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Chiropractic for Low Back Pain

By Felise Milan, MD

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THE LIFETIME PREVALENCE OF LOW BACK PAIN IN INDUSTRIALIZED nations is 70%¹ and more than one-third of those afflicted with low back pain seek care from a health care provider.² Low back pain is the second most common reason for office visits to primary care providers and the most common reason for visits to orthopedists, neurosurgeons, and occupational medicine physicians.³ This results in 17.4 million visits to physicians per year with an estimated cost of \$190 million per year.⁴

Chiropractic: Background Information

Spinal manipulation as a technique for treating musculoskeletal pain has been documented as far back as ancient China and Greece. The profession of chiropractic was developed in 1895 by Daniel David Palmer, a grocer and magnetic healer in Davenport, Iowa. Chiropractic (Greek for "done by hand") was founded on the principle that joint dysfunction and misalignment of the spine may play a significant role in health and disease. Spinal manipulation therapy (SMT), therefore, can correct these problems and facilitate the return of health and equilibrium. Early in its history, the profession experienced a philosophical split between two factions. The "straight" chiropractors insisted on remaining true to the original theories proposed by Palmer, while the "mixers" felt that it was more realistic to incorporate other theories of health and disease, such as infection, which were being adopted by the scientific community of the time. This lack of uniformity within the field continues today.⁵

There are 17 accredited colleges of chiropractic in the United States with a total of 2,000 graduates per year. Two years of college is required for admission and the five-year curriculum requires 4,000 hours of basic science instruction and 1,000 hours of clinical internship for graduation. The National Board of Chiropractic Examiners administers a three-part licensing exam. Most states also require a practical exam for state licensure⁶ and all 50 require licensure, but

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individual states vary with regard to their permitted scope of practice. All states allow a spine-focused history and physical exam, X-rays, and spinal manipulation, and 90% also permit a more general history and physical, health advice, and ordering tests (ranging from blood work to CT scans). It is advisable for any physician to find out from his/her own state's licensing body what his/her state allows.

Chiropractic: Efficacy Data for Low Back Pain

The literature for chiropractic undoubtedly has been the most scrutinized of all the complementary and alternative medicine fields. Chiropractic research has faced the same challenge as other therapies that involve strong doctor-patient interactions and hands-on and individualized therapy with criticism of its methodology. An expert panel assembled for the RAND Corporation critically reviewed the literature on the efficacy of spinal manipulation for acute and chronic low back pain, neck pain, and headache. Although several of the studies had poor research design, the consensus of the panel was that for acute, uncomplicated low back pain, spinal manipulation hastens recovery and decreases work-time lost. Its long-term effect either in preventing chronic low back pain or preventing recurrence of acute low back pain is unknown at present.⁷

Two more recent reviews concluded that there was limited evidence to suggest that spinal manipulation is better than placebo, physical therapy, and exercise in the treatment of acute low back pain.^{8,9} These same authors,

however, felt that there was strong evidence of efficacy in the treatment of chronic low back pain.

The U.S. Agency for Health Care Policy and Research¹⁰ and its British equivalent, the Clinical Standards Advisory Group,¹¹ both have suggested that spinal manipulation is better documented as an effective treatment for acute mechanical low back pain than any other treatment except nonsteroidal anti-inflammatory drugs (NSAIDs).

A meta-analysis of 39 randomized controlled trials (n = 5,486) compared SMT to sham therapy, therapies considered ineffective (traction, bed rest, corset, home care, topical gel, and diathermy), and therapies conventionally advocated (physical therapy, exercise, back school, care by general practitioners, and analgesics).¹² The authors found that SMT was more effective than either sham or ineffective therapies in relieving short-term pain for both acute and chronic low back pain. For chronic low back pain, SMT was more effective for relieving long-term pain as well as improving short-term function. (See Tables 1 and 2.) SMT was equally as effective as all therapies conventionally advocated on all outcome measures.¹²

A more recent systematic review used best evidence synthesis on 43 randomized controlled trials that met selection criteria.¹³ The authors concluded that there is limited to moderate evidence that SMT is better than physical therapy and home back exercise for chronic low back pain in both the long and short term.

A group in Oregon has done a much larger, prospective, non-randomized study following 2,870 patients with acute and chronic low back pain for four years. They compared patients followed by MDs and DCs for their back pain.¹⁴ A clinically and statistically significant improvement in pain (> 10 VAS points) and disability was seen in chiropractic patients with both acute and chronic low back pain in the short term (P < 0.001) and was sustained for up to 12 months. Chiropractic and medical costs were not significantly different when referrals and imaging costs were included.¹⁵

The same group in Oregon followed patients (n = 72) with chronic low back pain who were randomized to one, two, three, or four chiropractic visits a week for three weeks. They found a positive and clinically important effect on pain intensity and disability at four weeks with a greater number of chiropractic visits.¹⁶

An important multicenter randomized controlled trial with rigorous methodology—the U.K. BEAM (U.K. Back pain Exercise And Manipulation) trial—adds important information on both the relative efficacy and cost effectiveness of SMT for low back pain. Patients with low back pain, recruited from general practices

Alternative Medicine Alert, ISSN 1096-942X, is published monthly by Thomson American Health Consultants, 3525 Piedmont Rd., NE, Bldg. 6, Suite 400, Atlanta, GA 30305.

VICE PRESIDENT/PUBLISHER: Brenda L. Mooney.
EDITORIAL GROUP HEAD: Lee Landenberger.
MANAGING EDITOR: Paula L. Cousins.
GST Registration Number: R128870672.

