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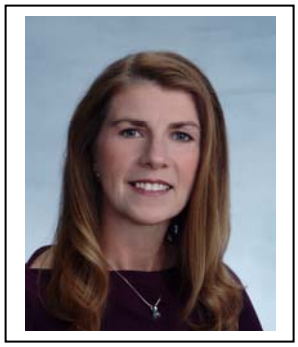

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ESTROGEN, HEART DISEASE AND THE WOMEN'S HEALTH INITIATIVE *by Ann Gerhardt, MD 8/31/07*

Subscribe at algerhardt@sbcglobal.net

Bottom Line at the Top: The 2002 Women's Health Initiative study of post-menopausal hormone therapy panicked 1000's of doctors and millions of women into discontinuing hormones. Problem is, the conclusions ONLY apply to healthy white women, an average of 15 years into their menopause, who are willing to be randomly assigned to take Premarin with Provera or not.

In 2002, the Women's Health Initiative (WHI) proved that reams of scientific evidence can be tossed into irrelevancy by one study. Until 2002, most data pointed to the conclusion that hormone replacement therapy (HRT), or at least estrogen, reduces risk for heart disease. Then the New England Journal of Medicine published the WHI, evaluating the health effects of the hormones Premarin and Provera in 16,608 post-menopausal women. The safety monitoring

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HELP Health Volunteers Overseas!

Dr G is returning to Lima, Peru to teach medicine to Peruvian doctors, under the auspices of Health Volunteers Overseas. This organization places healthcare personnel in third world countries to teach, rather than do. That way, the knowledge and work continues after we leave the country, rather than being dependent on our presence.

I've been spending a huge amount of time writing lectures for Peru (hence the delay in your newsletter). By returning to Peru, rather than going to a new country, I know more of their needs and am creating talks that should be of good use.

Your tax-deductible donation would really help to support HVO's work. Please send a check made out to Health Volunteers Overseas to Dr Gerhardt at P.O.Box 19274, Sacramento, CA 95819. Donations will be batched and forwarded to HVO. ⚕

Every Little Bit Helps *by Ann Gerhardt, MD* *Subscribe at algerhardt@sbcglobal.net 8/15/07*

Bottom Line at the Top: It doesn't take much physical activity to improve health.

The latest 'proof' for current exercise recommendations comes from a study of sedentary, overweight women. These women, starting at miserable levels of fitness, performed moderate activity at 50%, 100% or 150% of current exercise recommendations for 6 months. That translated to 72, 136 and 192 minutes of walking per week.

Going from no exercise to a measly 72 minutes of walking per week boosted their fitness level by 4.2%. Each incremental increase in walking time spurred an additional 2% gain in fitness. Presumably longer or more frequent walks could have bumped it even higher.

How high could they go if they had Forrest Gumped themselves into continuous frenetic activity? Eventually fitness, defined by peak oxygen consumption (VO2max), must max out. VO2max varies from person to person and is genetically determined. Whether or not we achieve our maximum capacity depends on how hard we train.

VO2max depends on the lungs to take up oxygen and transfer it to blood, the heart and circulation to pump the oxygen and blood to the muscles, and the muscles to pull oxygen out of the blood and use it. Sedentary males average a VO2max of 45. Sedentary females have slightly lower levels, about 39. Recreational athletes typically hover between 45 and 65.

Until we can genetically engineer more fit humans, is appears that we are stuck at a maximum VO2max of 85for males and somewhat less for females. Elite cyclists and some of the best runners in history, like Alberto Salazar, peaked at 85, while Joan Benoit Samuelson (long-time American marathon record-holder) maxed out at 78.

The good news is that we don't need to achieve our maximum fitness capacity to reap the longevity and health benefits of exercise. The bad news is that we don't have a reliable measure of those benefits. Physical activity reduces cardiac and vascular disease without necessarily affecting weight, cholesterol or blood pressure levels. That means that we can't use blood pressure, cholesterol and weight to determine whether or not we are doing enough.

No single lab test assesses exercise adequacy. VO2max measurement requires a special laboratory and costs money. Rather than a single number we can measure, there are a constellation of physiologic processes affected by exercise, most easily measured.

