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A garlic derivative, S-allylcysteine (SAC), suppresses proliferation and metastasis of hepatocellular carcinoma.

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Abstract

BACKGROUND: Hepatocellular carcinoma (HCC) is highly malignant and metastatic. Currently, there is no effective chemotherapy for patients with advanced HCC leading to an urgent need to seek for novel therapeutic options. We aimed to investigate the effect of a garlic derivative, S-allylcysteine (SAC), on the proliferation and metastasis of HCC.

METHODOLOGY/PRINCIPAL FINDINGS: A series of in vitro experiments including MTT, colony-forming, wound-healing, invasion, apoptosis and cell cycle assays were performed to examine the anti-proliferative and anti-metastatic effects of SAC on a metastatic HCC cell line MHCC97L. The therapeutic values of SAC single and combined with cisplatin treatments were examined in an in vivo orthotopic xenograft liver tumor model. The result showed that the proliferation rate and colony-forming abilities of MHCC97L cells were suppressed by SAC together with significant suppression of the expressions of proliferation markers, Ki-67 and proliferating cell nuclear antigen (PCNA). Moreover, SAC hindered the migration and invasion of MHCC97L cells corresponding with up-regulation of E-cadherin and down-regulation of VEGF. Furthermore, SAC significantly induced apoptosis and necrosis of MHCC97L cells through suppressing Bcl-xL and Bcl-2 as well as activating caspase-3 and caspase-9. In addition, SAC could significantly induce the S phase arrest of MHCC97L cells together with down-regulation of cdc25c, cdc2 and cyclin B1. In vivo xenograft liver tumor model demonstrated that SAC single or combined with cisplatin treatment inhibited the progression and metastasis of HCC tumor.

CONCLUSIONS/SIGNIFICANCE: Our data demonstrate the anti-proliferative and anti-metastatic effects of SAC on HCC cells and suggest that SAC may be a potential therapeutic agent for the treatment of HCC patients.

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