



## « Recent studies on cancer and diet »

## Editorial

Based on impressive evidence, the World Cancer Research Fund (WCRF) and the American Institute for Cancer Research (AICR) recommends eating more vegetables and fruits (V&F) as part of a healthy diet to prevent various types of cancer. Evidence on the role of diet in cancer prognosis is still limited but there are three recent studies (out of four) showing that survival may be improved by greater intake of V&F. Not surprisingly, attempts at improving V&F intake continue, in the general population and among cancer survivors.

Pollán et al. show in a recent case-control study a protective effect of a Spanish Mediterranean diet on breast cancer; the diet includes a high intake of fish, legumes and olives together with V&F and boiled potatoes and a low intake of juices. Benefit was seen particularly against triple-negative breast tumors but this needs to be confirmed in a prospective study.

Freedman et al. report on a multi-agency cooperation to facilitate a food-systems approach to increasing V&F. The agencies involved were Cooperative Extension Services (community-focused outreach programs of US universities), public health systems and community health centers. Growers and sellers of V&F were involved and structural changes instituted – e.g., a farmers' market – to improve both awareness and access to V&F. Although it is not yet established that this approach yields the desired results and although the agencies involved are United States specific, this could provide a model to be used elsewhere for multi-agency approaches to increase V&F.

Coleman et al. examined the role of depressive symptoms, hope, social support and quality of life in relation to V&F intake among cancer survivors and showed a modest association with social support. There is no sociologic or causal model in this paper so it is hard to understand exactly what is being reported, especially when the response proportion was less than 25 per cent. Perhaps the clearest message that can be extracted is that some beneficial circumstances cluster to influence cancer survival. Such clusters may, in turn, be related to socioeconomic status, education, etc.

Benefits of high V&F consumption are clear but further research must continue to explore what works to increase intakes. These recent papers provide a few more clues and directions for further research and intervention. However, V&F have low profit margins and receive very little advertising (compared especially with high-fat, high-sugar foods). It is an uphill battle to change community norms in the face of the power of corporate food empires but there is no option but to continue the struggle.

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# Extending Cancer Prevention by Improving Fruit and Vegetable Consumption

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## Nutrition and Health

Consuming vegetables and fruits (V&F) is associated with decreased risk for chronic diseases, including cancers. Despite the clear health benefits, few Americans consume the recommended daily servings of V&F<sup>1</sup>. Clearly, more attention should be directed at food systems change. In contrast to focusing on individual behaviors, food systems interventions address broader issues influencing V&F intake. The hallmark of these interventions is an implicit belief in the connection between agriculture, community health activism, and public health programming—sectors that have limited experience working together, especially in intervention implementation.

## Leveraging Existing Resources

One strategy to increase V&F intake involves leveraging the triad of Cooperative Extension Services (CES), public health systems (PHS), and community health centers (CHC). Through a mutual interest in promoting health equity and community and economic vitality, this collaboration provides common ground to spread evidence-based food systems interventions and share resources to foster grassroots support to sustain change.

PHS' long-standing work on policy, systems, and environmental change has been credited with promoting dramatic improvements in human health over the past century. CES also have a century of experience in bridging the gap between research and practice. Today, CES have "boots on the ground" connected to 100+ colleges and universities. CHC are key linkages for connecting CES and PHS. Formed in the 1960s, CHC provide patient-centered care to medically underserved populations regardless of income. Today ≥7,500 CHC in the U.S. are committed to community and economic development as a part of a health care mission.

## Connecting the Triad to Improve V&F Consumption

The Right Choice Fresh Start (RCFS) farmers' market represents a partnership of the three entities implementing a food systems

approach to improve V&F consumption<sup>2</sup>. The goal of the RCFS was to examine the feasibility of establishing a farmers' market at a CHC. CES was central to the formation of the RCFS farmers' market by identifying farmers who informed the development of the market and served as vendors, providing technical assistance regarding farmers' market operations, serving on the RCFS Advisory Council.

