Chemicals in brown algae may protect against skin cancer

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Substances extracted from a marine seaweed may protect against skin cancer caused by too much sun, new research suggests.

The animal study indicates that chemicals called brown algae polyphenols (BAPs), which are found in a type of brown marine seaweed, might protect against skin cancers caused by ultraviolet B (UVB) radiation.

UVB radiation in sunlight is thought responsible for 90 percent of the estimated 1.3 million cases of non-melanoma skin cancer diagnosed in the United States annually.

Researchers applied the BAPs to the skin of hairless mice and fed it to the animals in their diet. In both cases, the substances reduced the number of skin tumors by up to 60 percent and their size by up to 43 percent. They also reduced inflammation.

The study, led by researchers at the Ohio State University Comprehensive Cancer Center, is published in the Dec. 15 issue of the *International Journal of Cancer*.

"These compounds seemed to be dramatically effective at fairly low doses both orally and topically," says principal investigator Gary D. Stoner, professor emeritus of internal medicine and a cancer chemoprevention researcher.

"These findings suggest that, even when eaten, these compounds get to skin cells and neutralize the cancer-causing oxygen radicals that are produced by UV exposure."

Laboratory research has shown that BAPs are strong antioxidants and may have anticancer properties.

For this study, Stoner and his collaborators used a strain of hairless mice that are particularly susceptible to UVB-induced skin cancer. Nine experimental groups were used, each with 20 mice.

In two groups, BAPs were applied to the skin in concentrations of 3 milligrams or 6 milligrams in a mild solvent. In two other groups, BAPs made up 0.1 percent or 0.5 percent of the diet.

A group of untreated control mice was also exposed to UVB.

The remaining groups were additional controls: Two were fed the standard diet with and without UV exposure, and two had the BAP solvent applied to the skin with and without UV exposure.

The mice received the BAPs for two weeks before UVB exposure began, followed by 24 weeks of increasing UVB exposure according to a standardized schedule.

The researchers then counted the number of tumors in the treatment and control groups and calculated their size.

Animals exposed only to UVB developed an average of 8.5 skin tumors. The animals fed the lower and the higher dose of BAPs developed an average of 4.7 and 3.7 tumors respectively. Of those given the topical treatment, the lower and higher doses developed 3.4 and 4.6 tumors respectively.

In terms of tumor volume, the animals fed BAPs at the lower and higher doses had tumors that were 34 percent and 40 percent smaller than those in animals exposed to UVB alone. Of those given the topical treatment, the lower and higher dose animals had tumors that were 27 percent to 43 percent smaller than animals exposed to UVB alone.

In addition, the researchers compared the groups for skin levels of the enzyme cyclooxygenase-2 (COX-2) and of the hormone-like substance prostaglandin E2, both of which are strong indicators of inflammation, and for cell proliferation rates.

Animals treated with BAPs showed lower levels of both COX-2 and prostaglandin E2.

The researchers found that the dietary BAPs reduced COX-2 activity by 74-82 percent, and that the topical BAPs reduced it by 66-82 percent. They also measured lower rates of cell proliferation in BAP-treated animals.

"Both the oral and topical BAP treatment reduced COX-2 and prostaglandin E2 cell proliferation levels in the skin," Stoner says, "which corresponds with fewer tumors and small tumors in the treated animals."

Source: Ohio State University