The treatment of cancer and other autoimmune diseases requires the delivery and accumulation of drugs in specific cells within the body; current treatments are often ineffective in this regard. Lipid nanoparticles (LNPs) provide an effective delivery solution: they are a stable, protective vehicle that can encapsulate a variety of therapeutic agents, retain their cargo while in the bloodstream, and deliver this cargo preferentially to tumors and sites of inflammation. This reduces dangerous side effects and improves treatment efficiency. The primary components of LNPs are cholesterol and phospholipids. One phospholipid, distearoyl-phosphatidylcholine (DSPC), has been extensively used as the main phospholipid component, as it was found to create homogenous nanoparticles that can stably retain drugs. LNPs that contain other phospholipids with differing carbon chain lengths and degrees of unsaturation have yet to be tested and are the focus of this study. Lipid formulations were created by rapid mixing of cholesterol and different phospholipids in ethanol and phosphate-buffered saline. Formulations were dialyzed, filtered, concentrated and analyzed for particle size. To assess uptake of these LNPs into cells, three different cell lines were treated and analyzed by high-content analysis using the Cellomics. LNPs formulated with dimyristoyl-phosphatidylcholine (DMPC) and dipalmitoyl-phosphatidylcholine (DPPC) showed enhanced delivery to macrophage cells, suggesting that phospholipids with shorter hydrocarbon chain lengths are more effective. However, our preliminary investigation also suggests that particle size may contribute more to enhancing cellular uptake than phospholipid composition. This has implications for the design of efficacious LNPs for cancer and autoimmune disease treatment.

Themes:

Check (highlight) the most applicable theme according to the abstract.

| Innovation and Technology | Health and Wellness | Culture and Society | Sustainability and Conservation |

Comments:

Please describe the method of the study more thoroughly including limitations. Please articulate the implications of your conclusion if possible.