

Antitumor Allium Sulfides

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Abstract

We examined the sulfides in onion (*Allium cepa* L.), Welsh onion (*A. fistulosum* L.), and garlic (*A. sativum* L.), and obtained three new thiolane-type sulfides (onionins A1–A3) from onion; two new thiabicyclic-type sulfides (welsonins A1, A2), together with onionins A1–A3, from Welsh onion; and six new acyclic-type sulfides (garlicnins L-1–L-4, E, and F), ten new thiolane-type sulfides (garlicnins A, B1–B4, C1–C3, K1–K2), and three new atypical cyclic-type sulfides (garlicnins G, I, and J) from garlic. Acetone extracts showed the potential of these sulfides in inhibiting the polarization of M2 activated macrophages that are capable of suppressing tumor-cell proliferation. The effect of the thiolane-type sulfide of a major component, onionin A1, on tumor progression and metastasis in both osteosarcoma and ovarian cancer-bearing mouse models was then examined. Tumor proliferation was depressed, and tumor metastasis was controlled by regulating macrophage activation. These results showed that onionin A1 is an effective agent for controlling tumors in both *in vitro* and *in vivo* models, and that the antitumor effects observed *in vivo* are likely caused by reversing the antitumor immune system. Activation of the antitumor immune system by onionin A1 might be an effective adjuvant therapy for patients with osteosarcoma, ovarian cancer and other malignant tumors. Based on these findings, pharmacological investigations will be conducted in the future to develop natural and healthy foods and anti-cancer agents that can prevent or combat disease.

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