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New generations improved detection via nano microfluidics-based devices and nanodelivery to colon cancer therapy

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We and others have found that survivin, a member of the family of inhibitor of apoptosis proteins that is overexpressed in several human tumours. Lactoferrin is also known to express in inflammatory diseases such as inflammatory bowel disease and Crohn's disease. We assessed the differential expression of survivin, other apoptotic biomarkers and lactoferrin in stool and serum samples of colorectal cancer (CRC) patients. Three different detection systems were compared and Microfluidics-Device Based system was found to be most sensitive and specific for diagnosis. Our findings also suggest that the reduction in the serum survivin and copro-lactoferrin levels of advanced CRC patients after chemotherapy can be used as a predictor of response to the chemotherapy but not that of survival. In addition, we developed dominant negative mutant of survivin (SurR9-C84A) and loaded into Alginate enclosed chitosan- calcium phosphate nano carriers (ACSC-NCs), in order to improve the oral bioavailability and to protect the peptide from the locale of gastro intestinal tract. These CSC-NCs loaded with SurR9-C84A were tested in a xenograft mice model of human colon cancer. We found all tumor bearing mice regressed tumors significantly. Anti-tumor activity was mediated by inducing apoptosis and necrosis in tumours. There was significant decrease in angiogenesis and vasculature in the CSC NCs-SurR9-C84A as compared to empty CSC-NCs ingested control tumor mice. In the present study we developed a safe, nontoxic, mucoadhesive, completely biodegradable, compatible and sustain released CSC-NCs as a proof of concept in colon cancer which can be used for other cancer types. Thus these CSC-NCs can be exploited for oral administration to protect from variable pH in intestinal track and resistance to gastric enzymes which otherwise digest proteins in gastrointestinal tract.

Biography

Jagat Kanwar is an immunologist and molecular biochemist. He is group leader of the Laboratory of Immunology and Molecular Biomedical Research has an international reputation in investigating fundamental and applied molecular aspects of cancer and chronic inflammation. He has extensive training and expertise in studying the molecular mechanisms and devising treatments for human diseases like cancer and chronic inflammatory diseases such as asthma, atherosclerosis, inflammatory bowel disease (IBD), arthritis and multiple sclerosis in both in vivo and in vitro models. The research approach employed monotherapy (gene therapy, immunotherapy) or combinational therapy with commercially available chemotherapeutic agents including peptides.

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