Periodical postage paid at Atlanta, GA.
POSTMASTER: Send address changes to **Alternative Medicine Alert**, P.O. Box 740059, Atlanta, GA 30374.

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Table 1**Spinal manipulative therapy for acute low back pain compared to sham, ineffective therapies**

	Clinically Significant Improvement	Statistically Significant Improvement
Short-term pain	+	+
Long-term pain	-	-
Short-term function	+	-

Table 2**Spinal manipulative therapy for chronic low back pain compared to sham, ineffective therapies**

	Clinically Significant Improvement	Statistically Significant Improvement
Short-term pain	+	+
Long-term pain	+	+
Short-term function	+	+

(GPs) across the U.K. (n = 1,334) were randomized to general practice, exercise, manipulation, and manipulation and exercise for 12 weeks.¹⁷ The participating GPs were trained in the U.K. national acute back pain guidelines and these patients received educational materials (*The Back Book*). The exercise program and spinal manipulation “package” were standardized protocols developed by multidisciplinary groups of experts for use in this study. Based on the Roland disability questionnaire and the modified Von Korff scale for pain and disability, the study found that spinal manipulation with or without exercise provided the greatest benefit at three and 12 months follow-up. Exercise and GP care was better than GP care alone. Spinal manipulation was the most cost-effective therapy.¹⁸

There has been some work recently to develop¹⁹ and validate²⁰ a clinical prediction rule to identify which patients with low back pain are the most likely to benefit from spinal manipulation. Although having a clinical prediction rule potentially would be useful, it has only been studied in a military population with physical therapists administering a standardized manipulation therapy,²⁰ making it difficult to generalize the results to the broader population receiving individualized SMT from various practitioners.

Safety

One of the more widespread concerns about chiropractic care is that spinal manipulation, especially cervi-

cal, is actually dangerous. In fact, the estimated risk of a major complication from cervical spine manipulation is 6.39 per 10 million manipulations and one per 100 million manipulations for lumbar spine manipulation.²¹ This compares quite favorably to other forms of therapy for some of the same conditions. The rate of serious complications for spinal surgeries is 15.6 per 1,000 surgeries and 3.2 per 1,000 subjects for NSAIDs.²¹ Although serious complications from manipulation of the lumbar spine are exceedingly rare, there has been much concern about case reports of vertebral artery stroke attributed to cervical spine manipulation. The incidence of this has been estimated to be anywhere from one in 0.5 million to one in 5.85 million cervical manipulations.^{22,23} The rarity of vertebral artery stroke makes this association very difficult to study.

A case-control study tried to determine whether SMT is an independent risk factor for vertebral artery dissection.²⁴ Cases of TIA/stroke and cervical artery dissection in patients age 60 and younger were identified from the databases of two academic stroke centers with controls being patients with TIA or stroke from other causes. After a review of the hospital records and imaging data, two neurologists classified neurovascular events due to arterial dissections. Dissection of both carotid and vertebral arteries were included as cases even though carotid artery dissections have not previously been associated with SMT. Of 51 cervical artery dissections (25 vertebral and 26 carotid) found, seven patients reported visiting a chiropractor 30 days prior to the TIA or stroke. In multivariate analysis, vertebral artery dissection was independently associated with visit to a chiropractor within 30 days (odds ratio 6.62, 95% confidence interval 14-30). However, the controls were older and sicker and less than one-third of the cases identified were enrolled in the study. Analyses are based only on patient reports of a visit to a chiropractor and there is no information on whether there was actually manipulation of the cervical spine during those visits. An editorial in the same journal recommended caution in interpreting the results due to concerns about selection and recall bias.²⁵

Contraindications to manipulative therapy include severe rheumatoid arthritis with ligamentous laxity, bleeding disorders or anticoagulation therapy, and conditions that render the bony structures susceptible to additional trauma such as acute fractures, bone tumors, and severe osteoporosis. It is not unusual for patients to experience mild untoward effects from manipulation that turn out to be benign in nature, such as an increase in symptoms, myalgias, and fatigue. These effects usually are transient and need not prohibit further manipulation treatments provided that careful repeat assessment

is done regularly to exclude worsening of the patient's condition.

Clinical Practice

As mentioned above, the field of chiropractic is not unified in the philosophies that it promotes. This mani-

fest in varying practice styles and practices among different chiropractors. Before making a chiropractic referral, it is useful to find out what you and your patient can expect from the practitioner. (See Table 3.) Some chiropractors limit their practice to spinal manipulation, and others may use any variety of other therapeutic

Use of Chiropractic in the United States

By Felise Milan, MD

WITH 60,000 PRACTICING CHIROPRACTORS, THEY COMPRISE the third-largest group of health care providers in the United States after physicians and dentists. It is the largest and fastest-growing group of complementary and alternative medicine (CAM) providers in the United States, and its ranks are projected to nearly double by 2010. One in three persons with low back pain sees a chiropractor, amounting to 190 million patient visits per year. This figure has doubled in the past 15-20 years.¹ Most patients self-refer with only 3% of patients being referred by MDs. Most insurance carriers, including Medicare, cover chiropractic. Some plans now require a referral from a MD for coverage of the service. Several studies have attempted to determine what makes some patients with back pain seek chiropractic instead of or in addition to conventional medical care. Results have been inconsistent²⁻⁴ except for the finding that chiropractic use is associated with having insurance that covers the service or having no health insurance at all.^{3,4}

