INTRODUCTION

- Cancer is a disease with a high mortality rate which breast cancer is considered the second one.
- There isn’t a single-cure treatment due to the hallmarks of cancer.
- Treatments that are already on market have a lot of side effects causing damage to non-tumoural cells, cellular apoptosis.

New approach: Prodrugs encapsulated in nanoparticles

BREAST CANCER

Common characteristics
- Decrease of the pH release of lactate.
- Higher temperature faster metabolisms.
- EPR effect major permeability Angiogenesis to decrease hypoxia.

Particular characteristics
- BRCA tumor suppressor gene is mutated
- Her2/neu receptor over-expressed

NANOBIOPARTICLES

Definition
- It is a particle between 30 and 200nm in size for medical applications which is used to transport and release a drug.

Objectives
- To improve:
  - Biodistribution
  - Pharmacokinetics

Components
- Liposomes
- PEG
- (Pro)Drug
- Target ligand

Advantages
- Delivery
- Surface
- Loading
- Release
- Specific target
- Transport into bilayers
- No potential
- No aggregation
- Minimize opsinization
- Incorporation method
- Absorption method
- Solubility
- Long-term action

CONCLUSIONS

Prodrugs encapsulated in nanoparticle are good for:
- Target-specific EPR effect in the vessels of tumors surroundings.
- Interaction to Her2/neu of breast cancer cells.
- Activate the prodrug close to the tumor acidic pH.
- Avoid toxic side effects to “normal” cells.
- Encapsulate hydrophobic and hydrophilic (pro)drugs.

To accomplish that, the nanoparticle has to be:
- Liposome covered with PEG to avoid opsinization.
- It can have a big size max. 200 nm EPR effect.
- Ligand of Her2/neu attached to surface of the NP.

PRODRUGS

Definition
- It is the precursor of a drug, administered within an inactive form but through metabolic processes will be converted into the pharmacological molecule.

Bioprecursors
- Their activation is due to oxidation or reduction, among other situations.

Advantages
- Solubility
- Absorption
- Metabolism
- Tissue specific

Molecular mechanism of prodrugs
- They are different type of anticancer prodrugs:
  - Antimetabolite stop synthesis of DNA or blocking mRNA function.
  - Antimitotic Gemcitabine and Capetabine
    - Inhibit the depolymerization of microtubule in cell division
    - Paclitaxel

CONCLUSIONS

Images REFERENCES