



Are the ingredients extracted from fruits and vegetables superior to fruits and vegetables in cancer prevention?

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SUMMARY

A diet high in fruits and vegetables decreases the risk of various cancers. And recently, several ingredients extracted from fruits and vegetables are observed to have a protective effect against different cancers as well. Many of them have been allowed to enter clinical trial. Due to the fact that these ingredients possess not only a comparatively high purity and quantity, but also a potential economic value, it seems that they are superior to and could replace fresh vegetables and fruits in cancer prevention in the future. Herein, we proposed the hypothesis: the ingredients cannot take the place of fresh fruits and vegetables in cancer prevention.

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Introduction

It was estimated that more than 1 million people in America were diagnosed with cancer in 2008. In these cases, just only 5–10% was due to genetic defects, while the remaining 90–95% was associated with environment and lifestyle. And around 30–35% was linked to diet [1]. Although many efforts have been put into the area of new drug discovery and new treatment strategy exploration, in 2009, cancer still resulted in more deaths than heart disease in American people whose age were under 85 [2]. Therefore, the role of diet in cancer prevention is being paid more scientific and clinical attention.

Many studies revealed that diets rich in fruits and vegetables are related to a lower risk of various cancers. Then, people extracted constituents from fruits and vegetables with definite structures and comparatively high quantity and quality and tried to investigate the possible mechanisms. When used in vitro and in vivo, these ingredients could inhibit the development and metastasis of a variety of cancers as well. Lycopene plays anti-cancer effect by interfering cell proliferation, and inducing cell-cycle arrest and gap junctional communication [3]. Curcumin exhibits anti-inflammatory and anti-tumor properties by inhibiting COX-2 and nuclear factor KB [4,5]. And resveratrol inhibits the growth of tumor through cell-cycle arrest, up-regulation of p21, p53 and Bax and induction of apoptosis [6].

One of the advantages of dietary ingredients is that they exert the preventive or/and therapeutic functions with little or no obvious toxicity. That means these ingredients could be used in a relatively large dose and long time. It is efficacious and pharmacologically safe to consume some amount of these ingredients to prevent cancer for the people with unhealthy diet habit. Though, many drugs have been proved to possess chemopreventive and therapeutic functions, such as celecoxib and 5-fluorouracil in colorectal cancer prevention and treatment, and tamoxifen in breast cancer prevention, the long term use may be limited by their severe side effects [7–10].

Hypothesis

Considering these ingredients' structures and mechanisms of action are clear and they are much more convenient to take than fresh fruits and vegetables, their using into cancer prevention is becoming very promising. Then, a question arises; are the ingredients superior to fruits and vegetables in cancer prevention? Accordingly, we propose the hypothesis: both ingredients and fruits and vegetables have their own advantages, and neither one is superior to another.

Discussion

Actually, multiple researches have shown that healthy food themselves own conspicuous cancer preventive effects, e.g. several population-based prospective cohort studies or case-control studies among different countries suggest that greater intake of fruits and vegetables are associated with a reduced risk of colorectal cancer [11–13], breast cancer [14], oropharyngeal cancer [15], prostate cancer [16], squamous cell carcinoma [17], bladder cancer [18],

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and lung cancer [19]. It seems to be no necessity to use one ingredient with high purity in large doses to prevent the development of cancer. Furthermore, fruits and vegetables usually contain many components having beneficial effects. For example, except for lycopene, tomato is rich in vitamin C, PP. And apple includes not only polyphenol and cyanidin mainly existing in peel with potent anti-oxidant effect, but also plentiful fibers in flesh which could promote the movement of bowel. Despite the low content, these ingredients may exert their functions in a synergetic or additional way. Cancer is so complex that it would not be inhibited or/and treated effectively just because one molecule or pathway being influenced. Then, many ingredients together, especially when they possess different anti-cancer mechanisms, may have better effects. And evidence has indicated that the combinations of some phytochemicals may be far more effective in preventing cancer than isolated compounds [20]. Last but not least, fresh fruits and vegetables are palatable. And it is more natural for people to choose the ones according to their appetite and the seasons.

Conclusions

To sum up, the ingredients extracted from fruits and vegetables usually have a high purity and quantity. And these let it relatively easy to make clear their chemical structures and find the possible anti-cancer mechanisms, then, apply them to treat cancer clinically. As for fruits and vegetables, they contain many ingredients and are nutritious. Regular consumption of fruits and vegetables lets people take in several beneficial components which are enough to prevent carcinogenesis.

Despite the high incidence and mortality of cancer, it is mostly a preventable disease. Both the ingredients and fruits and vegetables could protect against cancer effectively and both of them have their advantages, and neither one is superior to another. People could choose the one which they think is appropriate.

Conflict of interest statement

None declared.

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