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Study of the Interaction of Dendritic Nanoparticles with Liposomes

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Dendritic nanoparticles (DNP) are nano-sized hyperbranched structures suitable for further functionalization in targeted drug delivery. We studied interactions between DNP and a simple model of cell membranes - liposomes (LS). In phosphate buffer dissolved LS were composed either from pure DMPC lipid, with neutral total surface charge, or LS were composed of a mixture of lipids DMPC:DMPG:Cholesterol , which carried a negative surface charge. We used a 1st and a 2nd generation DNP in concentrations range from 0.1 μM to 50 μM with the pH 7.4 at temperatures of 25°C and 37°C. We found that DNP interacted with negatively charged LS more markedly and increased their size with rising concentration of DNP, from 250 nm to several μm and zeta potential, which increased from approximately -40 mV up to -4 mV. The LS size varied at the higher concentrations of DNP suggesting proaggregation propensity of LS after interactions with DNP. This proaggregation behaviour supports our previous results with whole human blood, where we found clumps of platelets after adding DNP. We assume the LS aggregates were created due to the electrostatic interactions of negatively charged cell membranes with positively charged DNP.

Compounds were kindly provided by Prof. Majoral. Funded by the EU NextGenerationEU through the Recovery and Resilience Plan for Slovakia under the project No. 09I03-03-V04-00375.