



# Garlic

By Gene Bruno, MS, MHS – Dean of Academics, Huntington College of Health Sciences

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Garlic has been used as both a food and medicine throughout the course of human history. As a matter of fact, garlic is mentioned in written medical texts dating back as far as 5,000 years. This includes texts from China, India and the Middle East. In these texts, Garlic was described as useful for everything from poor digestion to coughs to skin conditions. During World War I, garlic was in high demand, and came to be recognized by the U.S. government as an antiseptic.<sup>1</sup>

Garlic's popularity has extended into modern times. Over 2,000 scientific studies have even been published about the medicinal value of garlic. In fact, garlic is now second only to echinacea as a top selling herb in health food stores.<sup>2</sup> The studies conducted on garlic have identified this plant as helping to improve cardiovascular health, fighting infection, effective against certain types of cancer, and providing antioxidant protection. Following is a synopsis of some of the garlic research.

## **Cardiovascular health**

Cardiovascular research has shown that garlic can play a successful role in lowering

cholesterol and triglyceride levels, and reducing high blood pressure.

## Cholesterol

Meta-analyses, reviews, and individual studies in a variety of countries have demonstrated that garlic is capable of lowering total cholesterol levels by an average of 9–12% over a one-to-four month period, which often included lowering LDL cholesterol, and increasing HDL cholesterol as well.<sup>3 4 5 6 7 8 9 10 11 12 13</sup> Most of these trials used 600–900 mg per day of garlic supplements. There has been some research where garlic was found to be ineffective for this purpose,<sup>14 15</sup> but these studies have been criticized for flaws in their design.<sup>16</sup> Part of the confusion may result from differing effects from dissimilar garlic products. In most studies, but not all,<sup>17</sup> aged garlic extracts and garlic oil (both containing no allicin) have not lowered cholesterol levels in humans.<sup>18 19</sup> Therefore both of these supplements cannot be recommended at this time for cholesterol lowering. Persons wishing to consume garlic and with no aversion to the odor can chew one whole clove of raw garlic daily. An effective alternative to raw garlic is tablets utilizing coatings (to protect against degradation by stomach acids), and standardized for allicin content—which appear promising in some research.<sup>20</sup> An appropriate dose is 600-1200 mg daily (providing no less than 5,000 mcg of allicin), divided into two or three doses.

## Triglycerides

Scores of human studies have demonstrated

garlic's ability to lower serum triglyceride (TG) levels. Reports that have analyzed the results of all studies performed to date on the TG-lowering effect indicate that over a one-to-four-month period, garlic supplements reduce triglyceride levels by 8–27%.<sup>21 22</sup>

#### High blood pressure (hypertension)

Garlic is probably the granddaddy of all natural blood pressure lowering agents, with an extensive traditional history of use for this purpose. This traditional use has been scientifically validated in a meta-analysis that included ten double-blind studies.<sup>23</sup> All of these studies administered garlic for at least four weeks, typically in doses of 600–900 mg daily. In those studies which were limited to people with hypertension, the average blood pressure-lowering effect was highly clinically significant.

#### **Infections**

Garlic has an extensive history of use against a variety of pathogens that cause infections, including bacteria, viruses or fungi/yeast (e.g., *Candida albicans*).<sup>24 25</sup>

#### Bacteria

Although scientific research on it began only 200 years ago, garlic has been used worldwide in folk medicine since ancient times for the treatment of infections and infectious diseases. Garlic was first prescribed by the Sumerians in 3000 BCE for its antibacterial properties.<sup>26</sup> Allicin is by far the most potent antibacterial sulfur compound found in garlic.<sup>27</sup> Authors of a study published in the *Quarterly Review of Biology* suggest that humans evolved a taste for spicy foods to kill the microbes responsible for food spoilage. Dr. Paul W. Sherman, a behavioral ecologist from Cornell University, and Jennifer Billing, his student, analyzed 4,578 traditional recipes from 36 countries and found that the hotter the climate (and the faster the food spoils without refrigeration), the spicier the food. Sherman and Billing conjecture that people who consumed spices with antimicrobial

activity enjoyed greater health, longevity, and reproductive success, passing on the taste for spicy foods. The researchers ranked 43 spices by their ability to kill different bacterial species. Onions and garlic were at the top of the list based on all 30 test microorganisms which they killed.<sup>28</sup> Other research has shown that long-term consumption of garlic can help to prevent infection by the *Helicobacter pylori*<sup>29</sup>, the bacteria which cause peptic ulcers.

