

THIS INFORMATION IS PROVIDED FOR THE USE OF PHYSICIANS AND OTHER LICENSED HEALTH CARE PRACTITIONERS ONLY. THIS INFORMATION IS INTENDED FOR PHYSICIANS AND OTHER LICENSED HEALTH CARE PROVIDERS TO USE AS A BASIS FOR DETERMINING WHETHER OR NOT TO RECOMMEND THESE PRODUCTS TO THEIR PATIENTS. THIS MEDICAL AND SCIENTIFIC INFORMATION IS NOT FOR USE BY CONSUMERS. THE DIETARY SUPPLEMENT PRODUCTS OFFERED BY DESIGNS FOR HEALTH ARE NOT INTENDED FOR USE BY CONSUMERS AS A MEANS TO CURE, TREAT, PREVENT, DIAGNOSE, OR MITIGATE ANY DISEASE OR OTHER MEDICAL CONDITION.

Allicillin™ softgels contain 200 mg of Garlicillin®, a blend of garlic oil and parsley oil with specified levels of garlic sulfides and ajoene, highly bioactive compounds formed from garlic. These softgels are enteric coated to reduce the strong garlic odor and repeating that may occur from supplementing with garlic. The parsley oil further helps as a natural breath freshener.

The phytochemistry of garlic is complex, but research shows that garlic's unique organosulfur compounds are responsible for its broad range of health benefits. The best known and studied of these bioactive compounds is allicin. Through its decomposition, allicin breaks down to form a variety of organosulfur compounds, which include *garlic sulfides*—diallyl sulfide (DAS), diallyl disulfide (DADS), and diallyl trisulfide (DATS)—and *ajoene*, as found in Allicillin™ softgels.

Highlights: Ajoene & Sulfides

Ajoene (from "ajo," the Spanish word for garlic) is a natural product of allicin degradation in oil, and it is one of the primary bioactive allicin metabolites.¹ During research isolating ajoene and two other garlic compounds that inhibit human platelet aggregation, ajoene proved to be four times more potent than the other two.^{20,21}

The antimicrobial (antibacterial and antifungal) properties of ajoene have received considerable attention. Studies show that ajoene exhibits broad spectrum antimicrobial activity against growth of gram-positive bacteria such as *Bacillus cereus*, *B. subtilis*, *Mycobacterium smegmatis*, *Streptomyces griseus*, *Staphylococcus aureus*, and *Lactobacillus plantarum*.² Growth of gram-negative bacteria such as *Escherichia coli*, *Klebsiella pneumonia* and *Xanthomonas maltophilia* is also inhibited by ajoene, although at higher doses than for the gram-positive strains.

Ajoene is more effective than allicin against *Aspergillus niger* and *Candida albicans*.¹¹ In clinical studies ajoene was shown to be as effective or better than the common antifungal, terbinafine, for the treatment of tinea pedis (athlete's foot), tinea corporis (generalized itch due to fungal infection, e.g., ringworm), and tinea cruris (groin itch).^{8,9} When tested against *Scedosporium prolificans*, a difficult-to-treat fungus, ajoene had a minimum inhibition concentration (MIC) of 2.0 to 8.0 mg/l compared to 2.0 to >16 mg/l for amphotericin B and >16 mg/l for itraconazole.⁷ Incredibly, ajoene has even successfully treated malaria in an *in vivo* animal model.¹⁵

Ajoene and other garlic extracts were tested *in vitro* against several viruses, including herpes simplex virus types 1 and 2, parainfluenza virus type 3, and human rhinovirus type 2.²² Ajoene was found to have the greater virucidal activity than allicin and the other garlic extracts tested. Ajoene also demonstrates chemopreventive properties due to its ability to inhibit aflatoxin B1-induced mutagenesis, and has additionally been shown to inhibit cholesterol synthesis *in vitro*.^{5,6,23}

Garlic Sulfides

Garlic sulfide compounds—diallyl sulfide (DAS), diallyl disulfide (DADS), and diallyl trisulfide (DATS)—have an extensive body of research supporting their efficacy across a wide range of actions. They may be beneficial for cardiovascular health, as they have been shown to protect against oxidation of LDL particles in humans.^{24,25} In a study that assessed the potential for garlic organosulfur compounds to reduce atherosclerosis, cellular adhesion molecule expression was reduced in HUVEC cells preincubated with the three garlic sulfides and then incubated with oxidized LDL particles. Adhesion of HL-60 cells to endothelial cells was inhibited 27% and 33% and the production of cellular peroxides was inhibited 43% and 50% by DADS and DATS, respectively.²⁶ In another study, DAS and DADS protected against further oxidation and glycation in samples of partially oxidized and glycated LDL particles from non-insulin-dependent diabetics, leading researchers to conclude that these garlic-derived sulfur compounds may benefit patients with diabetes-related vascular complications.²⁷