A national telephone survey conducted in 1997 (n = 2,055) showed that 29% of those interviewed used some type of CAM therapy to treat back and neck pain, 25% used CAM in addition to a conventional provider, and 34% used neither.⁵ Chiropractic was the most commonly reported CAM therapy used at 20%.⁶ Women were more likely than men to use CAM providers to treat neck or back pain. In this same sample, conventional practitioners were perceived by 27% to have been "very helpful" in treating their neck or back pain while chiropractors were rated as very helpful in 62% of cases.⁶

Several randomized controlled and observational trials have examined patient satisfaction with chiropractic vs. medical care for low back pain. They have consistently found that patients prefer chiropractic care to that offered by physicians.^{4,7-11} Satisfaction levels are better or similar to those reported by patients receiving care for low back pain from physical therapists.^{9,12}

A large randomized controlled trial (UCLA Low Back Pain Study) examined which factors accounted for the difference in satisfaction between chiropractic and medical patients with low back pain.⁹ In their cohort of 672 patients, satisfaction was significantly greater in the patients randomized to receive chiropractic care (P < 0.001). The difference

in satisfaction was accounted for almost entirely by the patients' reports of having received an explanation of treatment and self-care advice. This finding is not surprising when one considers that 85% of patients with isolated low back pain are not given a precise pathoanatomical diagnosis within the conventional medical framework.¹³ ♦

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Table 3

What to ask a chiropractor

- What therapies do you incorporate into your practice?
- Do you prescribe any supplements? If so, what kind and for what indications?
- Do you believe in the usefulness of “maintenance therapy”? Do you recommend it for your patients?
- What problems do you feel comfortable treating? What would be a welcomed referral?

interventions including exercise, dietary changes, and dietary and nutritional supplements. Some promote the idea of routine spinal manipulation on an ongoing basis (maintenance therapy), while others believe it inappropriate and focus on successfully treating the presenting problem. Some tout the use of chiropractic for any and all physical problems, but others use it almost exclusively for musculoskeletal problems.

Conclusion/Recommendation

Spinal manipulative therapy is safe and as effective as any of the more conventional therapies that routinely are recommended for the treatment of uncomplicated low back pain. Patient satisfaction with chiropractic for the treatment of low back pain is consistently higher than for patients who visit physicians. (See “*Use of Chiropractic in the United States*” on page 136.) This may be explained by the reported relative inadequacy of explanation that physicians often provide with respect to diagnosis and cause/effect, the relative paucity of self-care advice provided compared to chiropractors, as well as the fact that chiropractors regularly touch their patients in an appropriate manner. It also may be due, in many patients, to an actual improvement in their pain and function. In the future, it may be clearer which patients are likely to benefit from chiropractic. As fears of additional adverse effects from analgesics (NSAIDs and COX-2 inhibitors) commonly used for uncomplicated low back pain increase, chiropractic can be considered an attractive alternative for select patients with this very common complaint. ❖

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Chocolate, a Healthy Treat

By Roberta Lee, MD

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OF ALL THE CONFECTIONS THAT HAVE UNIVERSAL appeal, it's chocolate that usually tops the list. Americans consume more than 3.1 billion pounds of chocolate each year or roughly 11.7 pounds per person per year.¹ Surprising as it may seem, Americans are not the highest consumers of chocolate—that distinction is credited to Switzerland, where each person on average consumes 22.3 pounds a year.²

In the past, chocolate was thought to worsen acne, increase dental decay, and worsen migraine headaches. While some of these things may still be true, new reports evaluating chocolate's effect on blood pressure and car-

diovascular health are quite promising. This article will discuss recent studies showing the beneficial effects of chocolate.

Chocolate, produced from the seeds of *Theobroma cacao*, comes from a tropical tree whose name translates from Latin to "Food of the Gods." The name given to this tree by Linneaus signifies its importance to the Mesoamerican cultures who first used cacao. At one point, *Theobroma cacao* was so important in Mayan and Aztec cultures that it was used as a form of currency.

Theobroma cacao is divided into three major types: criollo, forestero, and trinitario. The trinitario group is derived from a mix of the criollo and forestero groups. *Theobroma cacao* grows within a tropical band that extends 20° north or south of the equator. The trees require partial shade and thrive in a hot and humid climate. The plants are pollinated by small midges, but 60% of the flowers fail to be pollinated.³ Usually trees do not produce fruit until they reach 5 years of age. Dispersion of the seed is facilitated by the sweet pulp surrounding the seeds, which attracts many animals that gnaw open the pods. To increase land production, cacao has been intercropped with other trees of economic value such as bananas, rubber, oil palm, or coconut.⁴

The seeds (also referred to as beans) are harvested initially from yellow or red pods growing directly on the stems and branches of the tree. Each pod bears 30-40 seeds each, depending on the variety. Once harvested, each pod is hulled to free up the seeds that are embedded in a white pulp. Over a 3-7 day period the seeds are "fermented," a process that reflects decay of the pulp as it separates from the seed. The final part of this process requires drying, usually in the sun, and during this time the seeds change from purple to brown. It takes 400 seeds or 40 pods to produce a pound of chocolate!⁵

Pharmacological Effects

The secret of chocolate's great appeal may be the result of a number of psychoactive compounds found in this beloved confection: the biogenic amines, methylxanthines, and cannabinoid-like fatty acids.