Some individuals do get immediate positive feedback from their exercise: My patient whose legs hurt less since he started to walk ½ mile per day has an easy guide to measure the effect of his exercise. For most, however, it takes decades to see outcomes like less heart disease, stroke and cancer.

How much is enough??? Long ago people didn't worry about exercise prescriptions. Without cars, desk jobs and TV's, walking and physical activity were just part of life. As lifestyles changed, so did attitudes about moving our bodies. By the 1970s, people figured out that regular exercisers live an average of 3.5 years longer and without cardiovascular disease than those who don't. Enough information was available about the beneficial effects of vigorous exercise that national health organizations began issuing physical activity recommendations to the public.

Initially cardiologists and sports medicine specialists prescribed vigorous exercise, 20 minutes per day, three days a week, while the Centers for Disease Control (CDC) and Surgeon General advocated longer, more moderate exercise. The different exercise prescriptions confused people, not recognizing that the groups' goals were different: The former groups pushed for improved fitness and the latter aimed for overall general health and longevity.

As understanding of the benefits of less vigorous activity grew, the two ends of the spectrum migrated to a common, middle ground. Recognition that small amounts of activity, accumulated over the day, all 'count' towards health had a huge impact on exercise goals. Now most groups agree that **we all should perform moderate activity 30 minutes or more on most days of the week, even if it comes in three 10-minute sessions per day**.

Don't lull yourself into believing that this is the last iteration of the exercise prescription tale. New information should lead to further refinement. Doctors might even be

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able to prescribe unique workout plans to fit each person's needs.

How much do people do??? The CDC acquired self-reported data from people all over the U.S. via random-digit dialing. Only 37 – 52% of people claim to exercise regularly by current standards. The range of 37% – 52% reflects different patterns according to race and sex. This data probably over-estimates exercisers, since many people refused to respond and, for those who did, self-reported data has proven time and again to skew reality towards overestimating 'good' behavior. The statistics are even worse in individuals with type 2 diabetes, 69% of whom report no or inadequate regular physical activity in a national health survey.

Can we do enough? Many studies of couch potatoes embarking on fitness programs instill hope. Theoretical models of human behavior propose that adoption and continuation of an exercise lifestyle follows a series of steps, starting with a contemplation phase. For some, this phase lasts a lifetime, punctuated frequently by avoidance maneuvers. For others, an action phase follows, which involves actually moving.

If this does not cause apoplexy, one can enter the maintenance phase, the hardest of all, but absolutely necessary to achieve long-term health benefits. (Tapering off to an occasional walk with the dog not only begets a fat dog, but fails miserably to achieve any health benefits.)

The good news is that the "no pain, no gain" philosophy has been replaced by "every little bit helps." reason. ╣

Morrie says, "If you're trying to show off for people at the top, forget it. They will look down at you anyhow. And if you're trying to show off for people at the bottom, forget it. They will only envy you. Status will get you nowhere. Only an open heart will allow you to float equally between everyone."
Tuesdays with Morrie by Mitch Albom

Garlic & Health by Ann Gerhardt, MD

Subscribe at algerhardt@sbcglobal.net 8/15/07

Bottom Line at the Top: Crushed garlic and garlic extracts block clotting by inhibiting platelet aggregation and this effect may prevent clogged arteries and heart disease. Claims that garlic lowers cholesterol, acts as an anti-oxidant, cures diabetes or prevents cancer lack definitive proof. Allicin is probably not the active component.

I thought garlic would be a simple, herb-with-some-data-a-lot-of-hype-some hope-subject for an article. Fat chance. It seems a basic premise was remiss. Until recently most people were convinced that allicin, a sulfur-containing constituent of crushed garlic, was responsible for garlic's health effects. Manufacturers standardize their garlic supplements according to the percent allicin. Scientists verify that their garlic tablets should work by documenting the allicin content. If for no other reason, it smells the worst, so it must be the healthiest part of the bulb.

It turns out that a lot or a little allicin in garlic supplements make no difference to health effects. Supplements with equivalent allicin content produce different study results. Allicin is not even absorbed intact into the body. Since supplements used in studies have been standardized to allicin content, it makes interpretation of their results problematic.

Medicinal Uses: Garlic (Allium sativum) is one of the most commonly used cooking spices and medicinal herbs Its aroma has attracted and repulsed for years, inspiring such common manes as stinking rose, nectar of the gods and camphor of the poor.

