Differential effects of organosulfur compounds from garlic oil on nitric oxide and prostaglandin E2 in stimulated macrophages

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Abstract

Objective

We investigated the inhibition of nitric oxide (NO) and prostaglandin E2 (PGE2) production by the garlic oil derivatives, diallyl sulfide (DAS), diallyl disulfide (DADS), and allyl methyl sulfide (AMS), in lipopolysaccharide (LPS)-activated RAW 264.7 cells.

Methods

Cells were treated with LPS (330 ng/mL) and various concentrations of DAS, DADS, and AMS. NO and PGE2 released into the medium and expressions of inducible NO synthase and cyclooxygenase-2 protein were measured.

Results

All three compounds suppressed stimulated NO production, among which AMS exhibited the least inhibition. Western blot analysis showed that DAS and DADS, but not AMS, inhibited the corresponding inducible NO synthase expression. An in vitro study showed that all three compounds possess NO clearance activity, and that DADS and AMS were more effective than DAS. On the contrary, only DAS inhibited activated PGE2 production and cyclooxygenase-2 protein expression.

Conclusions

The garlic derivatives, DAS, DADS, and AMS, differentially regulated the production of NO and PGE2 in stimulated macrophages. DAS decreased stimulated NO and PGE2 production by inhibiting inducible NO synthase and cyclooxygenase-2 expressions, and its enzyme inhibiting and NO clearance activity may also partly contribute to the suppression of NO. DADS inhibited activated NO production by decreasing inducible NO synthase expression and by directly clearing NO, whereas AMS suppressed NO mainly through its direct NO clearance activity. Further, neither DADS nor AMS showed any inhibitory effect on stimulated PGE2 production.