

The health benefits of garlic

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Table of contents

Introduction	3
History	4
Physiological effects	5
Western medicine	5
<i>Properties: external and internal use</i>	5
<i>Indications: external and internal use</i>	5
Traditional medicine	5
Chinese medicine	6
Recent studies	7
Cardiovascular protection, antioxidant effects	7
Rheological properties (improvement of blood fluidity)	8
Anti-aging effects, neurprotective effects	8
Dermatology	9
Infections: Antifungal, antibacterial, antiviral, antiparasitic	9
Immune booster	11
Cancer prevention and therapeutic effects	11
Side effects of garlic	13
Recipes	14
Internal use:	14
External use	15
Counter indications for garlic	15
End	16
References	17

Introduction

As long as diseases will exist, there will also be healers, but the most important point is that every human being must discover its own inner doctor to fight the disease, in total harmony with the environment.

Both disease and health are projected into the human mind. We live in a time of technical progress. New discoveries in the field of medicine determine expectations to a very high level in health status, in every medical aspect. The patient wants that the disease disappears quickly without any personal effort, such as changing their lifestyle. The medicine industry offers a large area of products even to the most usual flu disease cases. The increased use of medicines leads to serious secondary effects. Mankind has forgotten that “Mother Nature” can help us in most cases. Since the beginning of modern medicine, and the birth of the so called “official” doctors, the alternative side has often offered better solutions through the nature's own pharmacy. They were declined and attacked from the traditional, official medical side, in spite of all their good results when using natural methods. They used ancient recipes that passed on through and thousand of years, but their proved results were neglected by the official medical side. It is very simply to deny when you do not understand or have the possibility to explain some facts and phenomenon. In various countries of Eastern Europe, the old Soviet Union, China, Latin America, the medicinal plant were the accepted natural way, thus leading to various scientific papers, and the researchers were not afraid to publish studies about for example onion, garlic or cabbage.

The Western countries are looking very sceptical to phytotherapeutical methods. The knowledge of our ancestors' continues to amaze us. How could they prescribe with self-confidence and precision medicinal plant, when they did not know something about their chemical ingredients? Their own proved experience would be sufficient as an explanation. We can imagine that our ancestors knew even more, which has been lost through the years, as it happened for instance with the Library of Alexandria (ancient Egypt), or during the dark time of the Inquisition or during the period of conquering of Central and South America .

In our time, when the allopathic medicine finds itself insufficient in various diseases, an increasing number of people are turning to complementary and alternative medicine to help manage or prevent the onset of chronic disease, improve cognitive function, boost overall general well-being, and increase longevity.

My work tries to present one of the oldest traditional medicinal plants: garlic (*Allium sativum*). Garlic is a perennial plant in the family Alliaceae and genus *Allium*, closely related to the onion, shallot and leek. Garlic in short consists primarily of alliin which, by means of enzyme allinase, is converted into allicin, a powerful antibiotic and anti-fungal compound, ajoene, enzymes, vitamin B, E and C, folic acid, panthotenic acid and niacin, minerals (Mn, K, Ca, P, Mg, Se, Na, Fe ,Zn , Cu), aminoacids (glutamic acid, arginine, aspartic acid, leucine, lysine, valine etc).essential oil with many sulphur-containing components(allyl disulfide, allyl trisulfide, etc), flavonoids(particularly quercetin which is present abundantly in onion) ...etc. One uses only the bulb when cooking and to diverse medical preparations.

My data sources for this article is a review of the literature from the Pub Med database between 1990 to 2007 searching the keyword garlic, my teacher Peter Torssell, Dr. Jean Valnet and others phytotherapeutists.

History

Interest in the potential benefits of garlic has origins in antiquity and is one of the earliest documented examples of plants employed for treatment of disease and maintenance of health. Garlic was found in Egyptian pyramids and ancient Greek temples. There are Biblical references to garlic. Ancient medical text from Egypt (Papyrus Ebers), Greece, Rome, China and India each prescribe medical applications for garlic. It was administered to provide strength and increase work capacity for labours in the building of the pyramids. Hippocrates and Plinius gave a long list of scenarios in which it was considered beneficial. Garlic was given to the original Olympic athletes in Greece, as perhaps one of the earliest “performance enhancing” agents.

It is of interest that cultures that developed without contact with one another came to similar conclusions about the efficiency of garlic. Modern science is tending to confirm many of the beliefs of ancient cultures regarding garlic, defining mechanisms of action and exploring garlic’s potential for disease prevention and treatment.

Scientists from all around the world have identified a number of bioactive substances in garlic that are water soluble and fat soluble, minerals, vitamins, flavonoids. Mechanisms of action are being elucidated by modern technology. The validity of ancient medicine is now being evaluated critically in cell-free systems, animal models, and human populations. There are many promising lines of research suggesting the potential effects of garlic. The current state of knowledge does not recognize garlic as a true alternative, but it will likely find a place for garlic as a complement to established methods of disease prevention and treatment.

Since the passage of the Dietary Supplement Health and Education Act (DSHEA) of 1994 by the U.S. Congress, it has been claimed that garlic dietary supplements possess health benefits. According to the recent pharmacological findings, garlic is a preventive rather than therapeutic.

