

Interest Trend on Antioxidants in Cancer Prevention and Therapy

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Letter to Editor

Cancer is the second leading cause of death in the United States [1]. The American Cancer Society (ACS) estimated 836,150 males and 852,630 females in the US as new diagnosed cases with cancer in 2017 [2]. The number of estimated death by cancer will be 318,420 males and 282,500 females. Advanced therapeutic technologies and early diagnosis continue to inversely affect cancer statistics and positively improve some cancer patient wellbeing such as prostate and breast cancer [1]. For example, 40,610 deaths were estimated among 252,710 newly diagnosed females [2]. Although this significant decrease of death number caused by cancer, it is necessary to continue in developing efficient tools to positively impact human wellbeing. Prevention is another alternative that could be taken with high consideration. It had been reported that increasing fruits and vegetables intake is associated by a reducing cancer risks [3]. Antioxidants, including carotenoids and polyphenols, inhibit oxidation of molecules that generate free radicals.

A literature search was conducted between the March 13, 2017 and May 29, 2017 on www.PubMed.gov using cancer, carotenoids, antioxidant keywords among total published reports for data shown in the Figure 1, and published case report, clinical study and clinical trial

cancer as shown in Figure 2. The search was limited to human and animal studies. The number of reports during the last 20 years was used as an indicator of interest on this topic followed by a data analysis. Both sides of the association of carotenoids/antioxidant and cancer prevention or therapy were considered for a critical review.

We assume that the number of reports could reflect the number of research projects and interest tendency of the scientist community. The number of reports using antioxidant and cancer increased from 948 in 1997 to 3053 in 2015 (Figure 1). In contrast, the trend related to carotenoids was decreased from 645 in 1997 to 432 in 2015. A decline was observed in 2016 and beginning of 2017 on both antioxidants (2661 and 270) and carotenoids (269 and 17) respectively. To develop an accurate idea about this tendency, a research was performed in only case study, clinical study and trials data. As shown in Figure 2, the trend was aligned between antioxidants and carotenoids and declined during the last 3 years. The number of reports was 126, 117, 90 and 5 for antioxidants in 2014, 2015, 2016 and beginning of 2017 respectively. This trend is a sign of a beginning of an interest decline among medical community on the role of antioxidants in cancer prevention and treatment.

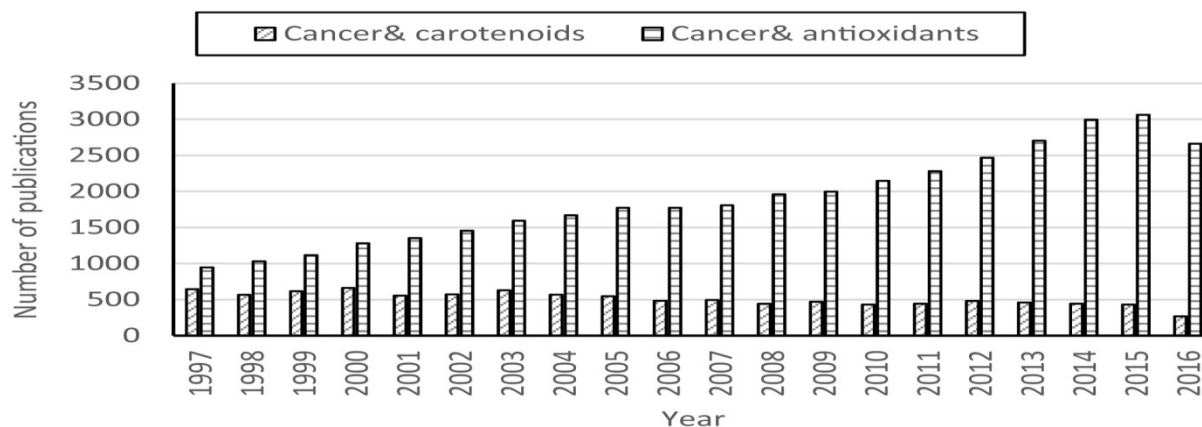


Figure 1: Number of publications on cancer associated with antioxidants and carotenoids (PubMed).

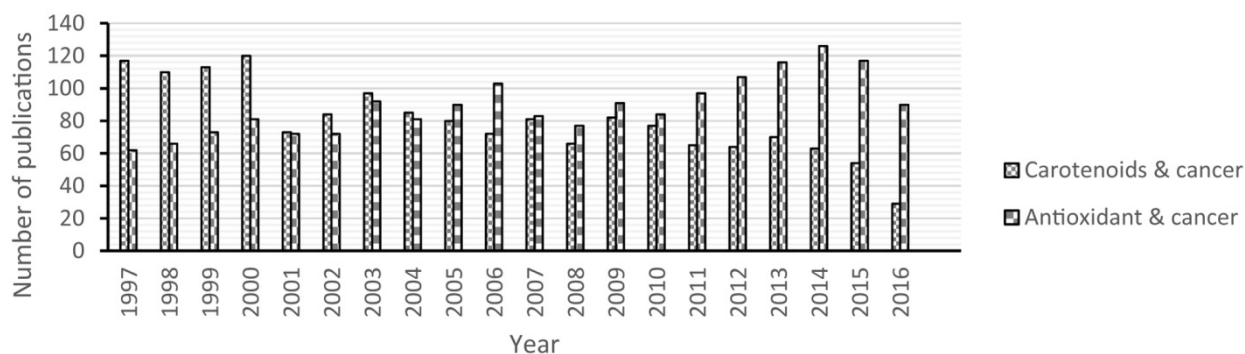


Figure 2: Number of publications on cancer associated with antioxidants and carotenoids among case report, clinical study and clinical trial data in PubMed.

The observed decline especially during the last three years may be due to lack of success in some cases in demonstrating the role of antioxidants in cancer prevention and therapy. There are many factors that need to be taken in consideration to clarify the biological role of antioxidants such as time of application, concentration of antioxidants, and the identification of tumor cells nature. The regulation of Reactive Oxygen Species (ROS) is a strategic target in cancer therapy [4]. It is known that high level of ROS results in mitochondrial damage and dysfunction to end by an anti-proliferative activity. Since, tumor cells don't have the same biochemistry including high production, oxidative stress could be a used to stop or at least reduce tumor cells, with potential to generate high level of ROS, proliferation.

Antioxidants have the potential to down regulate ROS and free radicals generation, which could reduce risks of developing cancer. In contrast, Initiation factors of oxidative stress shouldn't exceed the level that create an imbalance between oxidative and antioxidant parameters. Since there is a differential antioxidant activity is different among antioxidants a combination could be more efficient. For example, Nishino et al. [5] reported a high reducing cancer risk associated with a high combination of antioxidants. The mixture of different type of carotenoids may wider the range of biological effects

and improves the efficiency in prevention or extending the expectancy. Adding other type of antioxidants and phytochemicals with anticancer activity could improve the anticancer activity synergy. Oral antioxidants mixture supplements and fruits and vegetables as a combination may complement each other to fulfill the recommended daily intake dose. Antioxidants, chemotherapy or radiation time of application need to be also investigated.

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