Over the years, people have used it to treat leprosy, clotting disorders, deafness, TB (inhaling garlic dust), dropsy, smallpox, earaches, flatulence, Candida infections, diabetes, toothache, sore throat, worms, asthma and scurvy. More recently, it is used to prevent or reverse heart disease, improve the immune system, prevent cancer, normalize cholesterol and blood pressure, and cure cataracts and disturbances of the gastrointestinal tract, like colic, flatulence and dyspepsia.

Garlic kills a variety of bacteria and fungi when applied directly to them (as on skin). The powder is more active than garlic-in-oil. Russian army physicians treated infected wounds with garlic when antibiotics were scarce in WWII. Allicin was patented as an antifungal, however it never advanced to a commercial product.

Ingesting 1200 mg garlic daily repels ticks slightly better than placebo, but the dose, equivalent to ~ 3 cloves.

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Appearance Obsession, by any other name *by Ann Gerhardt, MD Subscribe at algerhardt@sbcglobal.net*

I'm continuously amazed at how the marketing machine turns perfectly laudable goals, like 'health,' into tools to sell products. I shouldn't be surprised, just like the cat shouldn't be surprised every time the garage door goes up, but he is and I am. Call it naivete or cluelessness but, to me, twisting a face lift into 'anti-aging', slimming clothes into 'health' and an air-polluting car into 'freedom' seem a bit disingenuous.

Health: I had hopes that *Health Magazine* would actually promote health. But it has turned out to be just another women's rag mag. It camouflages appearance and weight obsessions with liberal smatterings of the word 'health'. Not one article addresses men's or children's health. Too many articles and innumerable advertisements deal with make-up, fat lips and pedicures. Do those subjects really relate to health??? Try as I might, I just can't extrapolate "Gorgeous lips in minutes with our TOP picks for luscious lips" to *real* health … as in live-longer-with-less-disease.

Not one article in the September 2007 issue suggests that it's OK to be female and curvy. Over 50% of Health's pages, including ads, focus on weight loss, without comment about who should and shouldn't slim down. The "Style Tricks For Slimmer Hips" uses Kate Winslet, Kelly Clarkson and Tyra Banks, all of whom sport full, gorgeous bodies and proud-of-it attitudes, to show you how to dress to look thin. How *could* they go over to the dark side?? E

Even the "What Looks Great On Your Shape" article merely 'helps' 3 very normal women to lengthen the waist, slim and draw the eye away from the hips, lengthen legs, skim over curves and emphasize cleavage. If you fail at *being* thin, then at least buy clothes to look the part, and, you know, be *healthy.*

Anti-Aging: My email box fills with ads for 'Anti-aging' seminars where I could learn procedures and potions to make even tobacco-wrinkled, muscle-atrophied, hacking, vomiting bodies look young. That way they can look in the mirror and see young while they are dying. Belief in the delusion that appearance equals age just validates and perpetuates the marketing ploy. Do a shrink- wrapped face and buttock implants really equate to a younger being? No: The true rejuvenators are balanced diets, walks around the block, equanimity and peaceful sleep. But they won't be marketed as 'anti-aging.'

Colin Fletcher, the father of modern backpacking , died in June. When doctors cared for him in 2001 after he was hit by a car, they noted that his legs looked like those of a muscular 30 year-old, not the 79 year-old that he was. That sounds like health *and* appearance. Too bad that most people think of exercise as a tool to lose weight, rather than to promote both health and anti-aging. ╣

Estrogen, continued from page 1

board stopped the trial early, after women took their study pill an average of 5.2 years. They had noticed higher rates per year of breast cancer (8 more cancers per 10,000 women) and heart attack (7 more events per 10,000).

U.S. women suffered a collective hot flash, as doctors rushed to stop HRT, to prevent heart attacks and law suits. Some doctors were kind enough to have women taper off their hormones, to make the hot flashes less devastating. HRT prescriptions plummeted from 22.8 million in 2001 to 12.7 million in 2003. Standard dose Premarin use dropped

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WHI cardiovascular disease study results
16,608 women with an intact uterus, aged 50 – 79
Received Premarin/Provera or placebo daily for an average of 5.2 yr

Relative risk* starting with conditions made worse by HRT, and ending with conditions it seems to prevent

pulmonary embolism	2.13
stroke	1.41
heart disease	1.29
breast cancer	1.26
overall death rate	1.00
uterine cancer	0.83
hip fracture	0.66
colon cancer	0.63

* A relative risk of 2 = twice the rate, 1 = the same, and a number less than one is a low risk (0.5 would be half the risk), compared to placebo.

