Fondazione Don Carlo Gnocchi Onlus

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LABION LABORATORY OF NANOMEDICINE AND CLINICAL BIOPHOTONICS

Biophotonics Platforms for the characterization of functionalized nanoliposomes

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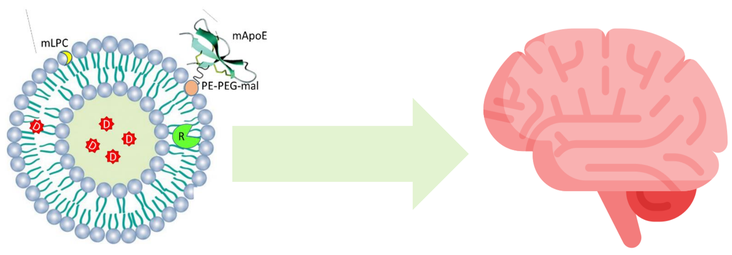
INTRODUCTION

The particular anatomical feature of **blood brain barrier (BBB)** prevents the passage of drugs for the treatment of brain disorders.

To overcame this limitation we use **nanoliposomes (LPs)** functionalized with a sequence of apolipoprotein E (mApoE) to deliver the drug to the brain.



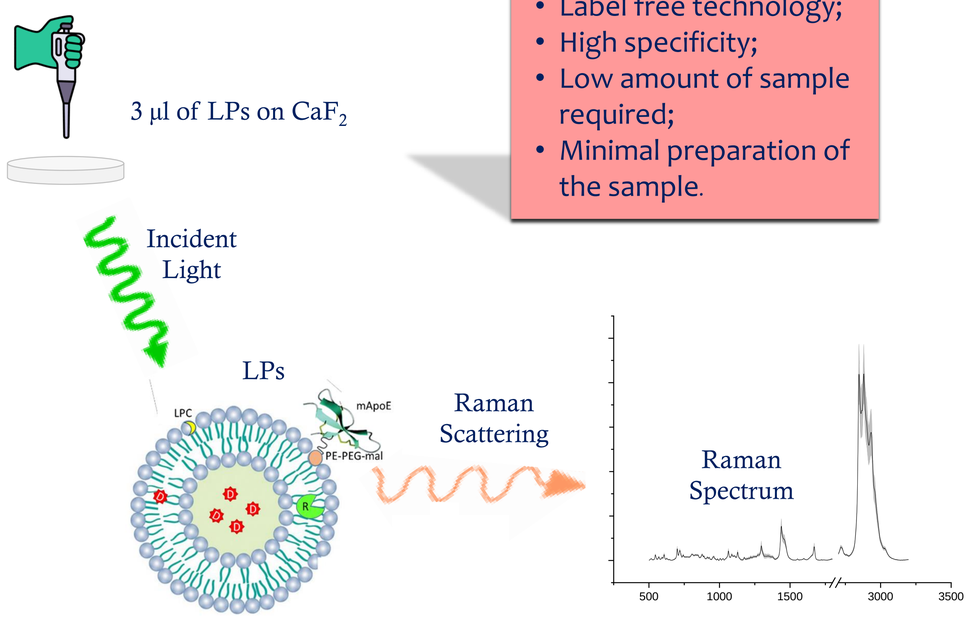
AIMS

- Quality control and reproducibility in LPs synthesis through **Raman spectroscopy (RS)**.
- Binding affinity between LPs and receptors using **Surface Plasmon Resonance imaging (SPRi)**.

METHODS

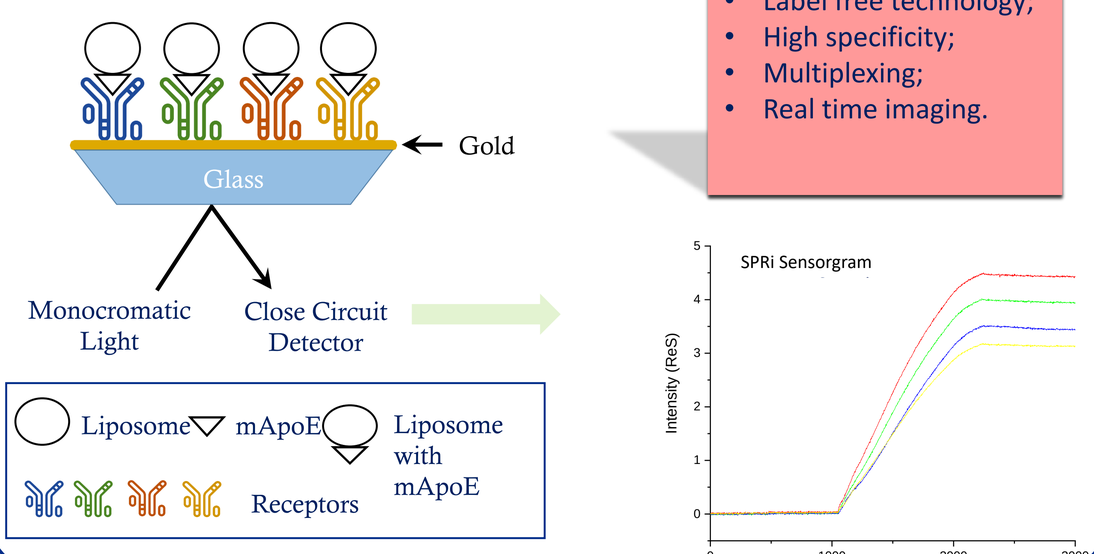
1.Raman Spectroscopy (RS)