Biogenic Amines. Two biogenic amines are found in chocolate: tyramine and phenylethylamine (PEA). These are known to have sympathomimetic effects similar to nicotine. Both nicotine and the biogenic amines stimulate dopamine release in the brain. PEA is "heterogeneously distributed within the central nervous system" and acts as a neuromodulator of brain synapses.⁶ Several studies have suggested that it is an important modulator of mood. PEA and L-phenylalanine, the amino acid precursor to PEA, have been shown to improve certain types of depression.⁷ Some have suggested that the

cravings for chocolate may be partially due to the biogenic amines found in chocolate (0.4-6.6 µg/g). Consequently, individuals consuming chocolate may be attempting to “self medicate” for these deficiencies.⁸ Opponents to this theory of amine-deficient chocolate cravings argue that PEA is too rapidly metabolized in the body to make this plausible. Within 5-10 minutes, PEA is metabolized by monoamine oxidase-β and aldehyde dehydrogenase to phenylacetic acid.⁸ Furthermore, PEA and tyramine are also found in other foods, such as cheeses and sausages, with similar or higher concentrations, yet they do not produce cravings in as large a number of people. In addition, many experts suggest that the consumption of PEA or tyramine does not ensure systemic circulation.⁹

Many substances with psychoactive properties share a similar chemical structure to phenylethylamine. An example of this is 3,4 methylenedioxyamphetamine (MDMA), otherwise known as “ecstasy.” Both are amphetamine analogs and act as stimulants facilitating increased catecholamine/serotonin levels. A case series of seven individuals—heavy users of MDMA who took from 200 doses to as much as 2,000 doses—showed a correlation between intense chocolate cravings and chocolate binges during associated depression following MDMA use.¹⁰ It is interesting that MDMA has been associated with low serotonin levels (5-HT) and 5-HT₂ receptor degeneration. The investigators suggested that the specific preference for chocolate in these heavy MDMA users was due to the high PEA and tyramine content in the chocolate and “although not conclusive the association deserves further study.”¹⁰

Methylxanthines. Methylxanthines, another group of stimulating compounds found in chocolate, are competitive inhibitors of adenosine. Adenosine is released after prolonged wakefulness and facilitates sleepiness.¹¹ Thus, consumption of chocolate much like consumption of coffee, can stave off sleepiness. Of the three kinds of methylxanthines contained in chocolate (theobromine, caffeine, and theophylline), theobromine is predominant. One ounce of bittersweet chocolate contains 5-10 mg caffeine compared to an 8 ounce cup of coffee containing approximately 150 mg of caffeine. Further strengthening the stimulant effect, caffeine enhances catecholamine release, which intensifies wakefulness of theobromine.¹² All three compounds are absorbed readily in the gastrointestinal tract. In addition, the methylxanthines are lipid-soluble and easily cross the placenta in pregnancy and the blood-brain barrier.¹³

Cannabinoid-Like Fatty Acids. The brain makes several substances called endocannabinoids. These are neurotransmitter-like substances that create euphoria,

disinhibition, relaxation, and increased appetite.¹¹ The endocannabinoids (arachidonylethanolamide, otherwise known as anandamide and 2-arachidonoylglycerol [2-AG]) bind to cannabinoid receptors such as the CB₁ receptors in the brain. Tetrahydrocannabinol or THC, the active ingredient of marijuana (*Cannabis sativa*), likewise engages this same receptor. Release of the endocannabinoids also activates the mesolimbic dopamine system, catalyzing dopamine release in the nucleus accumbens.¹⁴ This activation is thought to influence cannabinoid tolerance and reward (the reward system is part of the brain that is activated by both natural and artificial chemicals, like addictive drugs).^{11,15} N-acylethanolamine, an anandamide-like compound found in chocolate,¹⁶ either acts directly at the cannabinoid sites or potentiates anandamide by preventing its breakdown. Those challenging the hypothesis of increased CNS cannabinoid receptor stimulation when chocolate is eaten feel that there is insufficient systemic absorption and activity within the CNS.

Chocolate and Behavior

Beyond the psychoactive components, are there other factors that contribute to the satisfaction one has when savoring a bite of chocolate? To address this question of which constituents of chocolate satisfy chocolate cravings, Michner and Rozin observed individuals who were known to have longstanding chocolate cravings.¹⁷ Once a week they were given one of six treatments: a chocolate bar, capsules containing the same amount of chocolate contained in the chocolate bar, placebo containing flour with the same amount of calories as the cocoa bar, a bar of white chocolate, white chocolate plus capsules containing the cocoa powder, or nothing. (For those unfamiliar with white chocolate, it is cocoa butter and flavorings without cocoa mass and contains no flavonoids.) When the subjects experienced the cravings they would open the box and consume what was offered and rate the amount of satisfaction noted from that particular choice. The results showed that the chocolate bar had the highest ability to satisfy the cravings. To a much lesser extent the white chocolate showed some ability to satisfy the craving, but the pills had a similar effect to taking nothing. The investigators concluded that it was the sensory experience rather than the pharmacologic factors driving the cravings.