(JAMA 2002;288:321)

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80%, while other hormone formulations declined at a lower rate and low dose Premarin use slightly increased.

The lynch mob that followed WHI proclaimed that estrogen increases cardiovascular disease, clots, dementia, and breast cancer with no net clinical benefits. If the mob were politicians, I'd understand. But these people were doctors and scientists who should have known that a study of Premarin and Provera in mostly white women 15 years after menopause applies only to those drugs (not all hormones) and those women.

Postmenopausal women lack the hormones estrogen and progesterone. Losing these sex hormones leads to hot flashes and genital and breast atrophy. Because heart, blood vessels, joints, bone, brain, liver also bind estrogen, women lose estrogen's effect on those organs also.

To make the life of hot flashes less miserable and to prevent osteoporosis, doctors prescribe HRT. In women without a uterus, HRT equals estrogen in one form or another. If a woman has not had a hysterectomy, we add progesterone to prevent estrogen-induced uterine cancer.

For years we also thought that HRT prevented heart disease, because pre-menopausal women suffer fewer heart attacks than do men of similar ages. After menopause, women catch up, making heart disease their primary cause of death.

Animal experiments in the 1950's demonstrated that estrogen administered to animals on a high-fat diet prevented coronary heart disease. Retrospective, case-control studies in women supported the cardio-protective effect of estrogen. A variety of observational studies, with various types of subjects, hormones, parameters and end-points, were all mostly positive.

Even though numerous observational studies of estrogen showed reduced risk of heart disease, the significance of the association was questioned. Women taking estrogen were more likely to be lean and practice healthful behavior. A randomized trial of estrogen had to be done for proof.

To whom do the WHI results apply?
Only women similar to those in the study and taking the same medication. To understand the implications of WHI, we must know its specifics.

From 373,092 women contacted, the WHI study group recruited 27,347 (16,608 with uteri and 10,739 who had had a hysterectomy) healthy women, 50 to 79 years of age (average 63.3) from 40 U.S. clinical centers. The women who were screened but did not participate were either disinterested in participating, unwilling to sign a consent, deemed unreliable

for medication adherence (dementia or substance abuse), likely to move out of the area in 3 years or saddled with a current or history of disease that might recur in 3 years.

Less than 10% of the women contacted made up the study group of 27,347. **That means that 345,745 women, representing a huge segment of the female population, were excluded or chose not to participate for whatever reason.**

WHI included mostly white (83%), healthy women, an average of 15 years into their menopause, who were willing let someone randomly decide whether or not they took hormones. It does not apply to women who knew that they would hate their sleepless, sweating lives if they went off hormones and on placebo. WHI studied illness only in people with no life-threatening illness. Those who are black, Hispanic, drunk or forgetful can forget thinking the results apply to them.

About which drugs can we draw conclusions?
Only Premarin and Provera. Calling Premarin and Provera 'estrogen' and 'progesterone,' as most authors do so loosely, ignores the fact that neither is equivalent to normal human hormones. This misleading simplification is unconscionable. **Premarin (CEE) is a mixture of 6 conjugated estrogens from horses, only two of which are native to humans.** Their estrogenic activity varies, with some being more active and others less. Their effect on the liver and blood vessels are for the most part unknown. Provera, or medroxyprogesterone acetate (MPA), is a derivative of human progesterone, with weaker progesterone and more androgenic (male hormone) activity.

Estrogens and progestins other than Premarin and Provera are available, including the 'natural' hormone, 17β-estradiol. 'Natural' progesterone must be taken in a large dose of a micronized form (200 mg) because of poor absorption. Synthetic hormones are used primarily in oral contraceptives.

No existing HRT (including 'bioequivalent' hormones)

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perfectly mimics normal human hormone physiology. Most women take hormones orally, while natural estrogen is released directly into the circulation. After absorption by the gut, *any* estrogen taken by mouth must pass through the liver, at levels 4-5 times that of normally circulating hormones. Those high levels stimulate the liver's production of proteins involved in clotting, blood pressure (renin substrate) and cholesterol (apolipoproteins).

