Development of novel PVA-based nanoparticles for delivery system for bone cancer applications

SAMPAIO, V. S. 1, SILVA, G. 1, CHEE, B. S. 3, J. HARRI, 3, REGASINI, L. O. 4, SANTOS, M. B. 1, AYUSSO, G. M. 1, MARQUES, B. C. 5, FACHIN, A. L. 1, MARINS, M. 1, CHAO, Z. 1, NUGENT, M. J. D. 1

1: Materials Research Institute, Athlone Institute of Technology, Athlone, Co. Westmeath, Ireland.
2: Department of Biotechnology, University of Ribeirão Preto, São Paulo, Brazil
3: University of São Paulo, School of Pharmacy, Brazil
4: Department of Chemistry and Environmental Sciences, São Paulo State University, Brazil
5: Federal University of Health Sciences of Porto Alegre, Brazil.

Osteosarcoma is one of the most frequent bone cancers with almost 30% of patients developin metastasis [1,2]. Further study is needed to develop new drugs that avoid metastasis. There is experimental evidence that chalcones, small molecule abundant in plants, have anti-cancer activity. Unfortunately, chalcones often show poor pharmacokinetic profile and lack of specificity, which also happens with the doxorubicin (drug widely used in chemotherapy) [3]. Consequently, our purpose is to produce a drug delivery system based on polyvinyl alcohol (PVA) [4] nanoparticles (DDS-PVA), modified with bisphosphonates (bone tumor-seeking molecule), that can simultaneously deliver doxorubicin and chalcone (D14). We believe this chalcone will enhance the anticancer effects of doxorubicin and that DDS-PVA will improve the stability, bioavailability and specificity of doxorubicin and chalcones against osteosarcoma cells.

Methodology

Evaluation in vivo of the biological activity of PVA nanoparticles containing bisphosphonate and antineoplastic agents

Model of metastasis by tibial injection

Perspective

This drug delivery system could contribute in the future to the development of an optimal strategy for the controlled release of multiple therapeutic agents to be employed in osteosarcoma therapy.

References