Calcium phosphate nanoformulation for cancer treatment

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Abstract
Pancreatic cancer (PC) is a highly drug-resistant tumour, which makes it difficult to treat. In this context, poly-ADP ribose polymerase 1 (PARP1) is a relevant protein in chemoresistance in several types of cancer [1,2]. In this work, the synthesis of calcium phosphate nanoparticles (ACP) [3] encapsulating a PARP1 inhibitor (Olaparib, OLA) together with ascorbic acid (AA) has been performed. The nanoformulations were loaded with 13% OLA and 1% AA (NP-ACP-OLA-AA). Our results showed an interesting antitumour effect on three pancreatic cancer cell lines (PANC-1, Panc02 and MIA PaCa-2), matching or improving the effect of the free OLA. In addition, induction of tumours in immunocompromised SCID-NOD mice from the PANC-1 cell line showed that the mice group treated with NP-ACP-OLA-AA had lower tumour volume and longer survival compared to the free drug. This greater effect *in vitro* and *in vivo* is due to the gradual release of both compounds generated by their nanoencapsulation, protecting them from degradation and maintaining a controlled release of Olaparib for 72 hours. Analysis of *in vivo* samples shows that the NPs are able to efficiently reach tumours, generating an effective pro-apoptotic effect leading to cell death. Therefore, these NP-ACP-OLA-AA are shown to be a possible effective therapy, highly biocompatible and with great biodegradability compared to other alternative ways of administering OLA, producing a high induction of apoptosis and decreasing tumour growth-

References

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Figures

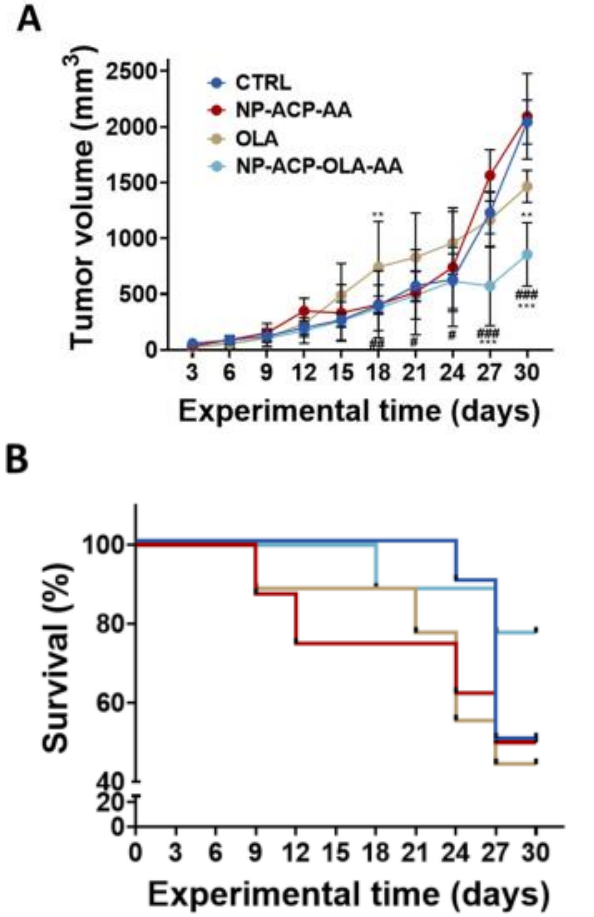

Figure 1. In vivo results in NSG mice with PANC-1 induced tumors. Tumor growth (A) and survival of mice (B) after CTRL, NP-ACP-AA, OLA, and NP-ACP-OLA-AA treatments