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Crocin-coated magnetite nanoparticles: A potential therapeutic alternative against liver cancer

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The aim of this study was to develop an effective method for treatment of liver cancer using magnetite nanoparticles (MNPs) coated with crocin, the main active component of saffron. MNPs were coated with dextran and a cross-linker to enhance conjugation of crocin. Treatment of HepG2 cells with crocin-coated MNPs led to a significant inhibition of their growth as compared to control or those treated with free crocin or uncoated MNPs. Histological examinations of the livers of cancer-induced mice revealed several precancerous changes such as multiple proliferative hepatic foci, hyper- or dysplastic transformations of bile ducts/ductules and vacuolation. Immunohistochemistry using antibodies specific for cell proliferation (Ki-67) and apoptosis (M30-CytoDEATH and Bcl-2) revealed their up-regulation during development of precancerous lesions. Using antibodies specific for inflammation (cyclooxygenase-2), oxidative stress (glutathione) and angiogenesis (vascular endothelial growth factor) indicated the involvement of multiple signaling pathways in the development of precancerous lesions. Treatment with crocin-coated MNPs was associated with regression of precancerous lesions, significant up-regulation of apoptotic cells and down-regulation of Bcl-2 labeling and markers of cell proliferation, inflammation, oxidative stress and angiogenesis. In conclusion, crocin-coated MNPs are more effective than free crocin for treatment of liver precancerous lesions in mice. These findings will help to develop new modalities for early detection and treatment of liver precancerous lesions.

Biography

Amr Amin has completed his PhD at University of Illinois at Chicago and received a Post-doctoral training in the field of Molecular Genetics at the University of Pennsylvania, School of Medicine. He has started his academic career at UAE University where he presently serves as a Full Professor of Cell Biology. His research focuses on ways to control cancer, particularly liver cancer. He has published many research articles and reviews and serves as a Reviewer and as an Editorial Member of many specialized peer-reviewed journals. He is also a member of many specialized societies and the sole recipient of many national and international scientific awards.

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