

## Cabbage and blueberries against breast cancer

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*Women who consume 5 portions of fruits and vegetables daily have a reduced risk of developing breast cancer, particularly the most aggressive forms of this disease, as shown by an important research study on more than 180,000 women. This protection is particularly seen with some particular plant-based foods, notably the cruciform vegetables and berries.*



### FOOD AND BREAST CANCER

The incidence of breast cancer varies considerably around the world, which indicates that lifestyle plays an important role in the risk of developing this disease. One of the best examples of this influence of lifestyle is the spectacular increase in breast cancer which occurs following immigration of Asian women to the West, particularly to North America: women from China, Japan, Korea and the Philippines, for example, have breast cancer rates amongst the lowest in the world, but this cancer can become up to 4 times more frequent following their migration to America. This increase is a direct consequence of the adoption of a North American lifestyle, characterized by a diet rich in calories but low in plant-based foods, a strongly sedentary nature and a marked increase in body weight. The effect of this lifestyle is such that their incidence of breast cancer becomes similar to that of third-generation Americans.

### A HETEROGENEOUS DISEASE

The identification of dietary factors responsible for the strong incidence of breast cancer in the West is complicated by the fact that this cancer is a very heterogeneous disease. The expression “breast cancer” is actually a generic term that covers at least 10 distinct diseases, with genetic signatures and biochemical characteristics that vary considerably between the individual forms. These differences are also used to tailor individualized treatments: for example, breast cancers which express estrogen receptors (ER+) can be treated with tamoxifen to specifically block this receptor. In other cases (20-30%), the cancer cells overexpress the HER receptor and we can then consider treating these cancers by use of specific inhibitors such as Herceptin. However, some breast cancers do not express any of these markers (i.e. the “triple negatives”) and are thus resistant to these medications. These cancers are characterized by an aggressive clinical evolution, a strong potential for forming metastases in the brain and thus a low rate of survival for the afflicted patients. All these cancers are thus very different diseases from each other and it is obvious that these differences will greatly affect their sensitivity to the chemopreventive effects of the various compounds present in the diet.

### TARGETED PREVENTION

To properly study the effects of diet on the risk of breast cancer, we must thus study not only the incidences of different forms of this cancer but also the individual effects of different fruits and vegetables on each form. Plants are a very heterogeneous source of foods, with contents that vary tremendously in phytochemical anticancer compounds, and they should not all be considered equal in terms of preventing cancer.

The utility of this approach can easily be seen in the results of a recent study from Harvard University involving 182,145 women who participated in two cohorts of the Nurses’ Health Study, both those of 1980-2012 (NHSI) and 1991-2013 (NHSII). This large number of participants, combined with the prolonged period of observation (30 years), allowed the researchers to show that women who consumed more fruits and vegetables (more than 5 portions daily) had a significantly lower risk of developing breast cancer than did those who ate 2 or fewer portions per day<sup>1</sup>. A more powerful analysis showed that this protection is particularly observed for the cancers which were ER- (15% reduction for every 2 daily portions of plant-based foods) and particularly for those which expressed the HER receptor (22% reduction per 2 daily portions).

These protections seem to be principally linked to specific plant groups. For example, regular consumption of cruciferous vegetables (cabbage, broccoli and cauliflower) as well as that of yellow/orange vegetables such as winter squash is associated with a 10% decrease in the risk of cancer, a protection which reaches 40% for the form which expresses the HER receptor. As for fruits, the consumption of blueberries and strawberries is associated with a marked decrease (31%) in the risk of ER- breast cancer.

Overall, these results confirm that increased consumption of fruits and vegetables, particularly of cruciferous vegetables and of berries such as blueberries, is associated with a significant decrease in the risk of breast cancer. The inclusion of these foods in the basic diet is thus particularly important for the prevention of this cancer, all the more so as they seem to principally interfere with the development of the ER- and HER+ forms, two subtypes which are particularly aggressive.

<sup>(1)</sup> Farvid MS et al. Fruit and vegetable consumption and breast cancer incidence: Repeated measures over 30 years of follow-up. *Int. J. Cancer.*, published online July 6 2018.