

# Garlic Assist™



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Garlic Assist™ features an innovative blend of garlic and parsley oils known as Garlicillin®, a highly potent, researched form of garlic delivering specified levels of garlic sulfides and ajoene. These organosulfur compounds in addition to Garlic's other bioactive constituents are thought to be responsible for Garlic's many health benefits, including antioxidant, anti-inflammatory, antimicrobial, immunomodulatory, antithrombotic, cardiovascular protective, hepatoprotective, nephroprotective, gastrointestinal protective, neuroprotective, anti-diabetic, anti-obesity, and anticancer properties.

The organosulfur compounds of garlic (*Allium sativum*) exhibit a broad range of antimicrobial properties such as antifungal, antibacterial, antibiofilm, antitoxin, and anti-quorum sensing activity against many microbes including multi-drug resistant (MDR) strains. Garlic extract enhances the antimicrobial activities of antibiotics on resistant strains.

The most studied of the bioactive compounds of garlic is allicin. However, allicin is problematic to deliver in supplement form, due to its instability. Garlic Assist™ overcomes this limitation by providing the compounds at the next stage of metabolism. In the body, allicin breaks down to form a variety of organosulfur compounds, which include ajoene and the garlic sulfides diallyl sulfide (DAS), diallyl disulfide (DADS), and diallyl trisulfide (DATS). The Garlicillin® in Garlic Assist™ provides these very compounds.

Parsley oil is added for its therapeutic benefit. Parsley is one of the best sources of apigenin, a powerful flavonol that reduces cellular oxidative stress. Apigenin functions as a neuroprotective agent by reducing reactive oxygen species and the resultant inflammatory cascade. It ameliorates hepatic lipid accumulation, commonly seen with mold and other lipophilic toxicant bioaccumulation in environmentally ill patients. Apigenin's anticancer potential is due to its immunoregulatory functions, modulating several signaling pathways. Conveniently, the aromatic oils of parsley also freshen the breath.

Garlic Assist™ was designed to be used alone or in combination with antimicrobial therapies to combat drug-resistant species, reset the biome to its commensal state, and to modulate immunity and inflammation.

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, bovine gelatin, glycerine, purified water, yellow beeswax, pharmaceutical glaze, sunflower lecithin, sodium alginate, annatto (color).

## Recommended Use

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

Does not contain gluten, dairy, soy or GMOs.

Softgels are enteric coated for maximum comfort for sensitive patients.

## Broad-Spectrum Antimicrobial

Garlic has a broad spectrum of antimicrobial activities, including antibacterial, antifungal, antiviral, and antiparasitic, while exerting immunoprotective effects on mucosal surfaces. The organosulfur compound, ajoene, enhances intestinal IgA production.

Regarding garlic's antifungal properties, its anticandidal mechanism involves disrupting normal metabolism of the yeast. In clinical studies, garlic's efficacy against *Candida albicans* and *Candida tropicalis* was nearly that of fluconazole, with particular enhanced activity against hyphal growth. Garlic compounds were more suppressive than fluconazole against biofilm formation, as well as suppression of the expression of select genes involved in the formation of biofilms.

Ajoene is a critical component of Garlic Assist™ for fungally-colonized patients, as it's the most effective of Garlic's organosulfur compounds against *Aspergillus niger* and *Candida albicans*, while garlic sulfides have activity against *Penicillium* species. Topical ajoene was comparable to terbinafine's effectiveness against superficial mycoses involving *Tinea cruris* and *Tinea corporis* in a randomized clinical-controlled trial.

The principal antibacterial mechanism of Garlic involves the ability of its organosulfur compounds to compromise the integrity of the bacterial membrane. Garlic oil restricts growth of *Escherichia coli*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus*. Garlic is a useful adjuvant for patients positive for Multiple Antibiotic Resistant Coagulase Negative Staphylococci or MARCoNS. Common practice involves co-administration of oral systemic garlic alongside intranasal treatments to enhance the mucosal response and improve MARCoNS eradication.

Studies show that ajoene exhibits broad-spectrum antibacterial activity against the growth of gram-positive bacteria. Growth of gram-negative bacteria such as *Escherichia coli* and *Klebsiella pneumoniae* is also inhibited by ajoene, although higher doses are required than for the gram-positive strains. Additionally, ajoene displayed *in vitro* activity against *Mycobacterium tuberculosis* through an activation of macrophages.

Garlic is being considered as an additional option for asthma management due to its modulation of inflammation and oxidative stress, as well as its antibiotic and antiviral activities.

Garlic and its organosulfur compounds possess significant antiviral activity by blocking viral entry into host cells, inhibiting viral transcription, and downregulating signaling pathways. The immunomodulatory properties are attributed for its effectiveness as a prophylactic modality, which results in an enhanced immune response.

Ajoene and other garlic extracts were tested *in vitro* against several viruses, including human Cytomegalovirus, Influenza B, Herpes simplex types 1 and 2, Parainfluenza virus type 3, vaccinia virus, vesicular stomatitis virus, and human rhinovirus type 2, as well as the common cold virus. Ajoene was found to have greater virucidal activity than allicin and the other garlic extracts tested.

Monitor closely when co-administering with antithrombotics, as garlic may delay aPTT.

## Preventing Resistance

Garlic sulfides possess antimicrobial activity against a number of multi-drug resistant pathogens. When used in combination, Garlic potentiates the activity of a number of antimicrobial drugs, and displays the potential to improve the effect of antimicrobials on resistant pathogens, including Methicillin-Resistant *Staphylococcus Aureus* (MRSA).