#### Viruses

Despite the fairly widespread use of garlic for treatment of the common cold, and the fact that it has an observable clinical benefit, there is no research available to validate its usefulness for this purpose. Nonetheless, the common cold is caused by viruses that infect cells of the upper respiratory tract, and research has shown garlic to be effective against other types of viruses.

In one “test tube” study, the anti-viral activity of garlic extract (GE) was tested on human cytomegalovirus (HCMV). In this research, GE was effective when administered concurrently with the HCMV, but the effect was stronger when pretreatment with GE occurred. In addition, the anti-viral effect of GE persisted long in infected cells after its being removed from the culture medium. The strongest anti-viral effect of GE was demonstrated when it was applied continuously. The authors of this study recommended that clinical use of GE against HCMV infection should be persistent, and the prophylactic (preventive) use of GE is preferable in immunocompromised patients.<sup>30</sup> In another “test tube” study, garlic and its sulfur compounds were tested against selected viruses, including herpes simplex virus type 1, herpes simplex virus type 2, parainfluenza virus type 3, vaccinia virus, vesicular stomatitis virus, and human rhinovirus type 2. The sulfur compounds found to have the greatest antiviral activity were ajoene and allicin; in that order.<sup>31</sup>

## Fungi/yeast

It appears that ajoene is the sulfur compound in garlic that is most potent against fungi.<sup>32</sup> One study found that a cream containing 0.4% ajoene was effective for treatment of athlete's foot fungus (tinea pedis), though such creams are not commonly available.<sup>33</sup> Some studies have even examined the effect of garlic on serious conditions such as leprosy and cryptococcal meningitis (a fungal infection seen mostly in immunocompromised patients). Garlic has been shown effective in these studies, but the data are too preliminary to make definitive conclusions<sup>34 35</sup>—and such serious conditions should only be treated by medical professionals anyway.

Candidiasis is an infection by a yeast-like *Candida* fungus, known commonly as *Candida albicans*. Candidiasis can be manifested as vaginal yeast infections, oral candidiasis (called thrush), and/or the more serious condition, polysystemic Candidiasis. The symptoms of polysystemic Candidiasis are diverse, including allergies, migraines, arthritis-like joint pain, depression, confusion, feeling out of touch with reality and loss of libido. Research has clearly shown that garlic has anticandidal activity, inhibiting both the growth and function of *Candida albicans*.<sup>36 37</sup> It is interesting to note that when six of garlic's compounds were studied, it was the ajoene fraction that had the strongest activity against *Candida*.<sup>38</sup> This suggests that when shopping for a garlic supplement, it is best to find one that is standardized for its ajoene content, not just the typical allicin content (although this is important too). Garlic exerts its effect by compromising the structure and integrity of the outer surface of yeast cells, oxidizing certain essential proteins in the yeast, which causes inactivation of yeast enzymes and subsequent microbial growth inhibition.<sup>39</sup>

## **Cancer prevention**

Garlic has been examined for its potential ability to prevent certain forms of cancer. In two studies conducted in China and Italy,

fresh or cooked garlic was found to lower the risk of stomach cancer.<sup>40 41</sup> Another study conducted in the United States demonstrated that a high garlic intake correlated with a lower risk of colon cancer in women.<sup>42</sup> How much is high? About, a clove or more daily seemed to yield the desired protective benefits.

## **Antioxidant**

Sulfur is an antioxidant, and so are the sulfur compounds found in garlic. In fact, in one study garlic was examined for its free-radical scavenging properties in vitro (i.e., in a test tube). The scavenging effects of garlic on hydrogen peroxide were measured and found to be equivalent to the reference compound. In another assay, garlic was found to be able to inhibit lipid peroxidation on the chain oxidation of lipid micelles induced by a hydrophilic radical initiator. The results of the study support previous evidence that garlic and its sulfur compounds may be useful therapeutically for scavenging free radicals such as hydrogen peroxide and peroxy radical.<sup>43</sup>

## **Conclusion**

Much of the aforementioned research indicates that there are various sulfur compounds in garlic which contribute to its activity. Consequently, it makes sense to find a garlic product which is not only standardized for allicin, but for other sulfur compounds such as allin (an allicin precursor), scordinin, ajoene, dithiols and diallylsulfides. Furthermore, research also suggests that garlic will retain more of its activity if it is processed in a way which protects its sulfur compounds from degradation by stomach acids.<sup>9</sup> Consumers should examine the labels of possible purchases to verify that such a process is used on that garlic product.