Physiological effects

Western medicine

Properties: External and internal use

- Intestinal and pulmonary antiseptic
- Bacteriostatic and bactericidal
- General tonic
- Cardio protector
- Hypotensive(by means of vasodilatation properties)
- Anti sclerotic
- Improves blood fluidity
- Glandular rebalancing
- Diuretic
- Anti goutiness, anti arthritis
- Relieves the gastric digestive problems
- Vermicide
- Anti febrile
- Prevents cancer
- Antispasmodic
- Treats klavus, wounds, skin infections

Indications: External and internal use

- Into the prophylaxis and the treatment of epidemic diseases: influenza, typhoid, diphtheria, otitis, infected wounds
- Intestinal diseases: spasm, diarrhea, colic, painful stool (on nervous basis), dysentery, parasitic disease, constipation, fermentation dyspepsia, flatulence, stimulates the appetite
- Lung diseases: chronic bronchitis, tuberculosis, abscess, whooping cough, asthma, emphysema (by modification of bronchitis secretions).
- Cardiovascular diseases: arterial hypertension, cardiac tiredness, tachycardia, circulatory troubles, atherosclerosis, varicose disease, hemorrhoids, vascular spasms, blood hypercoagulability, sicklecell anemia
- Kidney diseases; urinary lithiasis (urinary stone), leg edemas, oliguria
- Genital diseases: gonorrhea,
- Locomotors diseases: arthritis, gout, rheumatic disease
- Dermatological diseases: mycosis, parasitic diseases, bactericidal infections, alopecia, klavus, wart, insect bites(mosquitoes, wasps), skin ulcerations
- Cancer diseases: prevention and treatment of the prostate cancer, stomach and intestinal cancer, leukemia
- General weakness
- Antidote to nicotine intoxication

Traditional medicine

- Treating diseases caused by infected water
- Diuretic and vermicide effect
- Whooping cough and the expectoration's stimulation: eat often garlic blended with honey
- Whitlow (panaritium): boiled milk with garlic
- Insect bites: apply crushed fresh garlic on the affected area
- Treating spots: apply fresh garlic juice
- Fortifying stomach, intestines, liver, kidney: take garlic oil
- Avoid the garlic's bad smell: eat fresh crushed parsley
- Pain (tooth, ear, members): apply fresh crushed garlic on the affected area.

Chinese medicine

- Eliminate cold/phlegm/toxin
- Circulate qi
- Heats the spleen, lungs and stomach, and also eliminates the food stagnation
- Kills parasites

The Chinese name is Da Suan or Hu Suan, where hu means foreign. *Li Shizen* believes that it was imported with coriander during the Han dynasty, approximately 2000 years ago. It is often used raw, roasted or in cooked form. The most common use for garlic is its effect on parasites in the intestinal system. It is also used externally on the anus against intestinal worms. The heating effect of garlic can be irritating for the eyes (which are sensitive to heat), but it's widely recommended to support the spleen in its digestion of meat and grain. It has been observed, in provinces with a great consumption of garlic, that tuberculosis is more uncommonly spread, even though the high concentration of people that is an important factor for the spreading. Heading on to its effect on the lungs, it is noteworthy to point out that in Swedish traditional medicine it was recommended for asthma where it probably had the best effect on the type of asthma sensitive to cold/moisture (asthmatic bronchitis). **(128)**

Recent studies

Most studies on garlic during the past 20 years have been primarily in the fields of cardiovascular and cancer research. Cardiovascular studies have been mainly related to atherosclerosis, where effects were examined on serum cholesterol, LDL, HDL, and triglycerides. Another major beneficial effect of garlic is due to its antithrombotic and vasodilator action. Epidemiological studies have suggested that garlic plays a significant role in the reduction of deaths caused by malignant diseases.

Numerous studies are in progress all over the world to develop effective and odourless garlic preparations, as well as to isolate the active principles that may be therapeutically useful.

Fresh garlic, however, is not for everyone. It can cause indigestion and its pungent odour that lingers on the breath and skin which is a social deterrent. These disagreeable effects of fresh garlic are due to allicin, released upon cutting or chewing the clove. Scientific studies show, however, that garlic does not have to be fresh to be effective nor is its smell required for its health benefits.

An alternate source of garlic that is odourless and richer in antioxidant than the fresh bulb is the dietary supplement Aged Garlic Extract. Aged garlic extract (AGE) is a concentrated form of organic garlic that has been shown in over 350 scientific studies to be safe and effective in providing health benefits in humans. AGE has been found to help prevent atherosclerosis and protect against cardiovascular disease, to increase circulation and immunity, to prevent various kinds of cancer and neurodegenerative disease and to have anti-aging effects improving memory, endurance and learning. New data also show that AGE has potential as an adjuvant in cancer therapy.

The primary objective of my work is to show recent studies which try to present the physiological effects of garlic and all tips of garlic extract.

Cardiovascular protection, antioxidant effects

Epidemiologic studies show an inverse correlation between garlic consumption and progression of cardiovascular disease.

Cardiovascular disease is associated with multiple factors such as raised serum total cholesterol, raised LDL and an increase in LDL oxidation, increased platelet aggregation, hypertension and smoking.

Dietary therapy is the first step in the treatment to recommended.