Garlic extract was found to be effective against a total of 50 multi-drug resistant *Candida* isolates, with resistance against fluconazole, clotrimazole, Amphotericin B, itraconazole, ketoconazole, miconazole, and nystatin.

In animal models, ajoene was effective in combination with antifungal drugs (sulfamethoxazol/trimethoprim) for *Paracoccidioides brasiliensis* fungal infection, showing a positive additive effect. The synergism of fluconazole and itraconazole with fresh garlic extract on *C. albicans* yielded larger-sized inhibition zones in vitro compared with fluconazole or itraconazole alone. Topically, synergism was observed from both combinations of allicin with itraconazole and terbinafine in the treatment of *Microsporum Canis* causing Tinea Capitis.

Studies indicate the possibility of using garlic as a supplement during antibiotic therapy to increase the effectiveness of gentamicin and ciprofloxacin. The synergism of cefotaxime and ceftriaxone with garlic extract on *P. aeruginosa* yielded larger-sized inhibition zones in vitro than cefotaxime or ceftriaxone alone, suggesting that garlic sulfides may improve antibiotic sensitivity of pathogens to certain antibiotics and aid in the treatment of infections. Additionally, ajoene has a synergistic interaction with metronidazole against protozoan parasites, seen both in vitro and in vivo.

## Cardiovascular Protection

The garlic sulfide compounds, diallyl sulfide (DAS), diallyl disulfide (DADS), and diallyl trisulfide (DATS), have an extensive body of research showing beneficial effects on diabetes, hypertension, dyslipidemia, obesity, and cardiovascular diseases. They've been shown to protect against the oxidation of LDL particles, as well as having a significant reduction in the level of circulating C-reactive protein, common sequelae from the oxidative damage seen in mold-related illness.

Studies have shown that supplemental garlic can reduce blood pressure, waist circumference, body mass index, LDL cholesterol, non-HDL cholesterol, total cholesterol, triglycerides, and inflammatory markers. Additionally, it can increase the levels of HDL and improve cardiovascular parameters such as coronary artery calcium, microcirculation, epicardial and periaortic adipose tissue, low attenuation plaque, and carotid intima-media thickness.

A meta-analysis of randomized clinical-controlled trials showed that supplemental administration of garlic significantly lowered fasting blood glucose. In diabetic patients taking metformin, the addition of garlic was shown to further improve glycemic control, in addition to observed antihyperlipidemic activity.

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Hypercoagulability is an issue for mold-affected patients, especially if they have concomitant chronic infections which impact coagulability, such as tick-borne infections and Covid-19. Mycotoxins cause an odd combination of hypercoagulability, while simultaneously destabilizing the endocalyx, creating a confusing mixed coagulation clinical picture displaying an increased risk for thrombosis in combination with an increase in bleeding or bruising.

Garlic is well-recognized to possess antithrombotic and anti-platelet aggregation properties, while protecting the endothelium. Research on ajoene shows its ability to inhibit platelet aggregation through various mechanisms. A comparative study of the antithrombotic effect of garlic showed delayed activated partial thromboplastin time (aPTT) and reduced expression of intracellular adhesion molecule-1 mRNA. The garlic sulfides DADS and DATS have been shown to reduce lipopolysaccharide-induced inducible nitric oxide synthase, nitric oxide production, oxidative stress, and activation of NF-kappaB as well as reduce lipid peroxidation in human epithelial cells, suggesting DAS is effective in recovering cell viability and abating DNA damage.

## Oncoprotective

Multiple mold mycotoxins are carcinogenic, with some being classified as class 2B possible human carcinogens by the WHO International Agency for Research on Cancer. Specifically, Aflatoxin is implicated in hepatocellular carcinoma, Ochratoxin in nephrocarcinogenicity, while other mycotoxins have impacts on other body systems, including a plethora of immune cells.

The organosulfur compound found in Garlic Assist™, diallyl disulfide (DADS), exhibits anti-tumor activity against many types of tumor cells, including gynecological cancers (cervical cancer, ovarian cancer), hematological cancers (leukemia, lymphoma), lung cancer, neural cancer, skin cancer, prostate cancer, gastrointestinal tract and associated cancers (esophageal cancer, gastric cancer, colorectal cancer), including hepatocellular cancer cell lines.

A derivative from garlic suppresses proliferation and metastasis of hepatocellular carcinoma, correlated to Aflatoxin exposure, especially in those with a history of Hepatitis B infection. Ajoene's anti-metastatic activity in cancer cells is achieved within non-cytotoxic concentrations.

Apigenin from parsley oil is being increasingly recognized as a cancer chemopreventive agent against various cancers. It appears to act through the modulation of various cell signaling pathways, including tumor suppressor genes, angiogenesis, apoptosis, cell cycle, inflammation, apoptosis, PI3K/AKT, NF-κB, MAPK/ERK and STAT3 pathways. Germane to mold, a systematic review and meta-analysis of preclinical evidence suggests inhibition of inflammatory responses and oxidative stress in lung injury models by apigenin, of import to patients experiencing lower respiratory complications from exposure to mold spores and fragments.

## Therapeutic Differences by Composition



Garlicillin® is a highly potent, patented form of garlic and parsley oils, delivering specified levels of garlic sulfides and ajoene. These bioactive organosulfur compounds bypass the limitation of supplementing the most studied constituent from garlic, allicin. Allicin is highly unstable in supplement form. Therefore, Garlicillin®'s patented process provides the garlic sulfides and ajoene which are produced in the next stage of allicin metabolism.

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