ORT_10 - Synthesis and characterization of polymeric nanoparticle aiming breast cancer treatment

Vinícius de Lima Gonçalves[1]; Renata Chagas Bastos[1]; Patrícia Barbosa Jurgilas[1]; Helen Ferraz Conceição[2]; Sotiris Missailidis[1].
[1]Fiocruz/Bio-Manguinhos
[2]Programa de Engenharia Química - PEQ/COPPE/UFRJ

Introduction: Cancer is a health problem that grows in incidence and mortality worldwide. Among cancer types, breast cancer is one of the world's most prevalent over the years, for which many medicines have been developed. Among them, the hydrophilic doxorubicin (DOX) and drugs of the highly hydrophilic pharmaceutical (HHP) class have been under research. Despite the antitumor potential, they have toxicity and selectivity issues, resulting in moderate impacts on patient survival. Nanoparticle (NP) encapsulation can overcome these problems. The so- called nanomedicine is an innovative field with great potential for improving cancer treatment. Polymer NP can protect active pharmaceuticals from degradation, enhance biodistribution and provide controlled release at specific sites of interest. Targeted and controlled delivery involve the functionalization of these nanostructures with groups that enhance site-specific targeting.

Objectives: To prepare a polymeric nanoparticle containing antitumoral drugs for breast cancer treatment.

Methodology: Polymeric NP were synthesized by the solvent displacement method and acetone as the organic solvent. Different kinds of polymers were investigated. The polymer/solvent ratio was varied as well as the type of stabilizers. The mean diameter, polydispersity index (PDI) and zeta potential were measured by Zetasizer Ultra™. The amount of non-encapsulated drug was quantified by reverse phase chromatography.

Results: DOX nanoparticles encapsulated 1.53 mg (encapsulation efficiency 85.5% and loading capacity 15.3%) while HHP-containing nanoparticles were capable of encapsulating 0.95 mg (encapsulation efficiency 35.5% and loading capacity 9.5%). The nanoparticles diameter, PdI and zetapotential for the HHP nanoparticle were measured as: 81.5 nm, 0.24, -0.56 mv. And for the DOX nanoparticle were measured as: 90.5 nm, 0.26, -5.3 mv. The selected polymer has a maleimide group that is important for the future step of functionalization and targeting purpose.

Conclusion: The method used to encapsulate the drugs resulted in particles in the nanoscale and can be a potential tumor targeting.

Keywords: Nanoparticles, breast cancer, solvent displacement