Exchanges between CES, CHC, and PHS occurred in mutually beneficial ways. Researchers gave public talks at RCFS celebrations about the benefits of V&F consumption and cancer prevention. This information guided educational services offered by CES. The CHC created a "farmers' market produce prescription" to incentivize V&F purchases made by patients completing diabetes education and to boost revenue opportunities for farmers. The state PHS later supported the RCFS through a grant to fund the farmers' market manager and created a healthy food incentive program. CES offered additional support to the RCFS manager through engagement in monthly farmers' association meetings that introduced the manager to additional farmer-vendors and provided critical insights into some of the opportunities and challenges associated with growing V&Fs. Finally, this partnership helped the RCFS garner more resources to provide healthy foods to CHC patients and enhance economic opportunities for small-scale farmers.

## Conclusion

The RCFS exemplar highlights synergies among PHS, CHC, and CES to enhance community, economic, and health development. Each entity has a tradition of applying expertise to these goals, though none has the capacity to single-handedly change the food system for public health benefit. Working together, the triad has the opportunity to build on their respective strengths, creating a culture for co-learning, capacity building, and other mutual benefits while helping to decrease cancer risk across the broader population.



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# Spanish Mediterranean diet and other dietary patterns and breast cancer risk: case-control EpiGEICAM study

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Despite the fact that breast cancer (BC) is the most common cancer among women worldwide and the importance of diet as a key modifiable risk factor for many chronic diseases, the evidence on the effect of individual dietary factors on BC risk, apart from alcohol, is inconclusive. Some authors argue that focusing on overall dietary patterns, instead of on individual foods or nutrients, may better capture variability in the population's diet while allowing the evaluation of interactions between the dietary factors.

Using 1017 incident cases of BC, diagnosed in the Oncology departments of 23 hospitals included in the GEICAM Spanish Breast Cancer Research Group, (<http://www.geicam.org/>) and their individually matched healthy controls from the same town and of similar age ( $\pm 5$  years), this study explored the association between dietary patterns and BC risk in Spanish women according to menopausal status and intrinsic tumor subtype. Cases were sub classified as:

1. Luminal tumors (Estrogen Receptor (ER) and/or Progesterone Receptor (PR) positive with Human Epidermal Growth Factor (HER2) negative),
2. HER2 positive tumors (HER2+ irrespective of ER or PR results); and
3. Triple negative tumors (ER-, PR- & HER2-). Postmenopausal status was defined as absence of menstruation in the last 12 months.

Cases and controls completed a structured questionnaire collecting information on demographic and anthropometric characteristics, personal and family history, past physical activity and dietary intake in the last five years (food frequency questionnaire-FFQ). The 117-item semi-quantitative FFQ items were reduced to 26 food groups excluding non-caloric and alcoholic beverages. Major existing dietary patterns were identified in the controls by applying Principal Components Analysis (PCA). For each retained pattern, a score was calculated for cases and controls that measured the level of compliance with each pattern.

The association between dietary patterns and BC in general and according to menopausal status and intrinsic tumor subtypes (Luminal, HER2+, Triple Negative) was evaluated using logistic and multinomial regression models.

## The PCA evidenced three different dietary patterns:

- **Western pattern**, characterized by high intakes of high-fat dairy products, processed meat, refined grains, sweets, caloric drinks, and other convenience foods and sauces, and by low intakes of low-fat dairy products and whole grains;
- **Prudent pattern**, that denoted high intakes of low-fat dairy products, vegetables, fruits, whole grains, and juices; and
- **The Mediterranean pattern**, with high intakes of fish, vegetables, legumes, boiled potatoes, fruits, olives and vegetable oil, and low intake of juices.

## Protective effect of the Mediterranean diet on breast cancer risk

A higher Western pattern score was positively associated with BC, with the odds ratio (OR) for the top versus the bottom quartile being 1.46 (95%CI=1.04-1.31). This association was stronger in premenopausal women (OR=1.75; 95%CI=1.14-2.67). Conversely, a higher Mediterranean score implied a lower BC risk (OR=0.56; 95%CI=0.40-0.79). In both cases, the linear dose-response trend was statistically significant. Interestingly, the protective effect of the Mediterranean pattern was stronger for triple negative tumors (OR for the fourth quartile=0.32; 95%CI= 0.15-0.66), with a steeper dose-response trend compared to other subtypes (p-value of heterogeneity =0.04). No association with BC was found for the Prudent pattern.

