New Selenium-based nanocapsules to treat Breast Cancer: NEOSETAC

María-Jesús Sánchez-Martín[a] and Manuel Valiente[a]

[a]Grup de Tècniques de Separació en Química (GTS), Química Analítica, Departament de Química, Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

Background

Breast cancer is the most common cancers in women, it comprises of 10.4% of all the cancer incidences among women, causing 411 093 deaths per year overall the world. The complexity of breast cancer makes it a big challenge for successful treatment. Its treatment is dependent on disease stage, histologic and molecular subtypes and menopausal status. Surgery (mastectomy or breast-conserving surgery with or without lymph node dissection) and radiotherapy play an important role in early breast cancer: systemic therapy may be used for almost all women and is the predominant treatment for those with advanced disease. Targeted treatment of breast cancer remains an important goal for the future, but to date this has been relatively hard to achieve due to the complexity and variability of the disease.

Objectives

The clinical application of Selenium (Se) compounds for cancer treatment is until now limited in chemoprevention as dietary supplement. In NEOSETAC project, funded under H2020-MSCA-RISE-2017 call, GA 778325, an specific Se-cocktail has been designed in order to improve the therapeutic window and pharmacokinetic properties of Se-compounds as anticancer agents.

Methodology

An specific combination of two Se-compounds (Se-cocktail) has been selected. *In vitro* cytotoxicity of Se-compounds in 4T1-luc2 breast cancer cell line has been studied and a concentration study to find IC_{50} performed.

Results

The Se-cocktail showed an improved antitumor potency compared to other Se-compounds alone. The more efficient concentration after 24h of exposition to the compounds has been obtained.

Conclusion

Promising initial data have been obtained. After optimizing the concentration, the Se-cocktail will be loaded into targeted biodegradable nanoparticles, thus, drug release is controlled within the narrow therapeutic window of Se. At the same time, the uptake and activation of Se compounds at desired location (tumor lesions and metastasis) is achieved.