Since 1993, 44% of clinical trials have indicated a reduction in total cholesterol, and the most profound effect has been observed in garlic's ability to reduce the aggregations of platelets. Mixed results have been obtained in the area of blood pressure and oxidative-stress reduction. The findings are limited because very few trials have addressed these issues. The negative results obtained in some clinical trials may also have resulted from usage of different garlic preparations, unknown active constituents and their bioavailability, inadequate randomization, selection of inappropriate subjects, and short duration of trials. **(1)**

Oxidative stress plays a role in arthritis, atherosclerosis, heart disease, stroke, AIDS, cancer, aging, and in programmed cell death (apoptosis) of neurons, that leads to Alzheimer's disease and other neurodegenerative conditions. **(2,3,4,5,6)**

Garlic and garlic extracts, through their antioxidant activities, have been reported to provide protection against free radical damage in the body. Chung LY has positive resultants after investigated antioxidant properties of garlic compounds representing the four main chemical classes, alliin, allyl cysteine, allyl disulfide and allicin, prepared by chemical synthesis or purification. **(7)**

The same results came from Japan. Japanese demonstrate for the first time reliable quantitative kinetic data and the anti oxidative mechanism of allicin. **(8, 9)**

Sickle-cell anemia is one of the most prevalent hereditary disorders with prominent morbidity and mortality. Oxidative phenomena play a significant role in the disorder's pathophysiology. Garlic with its antioxidants effect and AGE can ameliorate complications of sickle-cell anemia. **(10, 11)**

Inducible nitric oxide synthesis (iNOS) has recently been shown to be present in human atherosclerotic lesion. Allicin and ajoene are discussed as active compounds with regard to the beneficial effects of garlic in atherosclerosis. **(12, 13b)**

Even oxidation of LDL has recently been recognized as playing an important role in the initiation and progression of atherosclerosis. Oxidized LDL, but not native LDL, promotes vascular dysfunction by exerting direct cytotoxicity to endothelial cells, by increasing chemotactic properties of monocytes, by transforming macrophages to foam cells, and by enhancing the proliferation of endothelial cells, monocytes, and muscle cells. The Chinese suggest that suppressed LDL oxidation may be one of the mechanisms that accounts for the beneficial effects of garlic in cardiovascular health. **(13 a)**

A pilot study in USA evaluating coronary artery calcification and the effect of garlic therapy in a group of patients who were also on statin therapy suggested incremental benefits. The implications of this study must be put in context of the potential importance of early atherosclerosis detection and prevention. **(14)** Garlic has the same mechanism as that of the cholesterol-lowering statin drugs, inhibits cholesterol synthesis. **(134)**

Antioxidant capacity can be damaged by cooking but, garlic cooked for a short time preserves a high bioactivity of non-processed garlic. **(15)**

Inflammation plays an important role in both the initiation of atherosclerosis and development of thrombotic events. The adherence of leukocytes /monocytes to the endothelium is an early event in atherogenesis. Garlic and garlic extracts were shown to have beneficial modulating effects in patients with atherosclerotic disease, even for patients receiving statin therapy. **(16, 17)**

Studies in rats suggest that chronic oral administration of raw garlic offered protection against induced myocardial necrosis and associated oxidative stress. **(18, 19)**

Another responsible for the development of atherosclerosis is nicotine. Based on the potent antioxidant effects of garlic, investigators in Turkey and India demonstrate the protective role of garlic. **(20, 21)**

Rheological properties (improvement of blood fluidity)

Oxidant stress and increased systemic inflammation may contribute to the endothelial dysfunction. Garlic improvement of blood fluidity and the simultaneous increase in fibrinolytic activity are an ideal complement. While the increase in fibrinolytic activity supports the physiological reparation process in the microcirculation, the improvement of blood fluidity produces an increase in capillary perfusion that has, in some way, a cleaning effect, with a 'purification' of the microcirculation. Garlic may be useful for systemic sclerosis which is characterised by impaired perfusion that often cannot sufficiently be influenced by standard treatment. Significant positive effects could be achieved in a placebo-controlled double-blind study through the administration of 800 mg of garlic powder over a period of four weeks. Spontaneous platelet aggregation disappeared, the microcirculation of the skin increased by 47.6% , plasma viscosity decreased by 3.2% , diastolic blood pressure by 9.5% and blood glucose concentration by 11.6%. The vascular protection of garlic as atherosclerosis prevention by influencing the mentioned risk parameters for cardiovascular diseases must be pointed out.

Especially interesting is the thrombocyte aggregation inhibiting effect. Thus, the application of garlic may be useful in case of acetylsalicylic acid intolerance. **(22, 23, 24)**

Recent studies suggest that garlic not only activates fibrinolytic activity by accelerating t-PA-mediated plasminogen activation, but also suppresses the coagulation system by down regulating thrombin formation, suggesting a beneficial role in preventing pathological thrombus formation in such cardiovascular disorders. **(25)**

Cooking garlic modify antiplatelet activity. Oven-heating at 200 degrees C or immersing in boiling water for 3 min or less did not affect the ability of garlic to inhibit platelet aggregation (as compared to raw garlic). Prolonged incubation (more than 10 min) at these temperatures completely suppressed it. **(26)**