Diet is a modifiable risk factor, therefore, the identification of harmful and beneficial dietary habits and the characterization of the population most susceptible to such habits is essential for the design of BC prevention policies. The results of this study provide novel information in these two fronts since the beneficial effect of a diet rich in fruits, vegetables, legumes, oily fish and vegetable oils over a diet low in calorie and fat intake is still debated, even in the scientific community. The study also identified a higher detrimental effect of Western dietary habits in younger women, pinpointing them as a main target for future preventive policies. Finally, according to the results, the Mediterranean diet appears particularly beneficial against triple negative tumors.

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# Social support, fruit and vegetable consumption and physical activity in cancer survivors

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Many behavioral changes have been researched as ways to affect the health, quality of life, and survival rate of cancer survivors. Previous studies pointed out that encouraging cancer patients to be more physically active and consume more fruits and vegetables could be a way to impact cancer survivors' survivorship and the potential for second malignancies<sup>1,2</sup>.

This study aims to examine depressive symptoms, hope, social support, and quality of life in relation to vegetables and fruit (V&F) intake and physical activity (PA) among cancer survivors diagnosed within the past four years.

In 2010, participants were recruited from a southeastern United States cancer center and completed a mail-based survey (response rate 22.7 per cent) assessing these psychosocial factors, V&F intake, and PA. Analyses for this study focus on the 128 participants who completed measures of interest in the current study.

Only 28 per cent reported consuming five V&F or more per day; that is, less than one-third of this sample consumed the recommended level of V&F. Participants consumed an average of 1.78 servings of fruits and 2.42 servings of vegetables per day. Only about 20 per cent of participants were physically active at least four times per week, with participants reporting an average of 2.17 days/week of walking for PA.

## Consuming five V&F or more per day was associated with higher social support and being female

The research showed that, although many psychosocial factors were associated with V&F intake and PA, social support was the most important.

Social support may be more likely to be involved in caretaking and preparing the participants' meals, encouraging higher V&F consumption. These results are consistent with previous

research indicating that social support is associated with intentions to eat V&F<sup>3,4</sup>.

Also, it has been shown that women eat more V&F than men<sup>5,6</sup> and have better knowledge about current dietary recommendations, greater awareness of the relationship between diet and disease, stronger beliefs in the importance of V&F intake for their health, and higher confidence in their ability to eat V&F in difficult or precarious circumstances situations<sup>7,8</sup>.

## No significant relationship existed between depressive symptoms and V&F intake or PA

This study revealed that there was no significant association between depressive symptoms and V&F intake or PA, which may be due to the somatic symptoms assessed by depression screening instruments that may more be more reflective of symptoms related to compromised health<sup>9</sup>.

However, higher hope was related to greater V&F intake and PA among cancer survivors, which is in line with prior research documenting higher levels of hope associated with nutrition and PA among college students<sup>10</sup>. Thus, hope may reflect emotional state better among cancer survivors<sup>11</sup>.

## There was an association between V&F intake and well-being

In addition, quality of life subscales assessing social and family well-being and functional well-being were found to be significantly higher for those who ate more V&F and engaged in PA more frequently. Social and family well-being was also highly correlated with the social support scale. Nevertheless, owing to the cross-sectional nature of this study, it is not clear whether increased quality of life leads to greater V&F intake and PA, or the reverse.

**This study has implications for research and practice.**

**Encouraging cancer patients to be more physically active and consume more V&F could be a way to impact cancer survivors' survivorship. Research should focus on examining the relationships among these variables in a larger sample and whether interventions to increase the hope and social support and decrease depressive symptoms may increase cancer survivors' V&F intake and PA**

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