WHY RAMAN?
- Label free technology;
- High specificity;
- Low amount of sample required;
- Minimal preparation of the sample.



2. Surface Plasmon Resonance imaging (SPRi)

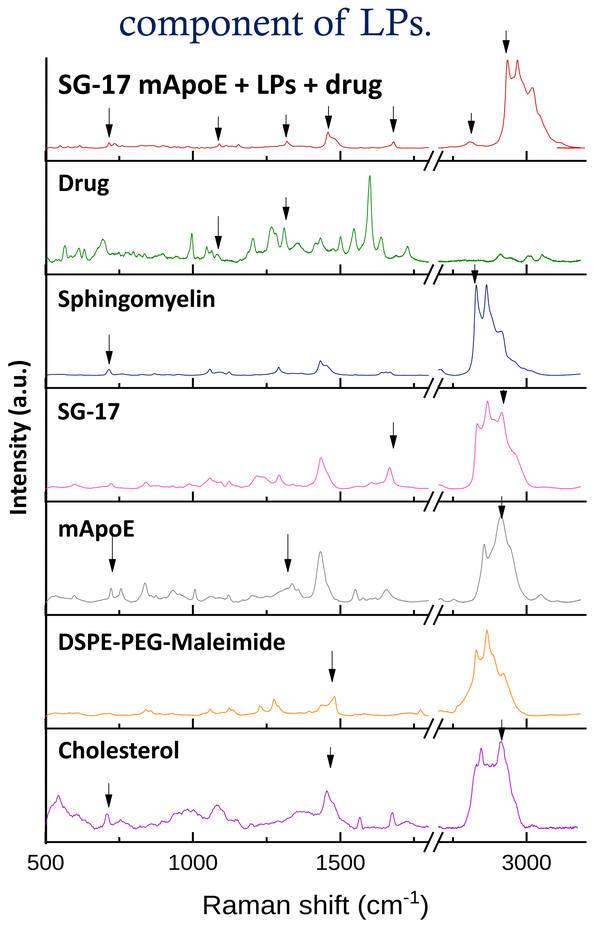
WHY SPRi?
- Label free technology;
- High specificity;
- Multiplexing;
- Real time imaging.



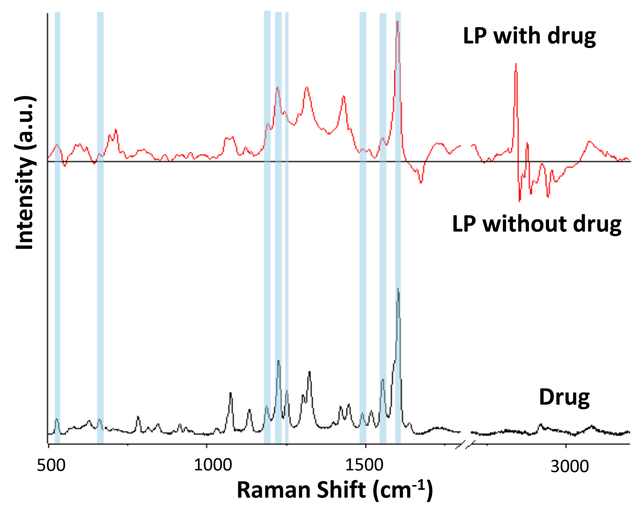
RESULTS

1. Raman analysis of nanoliposomes

RS is able to visualize each component of LPs.

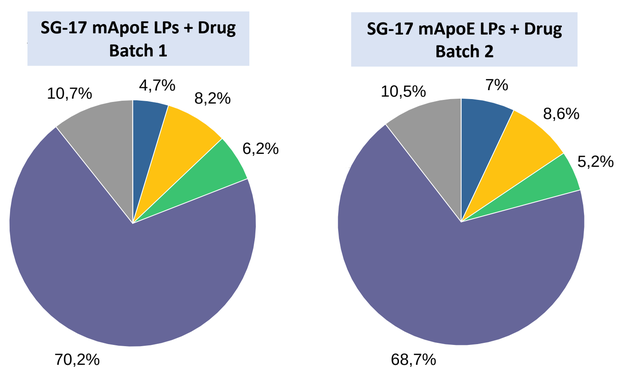


SUBCTRACTION SPECTRUM



In the subtraction spectrum we can identify identify the characteristic peaks of the pure drug.

