and size of transient pores. We monitor dendrimer-lipid bilayer interactions using unsupported black lipid membranes (BLMs) as model cell membranes. Custom bilayer slides contain two vertically stacked aqueous chambers separated by a 25 μm Teflon sheet with a 120 μm aperture where the bilayer is formed. We vary the composition of model membranes (cholesterol content and lipid phase) to create biomimetic systems and study the interaction of PAMAM G6 and G3 dendrimers with these bilayers. Dendrimers, dextran cargo, and bilayers are monitored and quantified using time-lapse fluorescence imaging. Electrical capacitance measurements are simultaneously recorded to determine if the membrane is porous, and the pore size is deduced by monitoring transport of fluorescent dextrans of increasing molecular weight. These experiments shed light on the importance of cholesterol content and lipid phase on the interaction of dendrimer nanoparticles with membranes.

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