A novel approach toward mucoadhesive and tumour targeting curcumin nanoparticles for colon cancer treatment.

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Abstract

Colon cancer is a crucial health problem worldwide. The current interventions combining surgery and chemotherapy have only partially addressed the issue of ineffectiveness and recurrence in patients [1]. Traditionally most anticancer drugs are administered intravenously even for remote cases as in colon cancer, where residential presence of the anticancer drug at the colon is an obvious desirability. Thus, encapsulating drug loaded oral formulations that offer cancer-targeting capability are a promising alternative to improving treatment of colon cancer, whereby localised drug concentration is increased and side effects are minimised [2]. Nanoparticles offer a rational choice due to its large surface area to volume ratio, but should withstand the milieu of the upper gut and deliver its cargo at the colon. In this view, we have developed a modified pectin-chitosan-curcumin nanoparticle system (MCPCNPs) (Figure 1) for targeted delivery of curcumin to the colon. The MCPCNPs presented high mucoadhesion propensity in simulated colonic media and minimal at pH 1.2 (stomach). We further enhanced the MCPCNPs by coupling contamumab antibody that target the death receptor (DR5) present on the tumour surface, through a two-step carbodiimide (EDC) approach. The *in vitro* evaluation of the conjugation was examined using some available analytical techniques, while the conjugation efficiency was confirmed via the micro-bicinchoninic acid assay. The *in vitro* cytotoxicity and cellular apoptosis assays of the composite nanoparticle-antibody-curcumin-delivery system are being studied currently. In general, the data obtained so far strongly suggests that the formulated mucoadhesive, targeted curcumin-loaded nanoparticles have the potential to be applied as an orally deliverable colon cancer treatment.

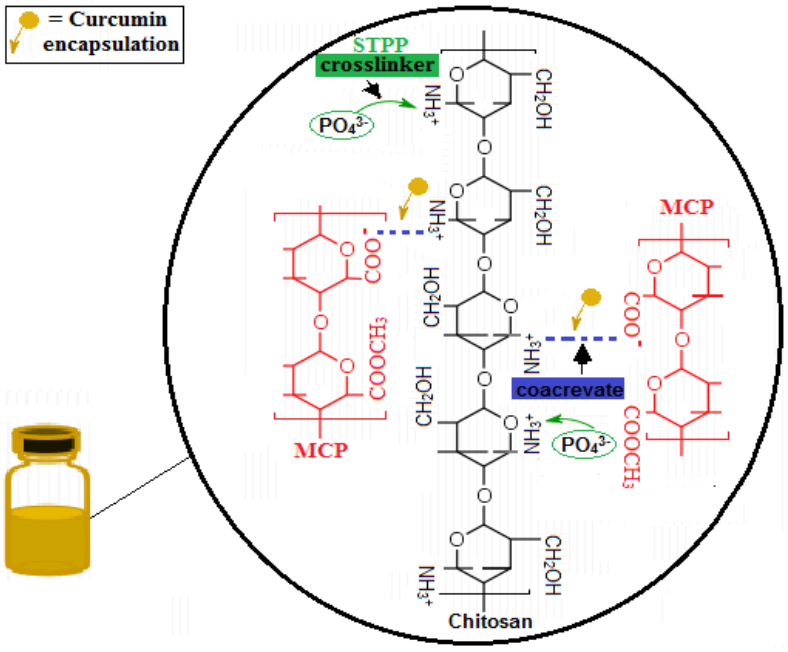


Figure 1. Schematic representation of the modified pectin-chitosan-curcumin nanoparticle system

References

[1] P. Cornelis, K. Miriam, V. Louis, Nature Reviews Clinical Oncology 14 (2017) 235–246.

[2] B. Viswanath B., S. Kim, S., K. Lee, International Journal of Nanomedicine 11 (2016) 2491–2504.