## **References**

1. Grieve M, *A Modern Herbal* (1931) New York: Dover Publications.
2. Brevoort P, *HerbalGram* (1995) 36:49-57.
3. Silagy C, Neil A, *J R Coll Physicians London*

- (1994) 28:39-45.
4. Neil HA, et al, *J R Coll Physicians Lond* (1996) 30(4):329-34.
  5. Holzgartner J, Schmidt U, Kuhn U, *Arzneim-Forsch Drug Res* (1992) 42:1473-77.
  6. Siegel G, et al, *Wien Med Wochenschr* (1999) 149(8-10):217-24.
  7. Bordia A, Verma SK, Srivastava KC, *Prostaglandins Leukot Essent Fatty Acids* (1998) 58(4):257-63.
  8. Orekhov AN, Grunwald J, *Nutrition* (1997) 13(7-8):656-63.
  9. Orekhov AN, Tertov VV, *Lipids* (1997) 32(10):1055-60.
  10. Agarwal KC, *Med Res Rev* (1996) 16(1):111-24.
  11. Ali M, Thomson M, *Prostaglandins Leukot Essent Fatty Acids* (1995) 53(3):211-2.
  12. Orekhov AN, et al, *Ann Med* (1995) 27(1):63-5.
  13. Gore JM, Dalen JE, *JAMA* (1994) 271(21):1660-1.
  14. McCrindle BW, Helden E, Conner WT, *Arch Pediatr Adolesc Med* (1998) 152:1089-94.
  15. Isaacsohn JL, et al, *Arch Intern Med* (1998) 158:1189-94.
  16. Lawson L, *Quart Rev Natural Med* (1998) Fall:185-86.
  17. Steiner M, et al, *Am J Clin Nutr* (1996) 64(6):866-70.
  18. Berthold HK, Sudhop T, von Bergmann K, *JAMA* (1998) 279:1900-2.
  19. Silagy C, Neil A, *J R Coll Phys London* (1994) 28:39-45.
  20. Silagy C, Neil A, *J R Coll Phys London* (1994) 28:39-45.
  21. Silagy C, Neil A, *J Royal Coll Physicians London* (1994) 28:39-45.
  22. Holzgartner J, Schmidt U, Kuhn U, *Arzneim-Forsch Drug Res* (1992) 42:1473-77.
  23. Silagy C, Neil AW, *J Hypertension* (1994) 12:463-68.
  24. Reuter HD, *Phytomedicine* (1995) 2:73-91.
  25. Sendl A, *Phytomedicine* (1995) 4:323-339.
  26. Golledge, Clayton L, Riley TV, *Medical Journal of Australia* (1996) 164:94-95.
  27. Yarnell E, Garlic: Continuing Education Module (1999) New Hope Institute of Retailing (produced in association with Bastyr University, Bothell, WA). 8 pages.
  28. Billing J, Sherman P, *The Quarterly Review of Biology* (1998) 73(1): 3-49.
  29. Zhou ZF, Zhang YS, Wang YM, *Chung Hua Liu Hsing Ping Hsueh Tsa Chih* (1997) 18(1):18-21.
  30. Guo NL, et al, *Chin Med J* (1993) 106(2):93-6
  31. Weber ND, et al, *Planta Med* (1992) 58(5):417-23.
  32. Yarnell E, Garlic: Continuing Education Module (1999) New Hope Institute of Retailing (produced in association with Bastyr University, Bothell, WA). 8 pages.
  33. Ledezma E, et al, *Mycoses* (1996) 39:393-5.
  34. Chaudhury DS, *J Ind Med Assoc* (1962) 39:517-20.
  35. Hunan Medical College, *Chin Med J* (1980) 93:123-6.
  36. Adetumbi M, Javor GT, Lau BH, *Antimicrob Agents Chemother* (1986) 30(3):499-501.
  37. Yoshida S, et al, *Appl Environ Microbiol* (1987) 53(3):615-7.
  38. Ibid.
  39. Ghannoum MA, *J Gen Microbiol* (1988) 134(Pt 11):2917-24.
  40. Buiatti E, et al, *Int J Cancer* (1989) 44:611-6.
  41. You WC, et al, *Cancer Res* (1988) 48:3518-23.
  42. Steinmetz KA., et al, *Am J Epidemiol* (1994) 139:1-5.
  43. Ide N, Matsuura H, Itakura Y, *Phytotherapy Research* (1996) 10:340-341.



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