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Editorial

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Can Bitter Gourd (*Momordica Charantia*) be a Novel Therapy for Human Cancers?

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Personal susceptibility together with increased exposure to diversified environmental carcinogenic factors account for the high incidence of cancers. Though great strides have been made in the development of different therapies for cancer, the high incidence and mortality of different cancers illustrate the needs for new drugs and novel treatments. It is postulated that some medicinal herbs, such as ethno-medicinal plants, are promising sources to mitigate the suffering of cancer patients [1]. Bitter gourd/BG (*Momordica charantia* from Family Cucurbitaceae) is both a vegetable in the daily diet and an anti-diabetic component in folklore medicine. Recently, the antitumor efficacy of BG crude extract and its purified components toward a wide range of tumor cells were reported. Considering the fact that it has been safely used as a staple for many years in different countries, BG is promising as a potential therapeutic agent for different cancers.

In some Asian countries, there is a long history of the use of BG fruits and seeds for antidiabetic, anti-obesity, anti-viral, and immunopotentiating purposes [2]. Until now, the majority of investigations were conducted on their ability to counteract diabetes and associated complications. Early in 1990, a type I ribosome inactivating protein/RIP named MAP30 was purified from BG, and its potent anti-HIV activity as well as antitumor potential were disclosed by Dr. Lee-Huang and coworkers [3-5]. Lately, some research groups were interested in the antitumor potential of BG and its isolated components. It has been found that the crude extract of young BG fruits inhibited proliferation of breast cancer cells by inducing cell cycle arrest and apoptosis [6]. Most recently, the same research group extended the antitumor potential of BG crude extract to prostate cancer based on results from both *in vitro* and *in vivo* studies [7]. It was observed that crude BG extracts impaired cell cycle progression and inhibited xenograft proliferation. This anti-prostate cancer potential is commensurate with the reports by others [8]. Furthermore, Brennan and colleagues discovered that BG extract inhibited proliferation of adrenocortical cancer cells through induction of apoptosis and modulation of diverse mechanisms [9].

Since there are many different known and unknown components in BG, it is important to disclose the functional components. MAP30 has been reported to exhibit cytotoxicity against many human tumor cells, such as BT20 breast cancer cells and DU145 prostate cancer cells [10]. Furthermore, a ribonuclease termed RNase MC2 purified from BG seeds, induced apoptosis in MCF-7 breast cancer cells associated with modulation of the phosphorylation of MAPK members and activation of caspase cascades [11]. The antagonism of tumors by BG is also contributed by other components, such as *Momordica charantia* lectin/MCL. The tetrameric MCL is a type II RIP which exhibits both RNA N-glycosidase and hemagglutinating activities [2]. It demonstrates antitumor activity against human nasopharyngeal carcinoma CNE-1 and CNE-2 cells in studies involving cell culture and nude mice [12]. The results explain the molecular basis of the antitumor potential of crude BG extract.

BG has potential medicinal applications as evidenced by its antidiabetic, anti-HIV, and antitumor activities, and most importantly, it is safe to use. In spite of the current encouraging results, there are still areas that necessitate studies before the clinical use of BG can be considered. Firstly, it is necessary to isolate and characterize unknown antitumor components in BG. The establishment of purification, identification, or even chemical synthesis of functional components will facilitate future commercial applications. Secondly, well designed, randomized, and placebo-controlled large-scale clinical trials are needed to test the efficacy and possible side-effects of BG in humans. In conclusion, though BG is 'bitter' to our palate, it may be 'sweet' for cancer patients in the future.

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