A skin patch slowly delivers estrogen through the skin into the blood. This transdermal estrogen bypasses the liver activating, it far less. Both Premarin and 17β-estradiol come in patch form. No one has studied the long-term cardiac or health outcomes of any transdermal estrogen.

In spite of these differences, authors and doctors lump all types of hormonal treatments under the moniker HRT. They persist in drawing conclusions for all estrogens and progestins based on data with Premarin and Provera. This condemns all hormone replacement by association and is scientifically irresponsible. As we have found with innumerable other medications, drugs of a similar type often differ in their activity and side effects. HRT is no different.

How can we reconcile WHI results with past studies?
More than 40 studies over three decades, with several hundred thousand woman-years of follow-up, pointed to beneficial effects of HRT for preventing heart disease. Those studies suggested that estrogen, usually Premarin, reduced coronary disease by 35-50%. Most were observational studies, not placebo-controlled, randomized, blinded or prospective trials, but they most agreed that estrogen confers at least some benefit.

The key to the difference between WHI outcomes and that of past studies might partly lie in timing. **Blood vessels lose their estrogen receptors with old age or disease.** Early in menopause, if a woman does not already have vascular disease, estrogen may work the magic that keeps pre-menopausal women from having so many heart attacks. Later on, when estrogen can't bind to blood vessels because the receptors are gone, it's impotent.

In monkeys, estrogen delays artery clogging if given early, but not late in menopause. The Estrogen in the Prevention of Atherosclerosis Trial (EPAT) of women treated with 17β-estradiol showed the same thing: In the first year angiograms showed no extra clot and there was a normal risk of heart attacks.

A younger woman who smokes or has diabetes might have damaged her blood vessels sufficiently that estrogen receptors disappear even before menopause, so estrogen won't have an effect. Similarly, once atherosclerosis diseases blood vessels to the point that estrogen receptors are obliterated, it's useless to try to reverse that disease with estrogen.

Even WHI investigators draw different conclusions when considering only women soon after menopause. After sending women into hot flash devastation, they published data in June 2007 of the effect of Premarin on 1064 younger women, 50-59 years of age and starting Premarin early in their menopause. They measured the level of calcium build-up in arteries, which is somewhat proportional to coronary disease. Those who had taken estrogen were 30 to 40 percent less likely to have measurable levels of coronary artery calcium compared to those on placebo.

We think we know one thing for sure: **In women who already have heart disease, long (15-23 years) after onset of menopause, Prempro does not 'fix' their heart problem.** This was proved convincingly by three large studies. In the Heart and Estrogen/Progestin Replacement Study (HERS), the heart attack and death rates did not budge in 2763 female cardiac patients taking Prempro for an average of 4 years. Two other studies used angiograms before and after three years of HRT (Premarin or Prempro in one and 17β-estradiol $\pm$ micronized progesterone in the other) to show that narrowed coronary arteries were no different with or without hormones.

HERS found that hormones escalated heart attack risk in the first year after starting HRT. Oral estrogen does make some women more susceptible to clotting, so HRT probably tipped the balance towards clot in those women most at risk.

After 5 years, the cardiac event rate matched that of placebo, with no further benefit or harm. Throughout the whole time period, the overall death rate was the same on or off hormones.

In the middle 3-5 years, HRT reduced risk, possibly because these women were not as susceptible to the clotting effects of HRT, and able to experience the benefits of estrogens. Estrogen dilates non-diseased coronary artery walls, so they can carry more blood. Estrogen raises the good HDL-cholesterol and reduces bad LDL-cholesterol, while Provera raises LDL-cholesterol. Estrogen reduces some aspects of inflammation and clotting, but increases others.

The recommendations that followed these studies advised against starting or continuing HRT long after the onset of menopause for the purpose of preventing heart disease. That conclusion does not cover all scenarios, however. It does not apply to women early in menopause, women with exceptional risk for osteoporosis (which estrogen guards against), women with severe hot flashes or black women. More than 80% of the subjects in two of those studies were Caucasian and the third studied mostly Hispanics.