Anti-aging effects, neuroprotective effects

The role of garlic in preventing age-related diseases has been investigated extensively over the last 10-15 years. Risk factors for cardiovascular disease, including high cholesterol, high homocysteine, hypertension and inflammation, increase the risk of dementia, including its most common form, Alzheimer's disease (AD). High cholesterol is also associated with elevated beta-amyloid (A β). Oxidative damage is a major factor in cardiovascular disease and dementia too, diseases whose risk increases with age. Garlic and Aged Garlic Extract may help reduce the risk of these diseases. AGE also may help prevent cognitive decline by protecting neurons from A β neurotoxicity and

apoptosis, thereby preventing ischemia and neuronal death and improving learning and memory retention. (27, 28, 29) High levels of cholesterol are implicated in potentiate Alzheimer's disease (AD). Therefore, the use of cholesterol-lowering agents such as statins has attracted considerable interest in treating AD. However, statins stimulate inflammatory response, which may aggravate AD-pathology. Although garlic is historically known for its hypocholesterolemic effects in relation to cardiovascular functions, but no reports indicate its use in treating AD. Results from animals study treated with aged garlic extract (40 mg/kg/d/4 wks) suggest a simple and non-invasive dietary therapy for reducing risk of AD in probable cases and reducing pre-existing amyloid burden in clinically diagnosed AD cases. (30, 31) Treatment with garlic and AGE prevented the degeneration of the brain frontal lobe, improved learning and memory retention and extended life span. (32,33,34)

Dermatology

Garlic has a long history of medicinal use for a variety of skin diseases. I will mention ringworm, tinea pedis, tinea corporis and tinea cruris. Antimycotic activity of the aqueous or alcoholic extract of garlic was investigated and is comparable to standard with antifungal drugs, like ketoconazole, terbinafine. (35, 36, 37, 38)

Alopecia areata is a recurrent type of hair loss. Garlic gel added to the treatment with betamethasone valerate can be an effective adjunctive topical therapy to induce hair re-growth. (39)

Infections: Antifungal, antibacterial, antiviral, antiparasitic.

Allium vegetables, particularly garlic exhibit a broad antibiotic spectrum against both gram-positive and gram negative bacteria. The inhibitory effect of garlic is depended on its concentration. Garlic has been used for hundreds of years to treat even fungal, parasitic and viral infections. Louis Pasteur was the first to describe the antibacterial effect of onion and garlic juices.

Candida albicans. Candidiasis is the most prevalent oral complication in patients compromised by HIV infection in patients which are using cortisone for asthma. Azole antifungal agents like clotrimazole are commonly prescribed for the treatment and prophylaxis of these infections, however, the emergence of drug resistant strains and dose limiting toxic effects has complicated the treatment of candidiasis. Garlic's antifungal effect (garlic paste for 14 days was found to be as effective as that of clotrimazole solution) may provide an important alternative route to chemotherapy. Fresh garlic extract has a grater efficacy than garlic powder extract. Both have effect on morphology and inhibition the growth. (40, 41, 42, 43) Garlic enhances the antifungal activity of Amphotericin B, a representative antibiotic for the control of serious fungal infections like *Candida albicans* and *Aspergillus fumigatus* but did not enhance its cytotoxic activity. (44) Garlic is effective against others oral bacterial species particularly putative periodontal pathogens or their enzymes, so it may have therapeutic value, particularly for periodontitis. (45) Garlic is utilized as a folk medicine in many countries for its antimicrobial, antimycotic and other beneficial properties. Aqueous garlic extract and concentrated garlic oil and pure allicin has been tested to the genus *Aspergillus* which are the most common cause of this infection and were found to have antifungal activity. (46, 47)

Development of resistance to available antimicrobial agents has been identified in every decade since the introduction of the sulfonamides in the 1930s. Current concerns for management of acute otitis media (AOM) are multi-drug resistant *Streptococcus pneumoniae* and beta-lactamase producing *Haemophilus influenzae* and *Moraxella catarrhalis*. Amoxicillin remains the drug for choice for AOM. To protect the therapeutic advantage of antimicrobial agents used for AOM, it is important to promote judicious use of antimicrobial agents and find others therapeutic treatment. Alternative medicine remedies may be of value for some infectious diseases including AOM. Garlic extract is bactericidal for the major bacterial pathogens of AOM but is heat- and acid-labile and loose activity when cooked or taken by mouth. (48) Garlic is an effective antibacterial agent for infections with *Staphylococcus aureus*, *Escherichia coli*, *Proteus mirabilis*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*. (49)

Helicobacter pylori (HP) infection is manifesting itself as chronic gastritis. In a great extent it results in peptic and duodenal ulcers and can even lead to the development of adenocarcinoma and lymphoma

of the stomach. Possible use of garlic in the treatment of these infections is intensively investigated. Garlic has bacteriostatic properties against *H. pylori*, more exactly allicin. Antibiotics are usually combined with a proton-pump inhibitor (for example omeprazole). The only antibiotic with any in vivo activity against *H. pylori* in monotherapy is clarithromycin. But resistance of *H. pylori* to clarithromycin and metronidazole is now found worldwide. The combination of garlic and omeprazole showed a synergic effect which was concentration dependent. Further clinical evaluation of garlic in combination with the conventional agents for *H. pylori* treatment seems warranted. The possibility of using garlic as a low-cost remedy for eradicating *H. pylori* is an example. Steam-distilled garlic oil has in vitro activity against *H. pylori* and may be a useful alternative treatment strategy. **(50, 51, 52)**

Allicin, a garlic compound, can prevent attack by the common *cold virus*. **(53)** Allitridin (diallyl trisulfide), a main effective compound of garlic inhibit viral proliferation of *human cytomegalovirus (HCMV)* in vitro. **(54, 55)**