Health benefits of ajoene include:

- Antibacterial²⁻⁴
- Antilipidemic^{5,6}
- Antifungal⁷⁻¹²
- Anti-inflammatory^{13,14}
- Anti-parasitic¹⁵
- Anti-mutagenic¹⁶
- Antithrombotic and antiplatelet^{17,18}

Similar to ajoene, garlic sulfides exhibit antimicrobial activity. In a mouse model of diabetes, DAS and DADS significantly decreased the viability of methicillin-resistant *Staphylococcus aureus* (MRSA), and reduced plasma levels of IL-6 and TNF- α , CRP, fibronectin, and fibrinogen.²⁸ It may be reductions in overall inflammation and these glycoproteins involved in blood clotting that underlie garlic's well-recognized antithrombotic and anti-platelet aggregation properties.^{29,30} DADS and DATS have been shown to reduce lipopolysaccharide-induced inducible nitric oxide synthase, nitric oxide production, oxidative stress, and activation of NF-kappaB. These effects were not seen with DAS, leading researchers to hypothesize that the potency of these compounds in eliciting these effects is related to the number of sulfur atoms present.³¹ The anti-inflammatory effects of garlic sulfides extend to reducing inflammatory markers in a murine model of inflammatory bowel disease.³²

Why Not Allicin?

The use of garlic sulfides and ajoene in Allicillin™, rather than allicin, was arrived at after careful consideration of the many problematic aspects of providing allicin in supplement form. Allicin is not present in fresh, intact garlic cloves. The predominant sulfur compound in whole, undamaged garlic is alliin. The alliinase enzyme, present in high levels in garlic, is contained in a separate compartment of the garlic, and it only acts upon its alliin substrate when the plant is injured. When fresh garlic cloves are crushed or chopped, or when garlic powder (that has been carefully dried to preserve its alliin/alliinase content) is added to water, allicin is quickly produced by the action of alliinase on alliin.¹⁹

Many dietary supplement companies claim to provide a product that delivers allicin. Allicin is often listed on labels as "allicin yield," or "allicin potential," reflecting the compound's instability and the inability to specify and guarantee allicin content and potency. Allicin potential is measured in laboratories using dried garlic powder that is added to water so that the alliin and allinase can quickly react to form allicin. The amount of allicin produced is the measure of allicin potential. However, this laboratory assay does not accurately reflect production of allicin when such garlic supplements are swallowed. The allinase enzyme is rapidly and completely destroyed by stomach acid, and allicin cannot be made from alliin in the absence of active allinase. Some garlic products claim to address this issue by using an enteric coated delivery method. Unfortunately, such methods have unimpressive efficacy. In a report of testing twenty-three enteric coated U.S. garlic supplements, twenty of the twenty-three failed to release even 15% of their claimed "allicin potential" when placed in simulated intestinal fluid.¹⁹ The study authors concluded that allicin potential is a poor measure of garlic supplement activity in the human body and should not be used for the standardization of garlic supplements. Considering the questionable utility of allicin potential, Allicillin™ was developed to contain sulfides and ajoene, the inherently stable metabolites of allicin.

Who Should Take Allicillin™?

Patients with recurring yeast infections, bacterial or viral infections, lipid abnormalities, platelet aggregation, inflammation, immune deficiency and/or history of heart disease. Consider Allicillin™ supplementation during antibiotic usage to prevent yeast overgrowth, a common side effect of antibiotic therapy. This product may be used in higher doses for acute conditions and can be taken daily as directed for prevention.

Allicillin™ has blood thinning capabilities and reduces platelet aggregation. Be cautious when recommending this product to patients taking Coumadin, Warfarin or other anticoagulant medications.

Supplement Facts	
Serving Size 1 softgel	
Amount Per Serving	% Daily Value
Garlicillin®	200 mg *
[Garlic oil (<i>Allium sativum</i>)(bulb) and parsley oil (<i>Petroselinum crispum</i>)(seed) blend containing 20 mg garlic diallyl sulfide, diallyl disulfide, diallyl trisulfide and ajoene]	
*Daily Value not established.	

Other Ingredients: Olive oil, yellow beeswax, sunflower lecithin; bovine gelatin, glycerine, purified water, annatto (natural color), pharmaceutical glaze, sodium alginate (softgel ingredients).



How to Take:

- Take one softgel per day, or as directed by a health care practitioner.

For a list of references cited in this document, please visit:

<http://catalog.designsforhealth.com/assets/itemresources/AllicillinReferences.pdf>

To contact Designs for Health, please call us at (800) 847-8302, or visit us on the web at www.designsforhealth.com.