Hormonal influences in chocolate cravings have also been evaluated. Some studies have suggested that there is a link between chocolate and the menstrual cycle. A questionnaire was distributed to 1,000 male and female college undergraduates evaluating choice of foods in cravings. Ninety-seven percent of the women and 68%

of the men reported cravings. Thirty-two percent of the women linked their cravings to their menstrual cycle.¹⁸ However, another study looking at cravings of sweets or chocolate in subjects given progesterone, alprazolam, or placebo from the third week of the menstrual cycle until the second day of the actual onset of menses, showed that neither the progesterone or alprazolam reduced either craving.¹⁹ Participants were women in the Pre-menstrual Syndrome Program at the University of Pennsylvania between the ages of 18-45. It is interesting to note that the role of progesterone and its influence on mood has been evaluated with conflicting results. Some studies have indicated that it has a mildly sedating effect²⁰ while others have suggested that progesterone may actually cause a negative mood.²¹

Antioxidants and Nutrients

Chocolate is rich in a variety of micronutrients including potassium, iron, magnesium, zinc, and copper (see Table). According to the U.K. Ministry of Agriculture, Fisheries, and Food (MAFF), chocolate has more iron than most vegetables (10.5 mg/100 g).¹³ It was shown in a three-day dietary record study that chocolate is a major source of dietary copper in the North American diet.²² Similarly, in Australia, sources of dietary copper among younger women were derived primarily from refined grains, beef, dairy, and chocolate. In addition, in a recent study of patients receiving long-term enteral nutrition with a documented copper deficiency, 30-45 g of Hershey's pure cocoa (with copper content 3.8 mg/100 g cocoa) was given for 40 days with a successful increase in copper levels.²³

Antioxidants

The physical health benefits associated with chocolate ingestion are primarily derived from the antioxidants contained therein. Antioxidants keep cells from being damaged during oxidation, a normal process that occurs in all living beings but is toxic to living tissue. Oxidation is tightly regulated by the body, with antioxidants acting as buffering agents that neutralize the oxidative process. Antioxidants come in a wide variety of classifications; those found in chocolate are phenolics and flavonoids. The flavonoids in chocolate are mostly composed of the catechins, epicatechins, and to a lesser extent the anthocyanins.¹³ These are the same flavonoids found in red wine and tea (*Camellia sinensis*). Chocolate actually contains more catechins than tea.²⁴ Dark chocolate contains 53.5 mg/100 g, whereas milk chocolate contains 15.9 mg/100 g and black tea 13.9 mg/100 g.²⁵ However, unlike green tea, chocolate does not contain (-)epigallocatechin gallate (EGCG), which has been

Table		
Mineral content for cocoa powder and chocolate liquor per 100 g		
Nutrient	Cocoa Powder	Chocolate Liquor
Potassium	1495.5 mg	1023.8 mg
Iron	13.86 mg	13.52 mg
Magnesium	596.64 mg	314.17 mg
Zinc	7.93 mg	4.29 mg
Copper	4.61 mg	2.36 mg

Adapted from: Knight I. *Chocolate and Cocoa: Health and Nutrition*. London: Blackwell Science; 1999.

found to have the most beneficial effects of all the catechins, particularly in regard to anticarcinogenic activity.²⁶

Antioxidant activity can be measured in specific units called oxygen radical absorbance capacity (ORAC) units per 100 g. Dark chocolate contains an order of magnitude more antioxidants when compared with other healthy foods such as blueberries, kale, and broccoli.²⁷ Different types of chocolate contain different amounts of flavonoids. The flavonoid content is therefore directly dependent on the amount of cocoa mass present. Dark chocolate with 30-90% cocoa mass has more flavonoids than milk chocolate, which has 7-35% cocoa content. White chocolate with no cocoa mass, only cocoa butter, lacks any beneficial antioxidant effect. One study done at the University of Scranton found that 40 g of milk chocolate contained 300 mg of polyphenols,²⁸ equivalent to five servings of fruits and vegetables or a glass of red wine.²⁹

Cardiovascular Health Benefits

Chocolate has several reported cardiovascular health benefits. It has been found to lower "bad" cholesterol, or LDL, while leaving unchanged the "good" cholesterol, or HDL.³⁰ The explanation for this reduction in LDL is linked to the high flavonoid content of chocolate. Arterial damage by LDL is mediated through an increase in oxidation and inflammation by the LDL particle as it becomes embedded in the inner lining of the artery (known as the endothelium). Over time this chemical reaction produces cholesterol plaque. In effect, the flavonoids serve as a source of further suppression of both inflammation and oxidation. In addition, platelet inhibition by chocolate was observed in a small study of 16 individuals given either 81 mg of aspirin, or cocoa, or aspirin plus cocoa.³¹ A significant reduction of blood pressure was also reported in several

studies with chocolate use.^{32,33} The mechanism for reduction in blood pressure is attributed to the enhancement of nitric oxide-dependent relaxation of the endothelial lining of the arteries. Some have concern that the fat content found in the cocoa butter can have negative cardiovascular effects because of the predominance of stearic and oleic acids. However, recent findings suggest that stearic acid, which comprises one-third of the lipid content in chocolate, is cholesterol neutral.³⁴

Conclusion

Chocolate has some promising data for health benefits and it may be effective in lowering cholesterol, reducing blood pressure, and adding valuable antioxidants in our diets. However, large trials are lacking and chocolate will need to be investigated further. Although chocolate can not be a substitute for fruits and vegetables, it seems reasonable to look upon this confection as a healthier treat. Based on the present evidence, one ounce of dark chocolate (65% cocoa or higher) would be a “therapeutic dose.” However, chocolate enthusiasts should be aware that white chocolate, mostly comprised of cocoa butter without cocoa mass, has none of the health benefits discussed above as the cocoa mass contains all the antioxidants. Furthermore, those wishing to maximize health benefits should look for dark chocolate bars that do not contain partially hydrogenated oils as these oils have negative health benefits.