Garlic powder was examined against *Bacillus anthracis* with good effect. **(56)**

Garlic could be used as an effective antibacterial agent in pneumonia caused by *Streptococcus pneumoniae* and *Klebsiella pneumoniae*. **(57)** *Pseudomonas aeruginosa* is the predominant microorganism of chronic lung infections in cystic fibrosis patients. *P. aeruginosa* colonizes the lungs by forming biofilm microcolonies throughout the lung. Garlic has been tested together with an antibiotic, tobramycin. The results indicate that garlic extract renders *P. aeruginosa* sensitive to tobramycin, leading to an improved outcome of pulmonary infections. **(58)**

Garlic kills *African Trypanosomes* and *Neisseria gonorrhoeae*. In high concentrations even *Staphylococcus aureus* and *Enterococcus faecalis*. **(59, 60)**

The increasing prevalence of *methicillin-resistant Staphylococcus aureus (MRSA)* in hospitals and the community has led to a demand for new agents that could be used to decrease the spread of these bacteria. Garlic could be considered as novel therapeutic agents for the treatment of MRSA infection. **(61, 62, 63)**

Garlic kills gram-negative diarrheagenic organisms like *Escherichia coli*, *Shigella sp*, *Salmonella sp* and *Proteus mirabilis* with better result than antibiotics. It appears that antibiotics that interfere with DNA and RNA syntheses, such as garlic does, could constitute an effective partner in the synergic effect with garlic. **(64)**

Fresh garlic juice was tested against *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus hemolyticus B*, *S. hemolyticus A*, *Klebsiella sp.*, *Shigella dysenteriae*, and *Candida albicans* with intention to investigate the effect of heating, storage, and ultraviolet exposure on antimicrobial activity of garlic juice and its bactericidal activity against these common human pathogens. Results showed that all the isolates were sensitive to fresh garlic juice; the most sensitive was *C. albicans*, and the least sensitive was *S. hemolyticus A*. Heating to 100 degrees C for 30 and 60 minutes completely abolished the antimicrobial activity, while heating for 5 and 10 minutes, storage for 24 hours, and 4 hours of ultraviolet exposure decreased it. Fresh garlic juice was bactericidal at concentrations of 5% and more. Thus garlic juice has marked antimicrobial activity that makes it a potential agent to be tested in clinical trials. **(65)**

Malaria is another infection disease on the increase and there is an urgent need to identify new drug targets for both prophylaxis and chemotherapy. Potential new drug targets include Plasmodium proteases that play critical roles in the parasite life cycle. Garlic, has ability to inhibit malaria infection. The combination of ajoene, a garlic compound, (50 mg/kg) and chloroquine (4.5 mg/kg), given as a single dose on the day completely prevented the subsequent development of parasitemia in treated mice. **(66, 67)**

Giardia is a common human parasite and can cause significant morbidity. Garlic is an effective anti-giardial. **(68, 69)**

Burning moxa with garlic has used successful in lymphangitis. Acute lymphangitis in TCM is explained by the accumulated internal fire and toxicity, and the external skin injury-induced infection, leading toxicity going upward along the meridians. The treatment should be given to clear away heat and toxin. Blood letting by a three-edged needle may promote qi and blood circulation and remove the toxic heat. Since the volatile oil in moxa is antagonistic to bacteria, the burning moxa can also promote the local flow of qi blood, and enhance the antagonistic effect of garlic on bacteria. (70)

Conclusion of infections diseases are:

Garlic has been used for hundreds of years to treat infections. Noteworthy results published include the following.

1. The inhibitory effect of garlic is depended on its concentration.
2. Raw juice of garlic was found to be effective against many common pathogenic bacteria.
3. Garlic is effective even against bacteria that have become resistant to antibiotics.
4. The combination of garlic with antibiotics leads to partial or total synergism.
5. Complete lack of resistance has been observed repeatedly;
6. Even toxin production by micro organisms is prevented by garlic.

Further research in this area is required to provide a better understanding of garlic and its ingredients. This knowledge may ultimately form the basis for the development of 'green' antibiotics, fungicides and possibly anticancer agents with dramatically reduced side effects in humans.

Immune booster

The immune system consists of many types of cells and protective substances that fight infections and help battle life threatening diseases, such as cancer. A strong immune system defends against bacteria, viruses and fungal diseases. When immunity is damaged, such as the case of AIDS, or compromised by poor diet, stress, environmental pollution, disease and aging, the body cannot fight off infectious organisms. Different active components from the garlic possess immunomodulatory activity both in vitro and in vivo. However, mechanisms of their actions are not sufficiently elucidated. Some components modulate lymphocyte proliferation, some has been found to affect oxidative stress and immune response in several experimental systems. (71) Garlic had been tested in rheumatoid arthritis (RA) for example with a good response in 86,5%. Alisate, a garlic preparation produced in Russia can be recommended for treatment of RA patients in combination and monotherapy. (72,73) AGE could be another promising candidate as an immune modifier, which maintains the homeostasis of immune functions. (74)

Cancer prevention and therapeutic effects

Of the many beneficial actions of garlic, the anti carcinogenic property is perhaps the most remarkable. Epidemiological studies have shown that higher intake of garlic or garlic-products are associated with reduced risk of several types of cancers. These epidemiological findings are well correlated with laboratory investigations. A number of studies have demonstrated the chemo preventive activity of garlic by using different garlic preparations including fresh garlic extract, aged garlic, garlic oil and a number of organosulfur compounds derived from garlic. Organosulfur compounds present in garlic is considered to be responsible for the beneficial effects of this herb. The water-soluble compound S-allyl cysteine is effective in reducing the risk of chemically induced tumours in experimental animals; it has no effect on established tumours. Oil-soluble compounds such as diallyl disulfide are effective in reducing the proliferation of neoplasm.

