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Targeting selective chemosensitization of cancer by phytochemicals

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Recently, a wide variety of phytochemicals isolated from different plants such as flavones, polyphenols, thiols, and isothiocyanates, particularly sulforaphane (SFN) have garnered significant attention in cancer chemoprevention. While the efficacy of these phytochemicals for the prevention and treatment of chronic diseases including cancer is continuously being explored, controversy still surrounds their mechanisms of action. We and others have shown that the cytotoxic and apoptotic effects of SFN and another phytochemical withaferin A (WFA) isolated from the plant-Ashwagandha (ASH, Withania somnifera) maybe attributed largely to their oxidative stress-induced lipid peroxidation (LPO) in cancer as well as healthy normal cells, thereby limiting their clinical applications. Since extracts prepared from the whole plant or its part(s) are non-toxic to humans, we have devised a novel strategy to utilize it by fortifying with an optimized amount of the purified bioactive agent(s) for a selective chemosensitization of the tumor cells. Comparative studies conducted by us on normal lung epithelial and non-small cell lung cancer (NSCLC) cells with WFA and the crude ASH extract fortified with optimum amounts of WFA (FASH) demonstrated a significant attenuation in the cyotoxic and apoptotic effects of WFA in FASH-treated normal cells with little or no change in FASH-treated NSCLC cells. These effects were associated with a preferential stimulation of the antioxidant defense systems and modulation of several protective signaling proteins and their transcription factors in normal cells when compared to cancer cells. These studies suggest that enrichment of the plant extract with the purified bioactive compound (s) may be an excellent approach to selectively chemosensitize cancer cells.

Biography

Dr. Rajendra Sharma completed his Ph.D degree in Chemistry from the University of Rajasthan, Jaipur, and pursued research in biomedical sciences at the All India Institute of Medical Sciences, New Delhi, India. He then joined the Oil and Natural Gas Corporation in India where he served in various positions. In the year 2000, Dr. Sharma was invited as a Visiting Scientist at the University of Texas Medical Branch, Galveston. In 2007, he joined the University of North Texas Health Science Center, Fort Worth, Texas, as a Research Associate Professor. Dr. Sharma has published more than 70 research articles, reviews and book chapters. He is serving as an Editorial Board member of repute.

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