

# 3<sup>rd</sup> International Conference and Expo on Pharmaceutics & Novel Drug Delivery Systems

April 11, 2024

Webinar

G. Dicle Kalaycioglu, J Pharm Drug Deliv Res 2024, Volume 13

## Simple-by-Design Phosphatidylglycerol/Docosahexaenoic Acid Monoglyceride Nano-Self-Assemblies

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**Background:** In addition to liposomes, micelles, and solid lipid nanoparticles, there is a growing interest in the development of drug nanocarriers based on lyotropic non-lamellar liquid crystalline (LLC) nanoparticles (including cubosomes and hexosomes)[1]. These nanoparticles with unique internal architectural repertoires are attractive for encapsulating hydrophilic, amphiphilic, and poorly water-soluble drugs. In this contribution, we aim at introducing structurally tunable and pH-sensitive nano-self-assemblies (including cubosomes, Figure 1) from binary mixtures of phosphatidylglycerol (DOPG) and docosahexaenoic acid (MAG-DHA). The latter is a new amphiphilic and biocompatible lipid with health-promoting effects and potential therapeutic uses in various disorders (including cancer and cardiovascular diseases). It tends to display an inverse hexagonal (H2) phase on exposure to excess water. Here, we show that its partial replacement with DOPG can be utilized to produce stabilizer-free and apolar solvent modifier-free liquid crystalline nano-self-assemblies. We also report on the biophysical characterization of these nanoparticles through use of nanoparticle tracking analysis (NTA), synchrotron small-angle X-ray scattering (SAXS), and cryo-transmission electron microscopy (cryo-TEM). In addition to the pH-responsivity, we describe the structural transformations and alterations in size and morphological features of DOPG/MAG-DHA nano-self-assemblies on varying lipid composition and increasing temperature. Considering the health-promoting effects of MAG-DHA and its potential therapeutic uses in various disorders, DOPG/MAG-DHA lamellar and non-lamellar liquid crystalline nanoparticles are attractive for use in the development of multifunctional nanocarriers for combinatorial delivery of drugs (or nucleic acids) and DHA

**Acknowledgment:** Financial support to G. D. Kalaycioglu by the Scientific and Technological Research Council of Turkey (TÜBİTAK) BİDEB-2219 International Postdoctoral Research Fellowship Pro-gram (Project No: 1059B192203132) is gratefully acknowledged. A. Yaghmur further acknowledges financial support by the Danish Council for Independent Research | Technology and Production Sciences (references DFF-7017-00065 and DFF-3105-00039B).

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## Biography

Asst.Prof.Dr. G. Dicle Kalaycioglu has started her academic career in Chemical Engineering Department, Hacettepe University. The compilation of the results of MSc studies led to publications in prestigious international journals, addressing the surface properties influencing the cellular-uptake performance for nanomedical applications, and received 'Best Poster Award' at the 10th National Chemical Engineering Congress. In her PhD thesis, she conducted a study on SLNs and the production of colloidal-microcapsules prepared via layer-by-layer technique, each layer utilized SLNs and AuNPs. The outcomes were published in two articles (Kalaycioglu and Aydogan, 2016; Kalaycioglu and Aydogan, 2020), one of them selected as the 'cover-article' for a high-impact journal in the field of colloid materials and interface science. Currently, she is doing her postdoctoral studies in Department of Pharmacy, University of Copenhagen, under the supervision of Dr. Anan Yaghmur on developing and characterization of lyotropic nonlamellar liquid crystalline nanoparticles to use as multifunctional drug-delivery nanocarriers..

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**Received:** February 21, 2024; **Accepted:** February 22, 2024; **Published:** April 11, 2024

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