A minimized crotamine-derived peptide (sh-CDP) aiming cargo delivery and theranosis of cancer


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Introduction: Therapeutics and diagnostics agents needs overcome biological barriers reaching their molecular target in appriate concentrations to depict their optimal effects. Crotamine is a highly basic toxin originally described as the main component of the South American rattlesnake venom (Crotalus durissus terrificus) and responsible for the hind limb paralysis and cytotoxicity observed in the envenomation conditions. Crotamine is a cell penetrating peptide endocytosed by high proliferative cells accumulating into the lysosomes and nucleus while demonstrate highly toxicity in vitro and in vivo. In this context, a short crotamine-derivate peptide (sh-CDP) was designed in order to maintain the cell penetrating properties and minimizing cell toxicity.

Objectives: To demonstrate the capacity of sh-CDP to transport cargos to intracellular moiety.

Material and Methods: To determine the half maximal inhibitory concentration (IC$_{50}$) the classical MTT test was performed after sh-CDP treatment. The effect of sh-CDP on cell size and complexity, in cell cycle modulation and on mitochondria potential ($\Delta \Psi m$) was evaluated through cytometry and confocal microscopy. Nuclear and cytoplasmatic morphologic changes were also accessed by fluorescence microscopy.

Results and discussion: The sh-CDP have demonstrated a rapid cell uptake but without however causing considerable cytoxicity. Sh-CDP have no hemolytic potential. In addition, the sh-CDP exhibits a high potential to cargo delivery since sh-CDP was assessed into the cell even in a first five minutes of incubation and getting trapped inside them for more than 24 hours. Last, the peptide have showing a mitochondrial and nuclear co-localization confirming the efficacy of sh-CDP as cell penetrating peptide.

Conclusion: sh-CDP have no cytotoxic effects and displays a great potential to cargo delivery to cells aiming especially the mitochondria nucleus. Thus, sh-CDP stands out as a new outstanding candidate to cargo delivery (drug delivery) into the cells during therapeutics schedule or even as a theranostic agnet in personalized medicine.

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