Several mechanisms have been proposed to explain these cancer preventive effects. They have been found to block covalent binding of carcinogens to DNA, to enhance degradation of carcinogens, to have anti oxidative and free radical scavenging properties and to regulate cell proliferation, apoptosis and immune responses. In view of the variety of effects produced by garlic and its chemical constituents, renewed interest has been generated in investigating its medicinal properties, particularly with reference to cancer prevention and prophylaxis.

Therefore, the consumption of garlic may provide some kind of protection from cancer development. **(75, 76)**

Studies demonstrate a direct toxic effect of garlic to sarcoma and gastric, colon, bladder and prostate cancer cells in tissue culture, but these effects cannot explain the inhibition of growth of transplanted cancer in animal models. The most likely explanation of this effect is immune stimulation. Comparison of the effects of garlic to BCG immunotherapy reveals many similarities. Both stimulate proliferation of lymphocytes and macrophage phagocytosis, induce the infiltration of macrophages and lymphocytes in transplanted tumours, induce spleen hypertrophy, stimulate release of interleukin-2, tumour necrosis factor-alpha and interferon-gamma and enhance natural killer cell and lymphokine-activated killer cell activity. These activities represent effective stimulation of the immune response. Studies suggest that garlic may be useful in preventing the suppression of immune response that is associated with increased risk of malignancy. Data suggest that maintenance of immune stimulation can significantly reduce the risk of cancer. Clinical trials should be initiated to test the hypothesis that the immune stimulation and other beneficial effects of garlic are able to reduce the incidence of cancer. **(77)**

Diallyl disulfide (DADS), an oil-soluble organosulfur compound found in garlic, could be a promising anticancer agent for both hormone-dependent and -independent breast cancers, and may harmonize with polyunsaturated fatty acids known as modulators of breast cancer cell growth. **(78)** DADS could suppress incidence of human gastric carcinoma too, and inhibit growth of transplanted tumour. **(79, 80)** DADS can induce apoptosis in human nasopharyngeal carcinoma cells too. **(101)** DADS has protective properties on colon carcinogenesis. **(81, 82, 83)**. Crude extract of garlic induce apoptosis in human colon cancer cells. **(103)**. Natural garlic and garlic cultivated with selenium fertilization have been shown in laboratory animals to have protective roles in cancer prevention.

Garlic enriched by selenium (Se) could be an excellent dietary for cancer chemoprevention. Because plants are capable of utilizing selenium in a manner similar to that in sulphur assimilation pathways, future studies should aim at determining whether, under appropriate conditions, these potent cancer chemo preventive synthetic selenium compounds can be synthesized by garlic and related to alliums foods. **(84, 85)** Alliums vegetables, like raw vegetables, may have an important protecting effect against not only stomach cancer, but also oesophageal cancer. **(86, 87)**

When it comes to leukaemia, melanoma, neuroblastoma, the organosulfur compound ajoene, a constituent of garlic, has been shown to induce apoptosis in a leukemic cell line as well as in blood cells of a leukemic patient. Ajoene is produced most efficiently from pure allicin and has the advantage of a greater chemical stability than allicin. It seems it will be a new anti-leukaemia agent for acute myeloid leukaemia (AML) therapy. **(88, 89, 90)**

Ajoene inhibits both primary tumour growth and metastasis of melanoma cells. **(91)**

Malignant (N-type) neuroblastoma continues to defy current chemotherapeutic regimens. The garlic compounds diallyl sulphide (DAS) and diallyl disulfide (DADS) induce apoptosis in human malignant neuroblastoma. **(92)**

Prostate cancer is the most invasive and frequently occurred cancer in men. In the initial stages, it is androgen dependent and the androgen ablation therapy is effective at this stage. In the final stages, it becomes androgen independent and is unresponsive to androgen ablation therapy. At this stage, induction of apoptosis is considered as a better strategy to control cancer. There is epidemiologic evidence that high garlic consumption decreases the incidence of prostate cancer, and compounds isolated from garlic have been shown to have cancer-preventive and tumour-suppressive effects. Garlic-derived organosulfur compound S-allylmercaptocysteine (SAMC) and S-allylcysteine (SAC) suppresses the growth of a human androgen-independent prostate cancer. **(93, 94, 95)** Diallyl trisulfide (DATS), another constituent of processed garlic can also induced apoptosis in human prostate cancer cells. The sequence of events leading to cell death is not fully understood. **(96, 97, 98)** Diallyl disulfide (DADS) has the same result, induction of apoptosis, which is considered as a better strategy to control prostate cancer instead of androgen ablation therapy. **(99, 100)**

