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Novel safe oral nanoformulation for colon cancer therapy

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Oral delivery of drugs and biomacromolecules is the most accepted form of drug intake in terms of patient compliance though it is not an easy task. This is due to the challenges faced in the gut milieu, from varying pH to enzymatic activities and poor absorption; which usually are difficult to overcome. We have recently developed an improvised novel, non toxic and biodegradable nanodrug delivery system to deliver anticancer proteins, peptides and other biomacromolecules via oral (mouth) route. The system was specifically designed i) to protect the proteins and other biomacromolecules not only from digestive enzymes but also from the acid attacks in stomach and ii) to increase the absorption from gut to the blood circulation. By employing the robust cell biossays and oral feeding experiments in human colon cancer xenograft nude mice model, we demonstrate here that these nanocarriers are capable of protecting bovine milk derived iron saturated lactoferrin (Fe-bLf) from the acidic environment in stomach and digestion activities of gut enzymes. These nanocarriers can effectively deliver Fe-bLf to cancer cells at tumour sites, resulting in apoptosis and tumour mass regression in a much aggressive and significant manner than observed with non-nanoformulation of lactoferrin. The developed nanodrug formulation of Fe-bLf selectively induced apoptosis in epithelial colon cancer cells (Caco-2 and HT-29) as well as in cell culture and tumour derived cancer stem cells. The nanoformulation proved nontoxic to normal human cells in bioassays and the oral feeding of nanoformulation proved safe with no toxicity in mice. With the promising results of our study, the future potentials of the NCs loaded Fe-bLf, in chemoprevention and in the treatment of human colon cancer, deserve further investigations for translational research.

Biography

Rupinder K Kanwar has completed her Master's and PhD degrees in the field of Medical Microbiology & Immunology. She has expertise in studying the molecular mechanisms and devising treatments for cancer and human chronic inflammatory diseases. She has delivered both academic and industry-oriented research. Dr Kanwar is a key inventor in more than 20 published and live patents/ applications and has 55 publications including 5 book chapters. She has also actively contributed to biomedical teaching, scientific community, student and research staff supervision, leadership and management activities. She is a reviewer, editorial advisory board member of several international journals and a member of professional societies including Inflammation Research Association. She has several national & international conference presentations, and won awards at conferences.

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