Doxorubicin-loaded poly(ε-caprolactone) nanoparticles to improve drug antitumor effect

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Abstract

Nanotechnology has provided new strategies in biomedicine for the treatment of certain pahologies such as cancer by the development of nanoformulations that transport antitumor drugs improving their solubility, specificity, half-life in blood stream and reducign their toxicity [1]. The tumor pathology more common diagnosed and the main cause of death worldwide for this desease is lung cancer [2]. One of the drug used to treat it is Doxorubicin (DOX) alone or in cobination with other drugs. This drug has a good antitumor activity. However, its low specificity for tumor tissues makes it toxic for non-tumor tissues causing severe side effects, especially cardiac toxicity [3].

Our study is based in the development of DOX-loaded poly (ε-caprolactone) (DOX-PCL) nanoparticles (NPs) that were tested in *in vitro* and *in vivo* lung cancer models. For the *in vitro* model we used human and mouse lung cancer cell lines A549 and LL/2. For the *in vivo* model immunocompetent C57BL/6 mice were subcutaneously inoculated with LL/2 cell line. Our results showed no toxicity of blank PCL NPs in general in any cell line thus demonstrating its biosafety and biocompatibility. Otherwise, DOX-PCL NPs increased cell death reducing the half-inhibitory concentration (IC50) compared to free drug up to 56.3% and 63.6% in A549 and LL/2 respectively (Fig. 1). Furthermore, *in vivo* assays demonstrated better antitumor activity (Fig. 2) and survival and also a reduction of cardiac toxicity in mice treated with DOX-PCL NPs. These results suggest that PCL NPs are a safe and efficient nanoformulation to improve the treatment of lung cancer.

References

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Figures

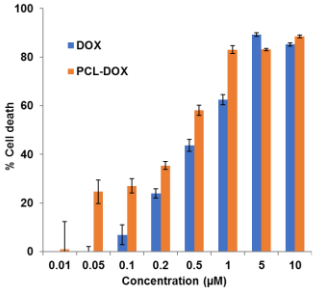

Figure 1: Percentage of A549 cell death.

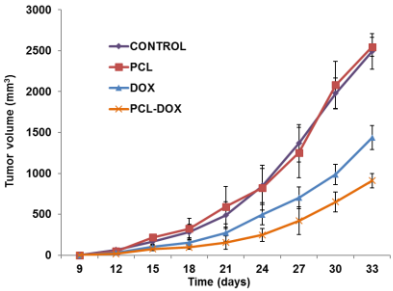

Figure 2: Evolution along time of tumor volume of mice.