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| **Title** | **Targeting of mRNA delivery systems** |
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**Project description:**

First, we aim to prepare different targeted and non-targeted carriers for genetic material based on the technology of liposomes and solid lipid nanoparticles (SLNPs). Cationic liposomes can be composed of a single double layer (unilamellar liposomes) or some concentric double layers (multilamellar liposomes) and together with SLNPs represent the most widely studied group of non-viral vectors. The cationic charge is obtained by using the desired amount of cationic lipids or phospholipids. The team is already studying stealth and targeted liposomes for drug delivery and is also investigating new liposomes for gene delivery. To widen the applicability of RNA as drugs, beyond vaccination, it is necessary to achieve selective targeting to specific cell populations. This aim can be reached by modifying the surface of the delivery system with proper targeting moieties, an approach that can be applied to several delivery systems and it is already widely investigated with other delivery systems, like those carrying anticancer drugs. mAbs or their derivatives are the most promising targeting agents owing to their great affinity for the targets, thus helping a precision delivery of the RNA cargo. It is particularly relevant how such mAbs/derivatives are coupled on the surface of the delivery system to achieve an optimal orientation and exposure on the surface of the delivery systems. In this regard, we have developed a stable surface functionalization of liposomes [1, 2] and now we can couple oriented Fab’ moieties through a polyethylene glycol linker bearing a strong hydrophobic anchor for the interaction with the liposome surface [3]. Nevertheless, we have in hands different chemical and enzymatic techniques for protein/mAb modification that are suitable for the generation of derivatives that can then be used for surface functionalization of RNA-delivery systems [4-5].

**References:**

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**Hosting group(s) for the period abroad (**tentative list, may change):

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• Prof. R. Satchi-Fainaro, Sackler School of Medicine, Tel Aviv University (IL)

• Prof Silvia Muro, Institute for Biosciences and Biotechnology Research (E).