Side effects of garlic

Herbal medicine is being frequently used by patients around the world. Several products may interact with ordinary medicine, so it is important for doctors to know what kind of herbal medicines their patients take. Interactions between herbal medicine and anaesthesia are prevalent. The frequently used herbal medicines were fish oil, ginkgo, Echinacea, Co-Q10, garlic, and rose hip. Anaesthesiologists have to ask specific questions to receive full information regarding herbal medicines during the preoperative period. DADS can be used for hepatoprotection during chemotherapy. **(102)** Garlic has been known to have antiplatelet properties. But AGE is relatively safe and poses no serious hemorrhagic risk for closely monitored patients on warfarin, an oral anticoagulation therapy. **(104)** Garlic effect is comparable to that of acetyl salicylic acid (ASA). **(105)** A case is reported of bilateral retro-bulbar haemorrhages with elevated intraocular pressure during strabismus surgery that occurred as a result of odourless garlic tablet ingestion prescribed by a naturopath. It is concluded that unregulated naturopathic prescribing is potentially dangerous; doctors need to ask specifically about naturopathic potions. **(106)** Garlic ameliorates gentamicin nephrotoxicity. **(107, 108)** Garlic and products like AGE protect against gastrointestinal ulceration and diarrhoea induced by methotrexate chemotherapy. **(109, 110, 111)** Regular garlic administration prevents acute adriamycin-induced cardio toxicity. **(112)**

Garlic protects against isoniazid and rifampicin-induced hepatic injury in experimental animal model. It decreases the bioavailability of isoniazid significantly with no change in rate of elimination. But, bioavailability of rifampicin is not significantly altered by garlic extract. **(113, 114)**

Very few garlic allergens have been reported, and garlic allergy has been rarely studied. The spectrum of garlic-related adverse reactions comprises irritant contact dermatitis, induction of pemphigus, allergic asthma and rhinitis, contact urticaria, protein contact dermatitis, allergic contact dermatitis, including the hematogenic variant. **(133)** Garlic allergy seems to affect young subjects with pollen allergy and asthma. It is an IgE-mediated reaction. **(115, 116, 117)** Phototoxic reactions to plants are common, photo allergic contact dermatitis to garlic and its products rarely occur. Diallyl disulfide, which is the allergen in garlic should be included in photopatch-test series. **(118, 119)**

Excessive intake of garlic may cause haemolytic anemia. **(120)** However, such anemia could be prevented by some tropical green leafy vegetables such as *Amaranthus cruentus*, *Baselia alba* and *Ocimum gratissimum*. **(121)**

Today it is generally accepted that every drug that possesses an active thiol group in its molecule is capable of inducing pemphigus (an autoimmune disorder that cause blistering and raw sores on skin and mucous membranes). Some plants, in particular those belonging to the *Allium* group, contain several active compounds with stable disulfide and thiol groups in their molecule. Nutritional factors should be added to the ever-growing list of exogenous factors capable of inducing or perpetuating pemphigus in genetically predisposed individuals. **(122, 123)**

Garlic burns, second-degree burn, in direct application. **(124,125,126)**

Botulism is a rare but potentially fatal disease caused by toxins produced by *Clostridium botulinum*. A case of botulism in a 38-year-old man after eating canned “garlic in chilli-oil” was reported. The patient was treated with antiserum. **(127)**

In summary, the epidemiological, clinical, and laboratory data have proved that garlic contains many biologically and pharmacologically important compounds, which are beneficial to human health from cardiovascular, neoplastic, and several other diseases. Numerous studies are in progress all over the world to develop effective and odourless garlic preparations, as well as to isolate the active principles that may be therapeutically useful.

Recipes

Dr Jean Valnet is considered from a long time ago as one of the greatest specialists in plant medicine and is represented in various environments. He introduced in France the concept of phytotherapy acting so it was reconsidered and re-evaluated by classical medicine practitioners and patients.

Dr. Martin Reeves recommends us to have a good health without taking medicines.

Paracelsus used to say: “All the glades, pastures, all the mountains and hills are our pharmacy shops”.

In the following lines I will present some recipes based on garlic from Dr Valnet’s book and from Romanian phytoterapeuts.

Internal use:

