GLYCOSILATED LIPOSOMES FOR TARGETING BACTERIA

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Keywords: Bacteria, Bacterial Biofilm, Liposomes, Targeting

In modern days biofilm associated bacterial infections are one of the most relevant health problems due to their ability to develop a high antibiotic resistance. In fact, in biofilm bacterial cells are embedded in a complex polymeric matrix that, on the one hand protects the cells from external agents and, on the other, confers to bacteria new powerful tools to survive, such as the ability to produce extracellular enzymes capable of degrading antibiotics and the skill to communicate among them by "Quorum Sensing", a system of stimuli and responses correlated to bacterial proliferation that exploits specific signal molecules [1,2].
Several molecules, such as ferulic acid, gallic acid, arbutin and resveratrol have been shown to inhibit Quorum Sensing in *in vitro* studies [3] but an optimal formulation for their targeted delivery in living organisms has not been developed yet.
We have designed and synthesized cationic glycosylated amphiphiles to develop glycosylated liposomes for the encapsulation of resveratrol (RSV) (figure 1), a well-known antioxidant, that is a promising Quorum Sensing inhibitor. Sugar moieties (glucose, mannose, galactose) should target bacterial surface, in particular lectins, specific proteins that bear binding sites for specific monosaccharides, or sugar receptors or transporters. (figure 2)
We prepared mixed liposomes, formulated with a natural phospholipid (1,2-dioleoyl-*sn*-glycero-3-phosphocholine, DOPC, or 1,2-dipalmitoyl-*sn*-glycero-3-phosphocholine, DPPC), a cationic glycosylated amphiphile (Figure 3) and cholesterol. The new liposomes were characterized in terms of size, polydispersity, and stability over time. The entrapment efficiency (EE) of RSV was determined by HPLC, Resveratrol chemical stability inside the liposome bilayer was evaluated by measuring the antioxidant activity of liposomal formulations using a protocol involving ABTS [4]; the influence of RSV on the organization of the lipid bilayer was investigated by DSC analysis.
Finally, the therapeutic efficiency of some formulations was evaluated on two *Staphylococcus epidermidis* cell lines.

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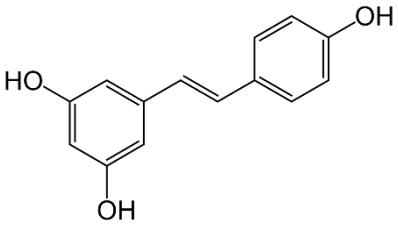

Figure 1. Resveratrol

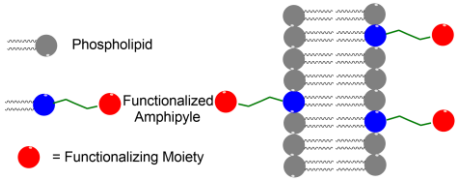

Figure 2 Functionalized double layer

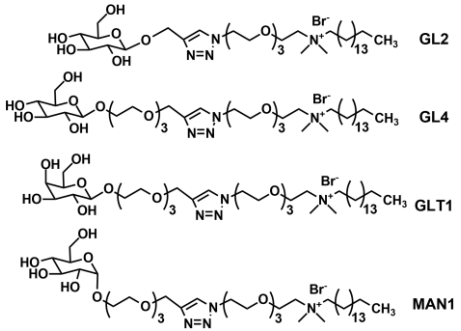

Figure 3. Synthesized cationic glycosylated amphiphiles