Chemical Biology Seminar

"Perfluorocarbon nanomaterials as theranostic delivery vehicles"

Abstract: Perfluorocarbon nanoemulsions, droplets of fluorous solvent stabilized by a polymeric amphiphile dispersed in water, are an intriguing platform for drug delivery. The fluorous phase is biocompatible, has a high dissolved oxygen content, and is both lipophobic and hydrophobic, preventing the leaching of payloads. Here, we describe the use of perfluorocarbon nanoemulsions as a drug delivery platform in which the payload can be easily modified. First, we utilize the high oxygen solubility of perfluorocarbons to perform photodynamic therapy, a treatment modality that requires oxygen, photosensitizer, and light to produce cytotoxic reactive oxygen species. Next, we deliver pDNA solubilized by noncovalent fluorous tags, resulting in the transfection of cells. Lastly, a panel of polymeric amphiphiles were studied to determine design properties such as size, stability, payload release, cellular uptake and protein corona. With these design principles PFC nanoemulsions can be tailored to a desired application.

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