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Estrogen, continued from page 6
Many doctors have switched their patients to 'natural' hormones, assuming their safety and beneficence. These assumptions are premature, since 'natural' hormones given orally might activate the liver and induce clotting similarly to Premarin. Perhaps the delivery route (pill vs patch vs cream) is more important than the type. 'Natural' hormones need their own studies to determine their worth and dnagers. It's going to be hard to address all different variables, when such studies take years, thousands of women and millions of dollars.

In the meantime women and their doctors must make decisions based on limited data, involving a flawed combination of Premarin and Provera. ╣

One of the signs of an impending nervous breakdown is believing that one's work is terribly important.
Bertrand Russell

Garlic, *continued from page 3*

garlic/day, would be guaranteed to repel most humans, too. It used to be the remedy of choice for serpent or vampire bites.

Cholesterol: Some have hypothesized that the lower-than-normal incidence of heart disease in some Mediteranean countries may in part be due to the routine consumption of garlic. Lowering cholesterol is one way that garlic might prevent heart disease. In liver cell cultures, water extracts of garlic block cholesterol synthesis by 30-87%. Other types of extracts, fresh garlic and aged garlic extract (AGE) are not as potent. Pure alliin or allicin are totally ineffective at lowering cholesterol. **A number of sulfur-containing compounds found in garlic, including ajoene and S-allyl cysteine (SAC), each decrease cholesterol production in cell cultures by 40-50%, but whole garlic extract works better.**

Scientists disagree about which step of the cholesterol production pathway garlic blocks. Some suggest that it blocks the same enzyme as do the statin drugs Lipitor and Crestor, while others find inhibition of a different enzyme (4-α-methyl oxidase) or multiple enzymes. But does this test tube effect translate into real cholesterol improvement in people who take it by mouth?

Over 100 animal studies generally (but not always) confirm garlic's cholesterol-lowering effect, but require a huge amount of garlic (up to 2% of their total food weight). A comparable dose for humans would be 4-5 cloves of garlic daily: You might have a better cholesterol level, but at the expense of no close (literally and figuratively) friends.

On average, cholesterol-lowering trials in people yield a 10% cholesterol reduction using fresh garlic, garlic power, garlic oil or AGE. Effects on triglycerides and HDL-C are less convincing. Dosages range from ½ to 5 cloves (or the equivalent powder or extract) per day. Conclusions about dose are difficult, because the same dose that lowered cholesterol in one trial might be ineffective in another.

A very well-designed study published this year seemingly buries any notion that garlic lowers cholesterol in humans. The Stanford investigators compared 1 clove per day of fresh garlic to 4 Garlicin tablets (garlic powder) or 6 Kyolic (AGE) capsules, standardized to their allicin content. After 26 weeks people with initially high LDL-cholesterol had absolutely no improvement of their cholesterol levels. It is hard to reconcile these results with the many others that showed cholesterol reduction, but many of the others had methodological short-comings.

Coronary heart disease: Though garlic inconsistently affects animals' and human's cholesterol levels, repeated animal studies show that high garlic doses keep their arteries clean, without the plaque build-up that causes heart attacks and stroke. Kyolic reduces the fat and cholesterol accumulation in rat aortas and blocks artery wall thickening.

Garlic may also protect against vascular disease by means other than cholesterol. **More than one of garlic's sulfur compounds inhibit blood clotting by impairing platelet aggregation and speeding up fibrinolysis (the breakdown of clot).** It also may open up arteries, leading to lower blood pressure, as it does in rats. Inconclusive evidence suggests that garlic acts as an anti-oxidant, and decreases calcium build-up in coronary arteries. Cardiac patients taking garlic oil were able to walk farther, with a lower heart rate. Garlic tablets did not help patients with bad leg circulation.

Diabetes: Some tout garlic as a treatment for diabetes, but in well-designed studies it does not significantly lower glucose. If garlic is good for diabetics, it is probably due to its beneficial vascular effects, since clogged arteries cause most lethal diabetic complications.

Cancer: Those who eat diets high in garlic and onion have 60% less stomach cancer. Claims for a protective effect of garlic against breast and prostate cancers have not yet been proven. Test tube experiments hint that garlic's sulfur compounds inactivate ingested carcinogens and down-shift

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the liver's conversion of charred meat's pre-carcinogens into carcinogens. Whether this occurs in humans after consuming garlic is unknown.