CLS FITTING



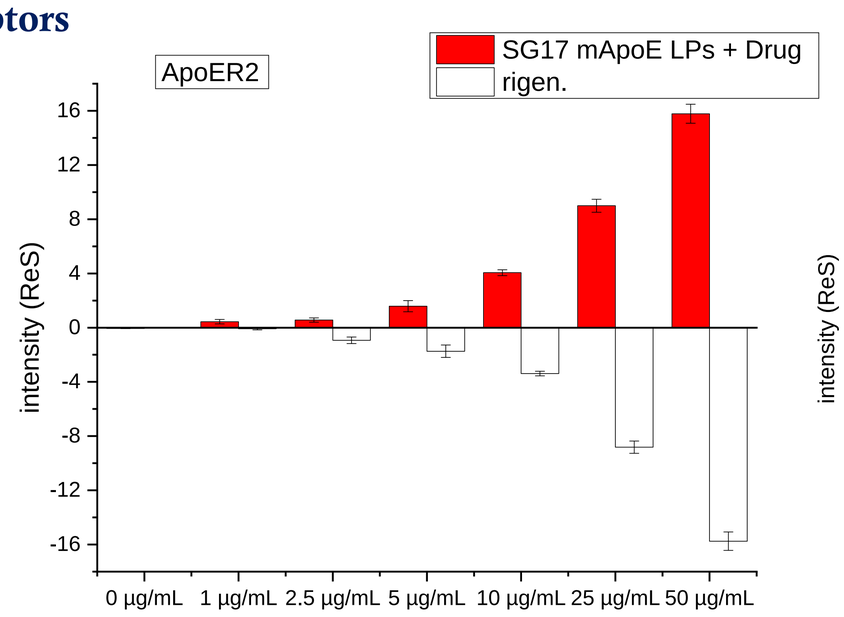
This analysis shows that there are no significant differences between the component percentages of different batches

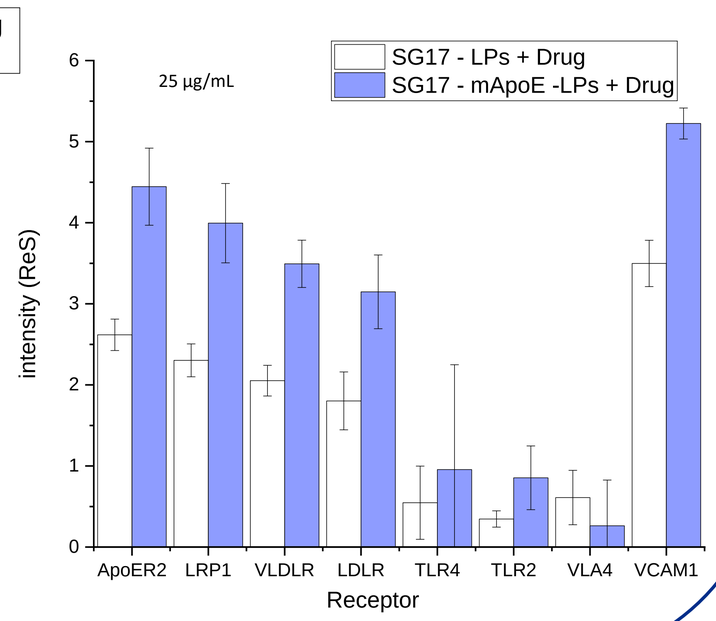
drug, SG-17, mApoE, Cholesterol, Sphingomielin, Maleimide

2. Binding affinity comparison with different receptors

- We optimize the gold chip regeneration procedures.
- The SPRi results confirm a LP concentration-dependent signal on mApoE specific receptors.
- The presence of mApoE in the LP formulation is responsible for a greater bond on some specific mApoE receptors.

rigeneration	SDS (%)	solvent
1 µg/mL	0.1	H_2O
2.5 µg/mL	0.25	H_2O
5 µg/mL	0.5	H_2O
10 µg/mL	0.5	H_2O
25 µg/mL	0.5	NaOH
50 µg/mL	0.5	NaOH





CONCLUSIONS

Our results demonstrate that RS and SPRi techniques can be valid quality control tools for characterization of functionalized liposomes.

Fondazione Regionale per la Ricerca Biomedica

Ministero della Salute

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