- As it in salads (in crude form)
- Crush in the evening two garlic cloves, mix them with some fresh parsley, add some olive oil drops; in the next morning, eat a bread toast with the prepared mix.
- In lung abscess: crush garlic bulbs and pour 250 ml boiled water over them.
 - Give 15g to children less than 2 years;
 - Give 25g to children between 2-5 years
 - Give 40g to children between 10-12 years
 - Give 60-80g for the othersContinue the treatment for one month; prepare the dilution every day.
- Arthritis: dilution from 2-3 crushed garlic cloves, boiled in 200 ml water/milk during 15 minutes. The dilution will be taken in one day.
- Atherosclerosis: eat 2-3 garlic cloves, every evening.
- Chronic bronchitis: the same recipe as in lung abscess.
- Intestinal parasites: put 3-4 crushed garlic cloves with boiled milk/water, in the evening; drink the dilution next morning and continue the treatment for 3 weeks.
- Intestinal parasites, another recipe: 2-3 crushed cloves mixed with potatoes purée/ rice. It takes daily, 3-5 days until parasites are eliminated.
- Taenia (swed. binnikemask): crush one great garlic bulb, mix with boiled water/milk; drink every morning, until taenia is eliminated.
- For neutralizing the garlic smell: take some coffee beans and crush them into your mouth or use similarly anise seeds, cumin seeds or cardamom or eat an apple or fresh parsley
- Sclerosis and arterial hypertension: 40g crushed garlic macerates together with 500 ml alcohol for several weeks in a warm, dark place. Take a dilution spoon 3 times/day.
- Arthritis, varicose veins, and cardiac ischemia: put 250 g crushed garlic together with 250g honey; mix them well and macerate for 1 week. Take a mix spoon 40 minutes before each meal (3 times/ day) during 1-2 months.
- A miracle “elixir”: mix 10 crushed garlic bulbs, 200g honey, 200g apple vinegar and a bundle of fresh cut parsley; keep them 1 week in a closed vase. Take every morning 2 teaspoon mix in a cup containing wild rose/watercress/milfoil tea. For various diseases as arthritis, bronchitis asthma, different cancer forms, arterial hypertension, indigestions, obesity, cold, influenza, headaches, ulceration, and impotence – the results are obvious very quickly. In arthritis one can take the above mix every morning and evening; the Romanian phytoterapeuts have noticed that the treated patients are cured in a proportion of 90%.
- Hypertension: crush 300g garlic, put it in a 400 ml vase and cover it with grain alcohol. Close the vase, macerate during 2 weeks, take out the garlic part, mix the rest with a dilution of bee propolis. Take 5-10 drops/day with some water. After complete use of the dilution, repeat the cure after one year.

External use

- Crushed garlic mixed with oil gives an ointment called devil's mustard which resorbes the white tumours (cold abscess) and acne
- For acne, press a cutted garlic bulb against the affected surface
- The disinfection of wounds and ulcerations: dilution of 10%garlic juice with 1% alcohol or compression with garlic vinegar(30g macerated garlic in 500 ml vinegar)
- Itch(scab): rubbing with a mix from one part garlic and two parts camphor alcohol, or wash with a dilution from 6 garlic bulbs in one litter of water
- General weakness and anaemia: the above dilution applied long on the vertebral column
- Oxiuris (swed. springmask): 3-4 garlic bulbs (6-12g) puts into 250ml water and macerate for 2-3 hours. After filtering, apply it as a local wash two times/ day.
- Other recipe against oxiuris: one teaspoon crushed garlic puts into 300 ml hot water; after 15 minutes, apply it as a local wash.
- For deafening of rheumatic cause: introduce into the ear a bit of gauze containing one bit crushed garlic. Another recipe: pour into the ear garlic oil.
- For corn(klavus) and wart: crush one bit garlic and apply it tight in the evening; protect with plaster the unaffected area; take out the garlic bit in the morning. Results can be seen after 2 weeks. Those having sensible skin will apply garlic onto wart 2-3 times/day.
- Another recipe for above: apply a warm bit garlic from oven, several times per day.
- Insect bites(wasps, etc): take out the needle and make rubbing the area with a bit garlic
- An old tradition says that some garlic bulbs in a little sack on the patient's neck or taped into the navel are vermicide and prevent infections.
- Typhoid: apply on the patient's leg a cataplasm with a mix of crushed garlic, onion and stinging nettle and cover them with a warm blanket. Repeat every hour

- Garlic tincture recipe: 50g crushed garlic bulbs, 250g 60% alcohol macerates together for 10 days and filter after. Use: as antiseptic, vasodilatatory, hypotensive, antisclerosis, antirheumatismal, antiasthmatic (a few drops on a bit sugar, in crisis). Generally: take 10-20 drops/day during 1 months, then when needed.
- Garlic tincture 1:50: take 10-15 drops, twice a day (30 drops maximum per day), in continuous cures some days (10---15--30), it depends on diagnosis.
- Garlic oil (crush 3 garlic bulbs, blend them with 3 spoons olive oil; macerate the mix for a week, filter after)

The TCM practitioners in China are using garlic in a large spectrum of diseases, especially in cancer forms combined with other treatments (for instance 10 ml garlic juice is administrated oral in lung cancer). In leukaemia, they cut the sublingual vein and apply fresh garlic rubbing for several minutes. In many cancer forms, the garlic oil is taken orally together with mint oil, beer yeast in combination with injections with F, K, E vitamins and chlorophyll.

Diverse malign tumours are treated with garlic: intramuscular injections with 5 ml distillate garlic, intramuscular injections with 1 ml garlic emulsion with 2 ml novocaine 2%, 2 times/ day and intravenous drop of 25 ml garlic in mixed with 500 ml glucose 10%, one per day. The above therapy lasts for 2 weeks, repeated when needed. (135)

Counter indications for garlic

The use of garlic is not allowed to patients having allergic dermatose (eczema), psoriasis, stomach or intestinal irritations, eye infections (conjunctivitis). The nursing mothers will abstain using garlic, which alters their milk and provoke colic to the baby.

End

Allopathic medicine is in a great dilemma. Never before have we seen such an abuse in administrating medicines. Each medicine has more counter indications than indications. Why not use natural resources? Modern research in natural medicines and treatments confirm the availability of thousand years proven practises, explaining in a scientifically manner “why” are they functioning well. I think we have no need to know why a treatment is good, when using one with proven efficacy. It is enough to know that it is active, undangerous, that it reduces the pain or completely cure the disease. In this category has garlic its special significance.

The mentioned studies from *References* indicate obviously that intensive research all over the world on “traditional” methods and medicines are in the focus of the scientific community.

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