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Sulforaphane for the chemoprevention of bladder cancer: molecular mechanism targeted approach

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Abstract

The clinical course for both early and late stage Bladder Cancer (BC) continues to be characterized by significant patient burden due to numerous occurrences and recurrences requiring frequent surveillance strategies, intravesical drug therapies, and even more aggressive treatments in patients with locally advanced or metastatic disease. For these reasons, BC is also the most expensive cancer to treat. Fortunately, BC offers an excellent platform for chemoprevention interventions with potential to optimize the systemic and local exposure of promising agents to the bladder mucosa. However, other than smoking cessation, there is a paucity of research that systematically examines agents for chemoprevention of bladder cancers. Adopting a systematic, molecular-mechanism based approach, the goal of this review is to summarize epidemiological, in vitro, and preclinical studies, including data regarding the safety, bioavailability, and efficacy of agents evaluated for bladder cancer chemoprevention. Based on the available studies, phytochemicals, specifically isothiocyanates such as sulforaphane, present in Brassicaceae or "cruciferous" vegetables in the precursor form of glucoraphanin are: (a) available in standardized formulations; (b) bioavailable- both systemically and in the bladder; (c) observed to be potent inhibitors of BC carcinogenesis through multiple mechanisms; and (d) without toxicities at these doses. Based on available evidence from epidemiological, in vitro, preclinical, and early phase trials, phytochemicals, specifically isothiocyanates (ITCs) such as sulforaphane (SFN) represent a promising potential chemopreventitive agent in bladder cancer.

Keywords: bladder cancer; chemoprevention; safety; sulforaphane; toxicity.

Figures