



## ENGINEERING EXTRACELLULAR VESICLES. A STUDY OF THE ENDOGENOUS CELL MACHINERY ROUTES AND *IN VITRO* AND *IN VIVO* PERFORMANCES

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**XXXI Cycle**

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### Background

Sara Busatto is a Ph.D. student in Prof. Bergese's Colloidal Clinical Chemistry Laboratory at the University of Brescia in Italy. In 2015, Busatto graduated from the University of Brescia in Italy with a master's degree in medical biotechnology. Her research focuses on exploring the targeting and drug delivery capacity of extracellular vesicles (EVs) *in vitro* and *in vivo*. She has several publications in the field of extracellular vesicles. Her goal is to foster and contribute to the progress of personalized and biocompatible nanomedicine.

(<https://advancingthescience.mayo.edu/2018/04/09/sara-busatto-a-different-kind-of-florida-visitor/>)

### Objectives

The general aim of Busatto PhD project can be summarized in the increasing international effort to exploit EV properties in nanomedicine. Focusing into engineering EVs, studying their biogenesis, their uptake processes by recipient cells and consequently EVs *in vitro* and *in vivo* performances.

### Methodologies

- Studying native EVs *in vitro* cell uptake: understanding extracellular vesicle (EV) internalization mechanisms and pathways in cells.
- Engineering EVs loaded with exogenous plasmid: exploitation of EV as vehicles for exogenous genetic material.
- Engineering EV structure: design of the first EV-made supported lipid bilayer.
- Study of extracellular vesicles (EVs) secreted by breast cancer brain metastases cells as vehicles for brain targeting.

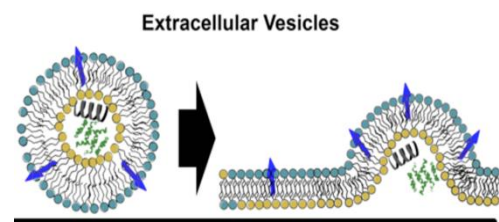


FIGURE 1. FIRST EXTRACELLULAR VESICLE-MADE SUPPORTED LIPID BILAYER.

### Expected Results and Impact

The project is aimed to contribute to the promising and appealing study of EVs. This research field is to date at the seminal level. For this reason, robust and reliable studies about EV diagnostic and therapeutic potential, especially those related to biotechnological and nanomedical applications, are necessary for EV future clinical translation.