Recommendation

If there is any challenge to the enjoyment of this confection and its health benefits it would be chocolate’s calorie density, which comes from its high fat content. Intake of cocoa in the form of a cocoa drink rather than as a chocolate bar will reduce both the calories and the fat content. A cocoa beverage using cocoa powder and made with skim milk has approximately 150 calories per cup. In contrast, a chocolate bar (50 g) has approximately 250 calories.³⁵ Thus, enjoy that one ounce or 1/3 of a dark chocolate bar a day as a treat—not a meal! ❖

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CME Questions

CME Instructions: Physicians participate in this continuing medical education program by reading the articles, using the provided references for further research, and studying the CME questions. Participants should select what they believe to be the correct answers, then refer to the list of correct answers to test their knowledge. To clarify confusion surrounding any questions answered incorrectly, please consult the source material.

After completing this activity, participants must complete the evaluation form provided at the end of each semester (June and December) and return it in the reply envelope provided to receive a certificate of completion. When an evaluation form is received, a certificate will be mailed to the participant.

43. **Chiropractic was founded on the principle that joint dysfunction and misalignment of the spine may play a significant role in health and disease.**
 - a. True
 - b. False
44. **The U.K. Back pain Exercise and Manipulation trial showed which of the following to be true?**
 - a. Spinal manipulation with or without exercise provided the greatest benefit at three and 12 months.
 - b. Exercise and general practice care was better than general practice care alone.
 - c. Spinal manipulation was the most cost-effective therapy.
 - d. All of the above
45. **Spinal manipulation therapy is safe and as effective as any of the more conventional therapies that routinely are recommended for the treatment of uncomplicated low back pain.**
 - a. True
 - b. False
46. **The physical health benefits associated with chocolate are primarily attributed to which component?**
 - a. Copper
 - b. Magnesium
 - c. Potassium
 - d. Antioxidants
47. **Which of the following contains the most antioxidants?**
 - a. Blueberries
 - b. Broccoli
 - c. Dark chocolate
 - d. Kale
48. **Based on the present evidence, what constitutes a therapeutic dose of chocolate?**
 - a. One ounce of dark chocolate
 - b. One ounce of milk chocolate
 - c. One ounce of white chocolate
 - d. All of the above

Answers: 43. a, 44. d, 45. a, 46. d, 47. c, 48. a.

With Comments from Russell H. Greenfield, MD

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Hyper (-ventilation and -tension)

Source: Joseph CN, et al. Slow breathing improves arterial baroreflex sensitivity and decreases blood pressure in essential hypertension. *Hypertension* 2005;46:714-718.

Goal: To determine whether breathing at a rate of 6 cycles/min decreases blood pressure in healthy and hypertensive individuals.

Design: Single intervention clinical trial.

Subjects: Subjects included adults older than age 50 years with essential hypertension (n = 20) or acting as normal controls (n = 26).

Methods: Following a brief period of acclimation to the lab, recordings and measurements were initiated (ECG, respirations as measured with inductive belts, end-tidal CO₂ as determined with capnography, and blood pressure) during: 1) 5 minutes of spontaneous breathing, 2) 2 minutes of controlled breathing at 6 cycles/min, and 3) 2 minutes of controlled breathing at 15 cycles/min. Breathing was controlled using visual instructions and under continuous monitoring with the capnograph; arterial baroreflex sensitivity was measured via a reportedly accepted method of spectral analysis.

Results: In the hypertensive group, slow breathing significantly decreased both systolic (from 149.7 ± 3.7 to 141.4 ± 4 mm Hg) and diastolic (from 82.7 ± 3 to 77.8 ± 3.7 mm Hg) blood pressure with no significant impact on R-R interval. A similar reduction in systolic, but not diastolic, blood pressure was found in hypertensive subjects during controlled breathing at 15 breaths/min and was associated with a shortening of the

R-R interval. Control subjects showed similar trends only for R-R interval changes. Baroreflex sensitivity was depressed in hypertensive subjects during spontaneous breathing compared with controls, but slow breathing improved baroreflex sensitivity to values similar to those of the control group during spontaneous breathing (apparent normalization). Controlled breathing at 15 breaths/min resulted in no significant change in baroreflex sensitivity. Hypertensive subjects had significantly higher resting respiratory rates and lower end-tidal CO₂ values compared with controls; during slow breathing, however, there were no significant changes in end-tidal CO₂ or minute volume (related to increased tidal volume).

Conclusions: People with hypertension exhibit signs of spontaneous hyperventilation. Slow, regular breathing at 6 cycles/min reduces blood pressure in hypertensive subjects in association with increased baroreflex sensitivity (vagal arm).

Study strengths: Degree of monitoring and methods employed for data collection.

Study weaknesses: Intervention was extremely limited (2 minutes duration), thus addressing only acute effects, not longstanding impact.

Of note: Slow breathing has been shown to enhance arterial baroreflex sensitivity, reduce sympathetic activity, and lessen chemoreflex activation in normal subjects as well as people with heart failure; subjects in the hypertensive group weighed significantly more than those in the control group; examinations took place during late morning hours; indirect methods were utilized to measure minute ventilation and tidal volume so as to avoid the use of a pneumotachograph, which can alter spontaneous breathing patterns; improved

baroreflex sensitivity in this study was dependent upon slow breathing rate and not the regular rhythmic nature of the breath, since there was no improvement in sensitivity at a faster fixed rate (15 cycles/min); interestingly, in hypertensive subjects, controlled breathing at a rapid rate also resulted in decreased systolic blood pressure; there was no decrease in heart rate noted with slow breathing.

