

Seaweed and Cancer Prevention

Sir—In the *Jpn. J. Cancer Res.*, Funahashi *et al.* presented convincing evidence that unpurified *wakame* and water-soluble *mekabu* can reduce the incidence, multiplicity and size of breast tumors in rats.^{1,2)} Considering that *wakame/mekabu* is particularly rich in iodine, they suggested that the tumor inhibition was brought about by the iodine via induction of apoptosis and proposed that their results provide a basis for the development of a chemopreventive regimen. We, however, would like to make some comments on this.

Wakame contains not only minerals besides iodine and vitamins, as the authors noted, but also dietary fiber and marine oil. Water-soluble minerals and vitamins including folate, water-insoluble minerals such as selenium and calcium, carotenoids including β -carotene and fucoxanthin and chlorophyll behave as anti-mutagens, anti-oxidants or anti-promoters for cancer including breast cancer.^{3–6)} The water-soluble dietary fiber/digestible algae polysaccharides such as alginic acid and fucoidin, and the short-chain fatty acids formed by biodegradation in the colon may alter the bacterial flora by increasing bifidobacteria, modulate the metabolism and uptake of carbohydrate, fat including cholesterol, bile acids and sex hormones, improve insulin resistance, reduce insulin-like growth factor (IGF)-I, increase IGF binding protein-3 and enhance immunocompetence.^{7–9)} Furthermore, *wakame* contains n-3 polyunsaturated fatty acids (PUFAs), including α -linolenic acid and eicosapentaenoic acid, albeit at relatively low concentrations, which can compete with n-6 PUFAs including linoleic acid and arachidonic acid, precursors of prostaglandin E₂, which cause inflammation and tumor promotion.^{9–12)}

The authors concluded that iodine was effective for preventing breast cancer at concentrations generally equivalent to our daily intake. However, as is well known, excess intake of iodine can certainly not be recommended because of the possibility of thyrotoxicosis. The situation is reminiscent of the very convincing inverse association between intake of green-yellow vegetables and cancer,^{7,13)} despite equivocal findings with individual components. Indeed, at high doses in heavy smokers, β -carotene acted as a pro-oxidant and increased lung cancer risk.^{14,15)} In conclusion, *wakame/mekabu* and other seaweeds as a whole appear to be good candidates for dietary modification to achieve cancer prevention, but great caution is necessary in consideration of chemoprevention using iodine as a chemical agent.¹⁶⁾

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