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Targeting Cancer Stem Cells with Dietary Phytochemical - Repositioned Drug Combinations

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Abstract

The cancer stem cell (CSC) is a member within the complex community known as the tumor niche. This cell population possesses the capacity to self-renew and generate cellular heterogeneity of the tumor. CSCs are resistant to conventional anti-proliferative drugs. In order to be curative, it is imperative that CSCs be eliminated by cancer therapy. A variety of dietary phytochemicals and repositioned drugs have been shown to act synergistically with conventional anti-cancer agents. Here, we advocate the development of a novel combination therapy approach incorporating both phytochemicals and repositioned drugs. This review covers select dietary phytochemicals (curcumin, resveratrol, EGCG, genistein) and repurposed drugs (metformin, niclosamide, thioridazine, chloroquine). Five of the eight compounds (curcumin, resveratrol, EGCG, genistein, metformin) are included in "The Halifax Project", which explores "the concept of a low-toxicity 'broad-spectrum' therapeutic approach that could simultaneously target many key pathways and mechanisms" [1]. We will discuss their mechanisms of action, the models in which their anti-CSC activities were identified, and the advantages, challenges and potential of combination therapy.