We knew that: Sympathetic hyperactivity and parasympathetic withdrawal may result in sustained blood pressure elevation related to changes in arterial baroreflex sensitivity, as well as chemoreflex-induced hyperventilation; impairment of the baroreflex is directly related to increased blood pressure variability, which in turn is related to an increase in end-organ dysfunction; device-guided breathing that produces slow, regular breathing appears to reduce blood pressure in hypertensive subjects; prior data suggest that slow breathing also inhibits chemoreflex activation.

Clinical import: The prevalence of hypertension remains very high, as does the rate of noncompliance with medical regimens used to treat hypertension. Given the opportunity to participate in a program to effectively lower blood pressure without medication, most hypertensive patients would jump at the chance, especially if the program is offered by their doctors. The simple act of controlled, slow breathing appears to have beneficial effects on blood pressure, at least acutely. Whether long-term effects on blood pressure can be expected with specialized training and regular use of slow breathing remains to be seen. So don't hold your breath (at least not yet ...).

What to do with this article: Keep a copy of the abstract on your computer. ❖

Proud to Be an American (Ginseng)

Source: Preddy GN, et al. Efficacy of an extract of North American ginseng containing poly-furanosyl-pyranosyl-saccharides for preventing upper respiratory tract infections: A randomized controlled trial. *CMAJ* 2005;173:1043-1048.

Goal: To assess the efficacy of an extract of North American ginseng (*Panax quinquefolium*) root for prevention of upper respiratory tract infections (URIs).

Design: Randomized, double-blind, placebo-controlled study performed over four months of a cold and flu season in Canada.

Subjects: Participants were aged 18-65 years with a history of at least two colds during the previous year (n = 323, data available for analysis on 279 subjects).

Methods: Subjects were recruited through local media advertisements and then screened by phone. Subjects then completed a questionnaire about their history of prior colds and were provided a two-month supply of either North American (NA) ginseng extract (200 mg/capsule) or placebo (rice powder) with instructions to take two capsules each morning after breakfast. Contact was made with participants by e-mail or telephone to help ensure compliance with the study protocol. Subjects were to complete a daily log each evening, were advised to contact study investigators at the first sign of a cold, and were asked to record the severity of cold-related symptoms (fever, runny nose, sneezing, etc.) as well as perceived side effects.

Participants returned for evaluation two months into the study, at which

time they received additional capsules, and again at study's end at four months. The primary endpoint of interest was the number of reported and verified colds per subject. Secondary endpoints included symptom severity, number of days of illness, and duration of all colds during the four-month period.

Results: The mean number of verified colds per person was less in the ginseng group (P = 0.017). A significant benefit was associated with ginseng use when considering cold recurrence, with only 10% in the ginseng group reporting more than one cold compared with 22.8% in the placebo group (P = 0.004). Symptom scores and total number of days with cold symptoms were likewise significantly less in the ginseng group.

Conclusions: The specific extract of NA ginseng studied significantly reduced the mean number of colds per person and the risk of recurrent cold during four months of a cold and flu season.

Study strengths: Degree of follow-up; integrity of randomization; standardization of extract; high degree of compliance; intention-to-treat analysis.

Study weaknesses: Compliance determined by weighing returned bottles; imbalanced treatment assignment; study did not distinguish between common colds and the flu.

Of note: More than 1 billion colds/year are reported in the United States alone; a published trial of NA ginseng in institutionalized elderly subjects showed a marked benefit in preventing illness due to influenza and respiratory syncytial virus; potential subjects were barred from participation if they had received the flu vaccine within six months of the study; blinding appears to have been well-maintained during the trial; two

subjects in the ginseng group were withdrawn from the study after being diagnosed with Type 2 diabetes; extracts of NA ginseng appear to have a broad range of activity against a variety of viral strains; other herbs commonly referred to as ginseng include Asian ginseng (*Panax ginseng*) and Siberian ginseng (*Eleutherococcus senticosus*), though the latter is a not a true ginseng.

We knew that: The average American gets 2-6 colds per year; antihistamines and decongestants have limited efficacy, while some antiviral drugs are associated with the potential for significant side effects; extracts of *Panax quinquefolium* have been found to possess a wide variety of immunomodulatory effects; one study raised the specter that certain antiviral drugs may induce specific viral resistance.

Clinical import: Every winter patients flock to doctor's offices, urgent care centers, and emergency departments in search of relief from viral URIs. The majority of available pharmaceutical agents offer little in the way of protection against such infection, let alone treatment of symptoms, and herbal remedies long held dear for the same indications have not consistently held up under intense scrutiny. This well-done study brings to light the potential of NA ginseng as prophylaxis against viral URIs, and with impressive results. Yes, further study is warranted, but the extract of NA ginseng appears to be both safe and effective for adults, and there simply are no effective conventional interventions protecting against the common cold. May it prove as effective in kids

What to do with this article: Keep a hard copy in your file cabinet. [Thanks to Kathi Kemper, MD, MPH, for bringing this paper to our attention.] ❖

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ALTERNATIVE MEDICINE ALERT™

A Clinician's Evidence-Based Guide to Alternative Therapies

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Holiday Depression and Stress

