

Intelligent design, synthesis and validation of drug delivery systems targeted against breast cancer stem cells

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Abstract

Tumor recurrence, metastatic spread and progressive gain of chemo-resistance of advanced cancers are sustained by the presence of Cancer Stem Cells (CSCs) within the tumor. Targeted therapies with the aim to eradicate these cells are thus highly regarded. However, often the use of new anti-cancer therapies is hampered by pharmacokinetic demands. Drug delivery through nanoparticles has great potential to increase efficacy and reduce toxicity and adverse effects. However, its production has to be based on intelligent design. Likewise, we developed polymeric nanoparticles loaded with ZileutonTM, a potent inhibitor of Cancer Stem Cells (CSCs), which was chosen based on high throughput screening. Its great potential for CSCs treatment was subsequently demonstrated in in vitro and in in vivo CSC fluorescent models. Encapsulated ZileutonTM reduce amount of CSCs within the tumor and effectively block the Circulating Tumor Cells (CTCs) in the blood stream and metastatic spread.