Allicin dilemma: Allicin is not present in raw garlic, though garlic is full of natural sulfur-containing chemicals responsible for its sharp taste and strong smell. Raw garlic contains alliin, with little smell and no apparent biologic function. Crushing garlic liberates alliin from one compartment, and the enzyme allinase, which is released from another compartment, converts it to allicin. Allicin confers the really sharp aspect to crushed garlic's odor.

Allicin blood levels are undetectable in the body after even excessive (10 cloves) garlic consumption. This is probably because allicin is unstable and degrades to another sulfur substance (allyl-methyl-sulfide) in the stomach. That compound and others pass through the gut into the liver where they are further modified, then carried by the bloodstream to the lungs and skin. For hours to days later, they escape as garlic breath and body odor, reminding your friends about your recent garlic meal.

Allicin's chemical instability makes it unlikely that it has any health benefits. Independent laboratory analysis of supplements often show little or no allicin in tablets and oil capsules on the market. Some manufacturers have attempted to maximize allicin's bioavailability (absorption into the body in a usable form) with an enteric coating to protect it from stomach acid, without much success.

Must it smell to be good? Those who believe that the smelly substances in garlic confer its medicinal qualities dispute the therapeutic value of deodorized garlic. But allicin, which contributes significantly to garlic's smell has not been proven to be responsible for garlic's health benefits. Most studies demonstrating garlic's health benefits used cooked garlic, pickled garlic, aged garlic, and AGE. All of them have little typical garlic odor, refuting the idea that garlic must reek to be good.

Composition: Garlic contains dozens of sulfur-containing compounds. Though individual compounds, such SAC, seem to be biologically active and are absorbed by the body, it is likely that multiple compounds act in synergy for medicinal effects. Other members of the Allium plant genus, like leeks, onions, chives and shallots, contain lesser amounts of these same sulfur compounds. Garlic contains vitamin B6, vitamin C, flavonoids, germanium, selenium and manganese. Their quantities in garlic are probably too small to confer health benefits.

Significant variability: Garlic's chemical make-up varies depending on where it was grown and even from bulb to bulb. How garlic is processed to form pills and capsules further affects its composition. Whole garlic cloves, garlic crushed in oil, steam-distilled garlic oil and garlic powders all have different amounts of each sulfur-containing compound. Depending on the preparation, there might be zero to 100% of the amount found in crushed garlic.

Composition also changes over time during storage and is affected by heat. Allicin decomposes slowly over time and rapidly with heating, which is why garlic's odor mellows with cooking. Crushed garlic's ability to inactivate platelets lasts 10 months if stored at less than 45°F and is gone after 10 minutes of boiling or 400°F heat. Uncrushed garlic loses its ability to block platelet aggregation after 6 minutes of boiling or high heat. Microwaving inactivates the least. Freshly crushed, uncooked garlic is most active.

Side effects: Garlic's ability to inhibit clotting by inactivating platelets might lead to bleeding, so garlic supplements should not be taken with warfarin (coumadin) or anti-platelet drugs such as aspirin or Plavix. **It should be stopped one week prior to surgery.** Fresh garlic extract may elicit burning of mouth, esophagus and stomach, non-bacterial halitosis, nausea, sweating and lightheadedness. Garlic dust induces asthma. Garlic-in-oil preparations have caused botulism. Strong oils and pastes applied directly to the skin have caused burns, particularly on children. Some babies who are breast fed by mothers who eat garlic are slow to feed and later smell like garlic-breath.

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Think first, before you act: Because you are an extraordinary manifestation of a tangle of unique genetic material, think first, before applying any or all of this newsletter's information to your life choices. Dr G's just trying to interpret medical and nutrition news for you - within the framework of information already known and the limitations of how the studies were done. Articles this size can't possibly contain every bit of information published on a subject.. Distillation may leave some things out: Hopefully not crucial pieces. Don't crucify me if some new tidbit of information comes along that contradicts what I wrote. This newsletter offers some insight, not The Cure. PLEASE discuss any changes in therapy or lifestyle with your doctor. Subscribing to this newsletter presumes that you accept your own risk when making decisions about your health. **Feel free to send questions or comments.** Feedback and change are good.

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