THE HOLIDAY SEASON IS A TIME FULL OF JOY, CHEER, PARTIES, AND FAMILY GATHERINGS. However, for many people, it is a time of self-evaluation, loneliness, reflection on past failures, and anxiety about an uncertain future. Many factors can cause the “holiday blues”: stress, fatigue, unrealistic expectations, over-commercialization, financial constraints, and the inability to be with one’s family and friends. The demands of shopping, parties, family reunions, and house guests also contribute to feelings of tension. People who do not become depressed may develop other stress responses, such as headaches, excessive drinking, over-eating, and difficulty sleeping. Even more people experience a post-holiday let down after January 1. To cope with stress and depression during the holidays, consider the following suggestions:

- Keep expectations for the holiday season manageable. Set realistic goals. Pace yourself. Organize your time. Make a list and prioritize the important activities.
- Be realistic about what you can and can’t do. Don’t put the entire focus on just one day, remember it is a season of holiday sentiment and activities can be spread out to lessen stress and increase enjoyment.
- Remember the holiday season does not banish reasons for feeling sad or lonely; there is room for these feelings to be present, even if the person chooses not to express them.

Taking Control of Your Response to Stress

THE FIRST STEP IN TAKING CONTROL OF YOUR STRESS LEVELS INVOLVES IDENTIFYING YOUR STRESSORS and your body’s response to them. When you can recognize that you are stressed, you can use one of several relaxation techniques to reduce your stress levels.

- Take a deep breath
- Stretch during the day, especially if you sit at a desk or talk on the phone
- Take a time out and divert your attention for 5 minutes: walk around the block, look out the window
- Listen to a 10-minute relaxation tape
- Listen to soothing music
- Appreciate something beautiful
- Do something physical
- Pick a small task and finish it
- Take a moment to pray for someone less fortunate than you
- Watch fish swim in an aquarium
- Scan your body for tension and consciously release it
- Have a cup of caffeine-free, calming tea
- Leave 15 minutes early for your next appointment and take your time getting there
- Call a friend and hear some good news
- Repeat a prayer and put things in perspective

Source: Mary L. Hardy, MD, Cedars-Sinai Integrative Medicine Medical Group

- Leave “yesteryear” in the past and look toward the future. Life brings changes. Each season is different and can be enjoyed in its own way.
- Do something for someone else. Try volunteering some time to help others.
- Spend time with supportive and caring people. Reach out and make new friends or contact someone you have not heard from for awhile.
- Be aware that excessive drinking will only increase your feelings of depression.
- Try something new. Celebrate the holidays in a new way.
- Save time for yourself. Recharge your batteries. Let others share responsibility of activities.

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Tips for Keeping Stress at Bay

WHETHER IT'S YOUR PROFESSIONAL LIFE OR YOUR PERSONAL life—or both—that has you in knots, the long-term effects of stress can be debilitating. Increased levels of stress experienced over a period of time have been linked to immune deficiency, heart disease, and even memory loss. Although single, high-stress incidents don't seem to share the same link, knowing how to cope with life's stress can go a long way toward your physical, not to mention your mental, health. If you're feeling stressed, try the following stress-busters. They won't eliminate stress. But you'll be calmer.

- **Emulate those who seem impervious to stress.**

Everyone has a friend or neighbor who seems permanently unruffled in the face of stress. Are they? Or are they just copying someone else's behavior? Either way, studies have shown that people who focus on the immediate issue—the crisis before you rather than the global picture—are less affected by stress. The perpetually calm also have found ways to rationalize stress-causing factors: “If I couldn't take it, it wouldn't have happened to me,” for example.

Moreover, people adept at coping with stress take an “explanatory approach” toward life whereby they assume their troubles are temporary rather than permanent and view them as specific as opposed to universal. In other words, having a bad day is just that. It doesn't mean your entire life is cursed. Lastly, when using this approach, people internalize their success rather than externalize it.

You need not be a Zen-master to be calm. It's something you can learn. By acting as though you hold these beliefs, you will be perceived as calm, and with a little practice may even come to believe it yourself.

- **Take a holistic approach.**

Meditation and massage have both been shown to help people reduce their levels of stress. Both trigger physical responses that help the body cope. Meditation, for example, lowers a person's blood pressure and heart rate, as well as the flow of stress hormones. No one knows exactly why massage works, but studies on premature babies have shown that those receiving it gain weight faster (47% more in 10 days) than their nursery mates.

- **Work it out.**

It's the old standby—exercise. Everyone knows it's good for combating stress, but unfortunately, many of us are too stressed and have too little time to even consider it. Scientists have conducted studies whose results show that after 30 minutes on a treadmill, young men scored 25% lower on anxiety tests and showed favorable changes in brain activity. The best advice is if you're feeling that you don't have enough time, exercise is one thing you should make time to do.

- **Write it down.**

No one likes to be micromanaged, but when it comes to handling stress, making a list and checking it twice can do wonders. Experts advise making a to-do list at the start of each day. Prioritize the list, and note which items are and aren't within your control. Then start chipping away at it. Distractions will happen but having the big picture before you can help keep you focused and help keep you calm.

- **Let's do lunch.**

Whether it's taking a walk with your spouse, heading for the confessional, or simply chatting about your life over lunch with a friend, studies have shown that talking about what makes you stressed can ease your mind. Not only does the act of talking force you to put some order to your thoughts, but you might even get some sound advice.

ALTERNATIVE MEDICINE ALERT™

The Clinician's Evidence-Based Guide to Complementary Therapies

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