Comments

Food Labeling: Use of Nutrition Symbols to Communicate Nutrition Information, Consideration of Consumer Studies and Nutrition Criteria; Public Hearing; Request for Comments.

[Docket No. 2007N-0277]

INTRODUCTION

Dole is committed to educating the public on the benefits of a diet rich in fruits and vegetables. Dole's Chairman, David H Murdock, founded the Dole Nutrition Institute (DNI) in order to "feed the world with knowledge". The DNI pursues this mission through a variety of methods including: brochures, electronic newsletters, videos, websites and promotional items. As part of the Dole Food Company, we are privileged to be able to educate consumers through one of the broadest platforms available: labels, icons and packaging.

Dole Food Company's use of nutrition symbols is mainly restricted to the use of "Dole Superfood" logos which inform consumers of which foods qualify as Superfoods for the Heart, Eyes, Brain, etc. The eight Dole Superfood categories identify those fruit and vegetables that contain a family of nutrients supporting specific aspects of health. Since consumers are more interested in a product's end benefit (e.g. a banana is good for your heart) vs. isolated nutrient content claims, the Dole Superfoods icons were developed as a concise, straightforward and economic means of communicating such information in an accessible, visible manner. Since all Dole products are inherently healthy (low fat, low sodium, low cholesterol, nutrient dense etc.) we don't need to offer a "healthier version" of our products (as with the soda or potato chip products).

The Dole Superfoods concept extended the high nutrient density concept of Superfoods by grouping multiple nutrients together, according to human health concerns, and based on how these particular nutrients could beneficially impact that concern.

We surveyed published science and government guidelines to identify which individual nutrients support what aspects of health, we then grouped those nutrients together that all benefited heart health, brain health etc. We used this nutrient grouping and the levels the foods contained as criteria to identify those fruits and vegetables which qualified as Superfoods. We encouraged the marketing teams involved with the promotion of qualified foods to use the appropriate Superfood nutrition symbol on its packaging. These symbols are particularly useful on loose items like bananas and apples, as the symbol does not mention specific nutrients so it does not require a nutrition facts panel.

All Dole Superfood symbols used on Dole products are in the form of a shield (see below). There are eight categories each displaying a URL directing the consumer to the main Dole website which is linked to a dedicated site (www.dolesuperfoods.com) containing all Superfood relevant information including, criteria, qualified foods and brief descriptions of why each qualifies.

Dole food company welcomes the FDA's investigation into the use of nutrition symbols. We recognize that government endorsements increase the trust the public has in product labels but note that fresh fruit and vegetables deserve different consideration and possibly different symbols than TV dinners, chips and soda. For example, a symbol merely encompassing the fact that a particular food is low calorie, low fat, low sodium and low cholesterol, like the traffic light system, would hardly do justice to the tremendous nutritious nature of fruits and vegetables, and under inform consumers in the process. Doles emphasis is truly focused on how nutritious a food is by virtue of what it has in it, not what is doesn't!

The following comments relate to the questions detailed in the open hearing notice. A brief summary of the Dole Superfood concept was provided in an oral presentation given at the meeting (9/10-9/11). This document represents a more comprehensive explanation of the Dole Superfood concept and its use.

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ISSUE 1 – Information on foods that use symbols and the nutrient requirements for those symbols.

Question 1 – *In what product categories are nutrition symbols used (e.g., packaged foods, fresh produce, meat/poultry, seafood)?*

- The Dole Food Company uses the Dole Superfood symbols on bananas, pineapples, berries, dates, prunes, raisins, broccoli, cauliflower and watermelon. These are usually fresh whole foods from the fruit and vegetables divisions but may include packaged salads (blends of whole food ingredients) and frozen products containing whole foods (e.g., frozen blackberries etc.). Dole's packaged products (e.g., canned goods, fruit cups and parfaits) typically don't qualify for Superfood status, and do not use these symbols.

- Dole Superfood status is calculated on an individual basis and originally designed to be applicable only to whole fresh foods such as bananas, apples, broccoli or spinach etc. However, in order to be consistent with the criteria, we extended the concept to "blends" of only whole food ingredients such as packaged salads and frozen fruit blends as long as such products met with the criteria on a per serving basis.

Question 2 – *Which symbols are nutrient specific, and which are summary symbols based on multiple nutrients ?*

- None of the Dole Superfood symbols are nutrient specific as none of them explicitly mention a nutrient or nutrients. However, they are "health area" specific, and, of the eight Dole Superfood categories, six require the minimum content of multiple nutrients and two the minimum level of single nutrient.

Question 3 – *What are the nutritional criteria, including calories, included in a symbols system and how were those chosen for inclusion?*

- The criteria for all Dole Superfood symbols are health function specific. Generally food qualification depends on the attainment of a minimum level of the adult labeling daily value for a particular combination of vitamins and minerals, antioxidant content as measured by ORAC or containing a specific phytochemical, e.g., bromelain.

- None of the criteria for Dole Superfood symbols involve calories, fats or salt. With few exceptions, fresh fruits and vegetables are naturally low in all these, so it would be less relevant to include them in our criteria.

- A detailed list of each Dole Superfood category criteria is to be found in APPENDIX 1.

Question 4 – *What nutrient thresholds and/or algorithms are used to determine if a food product may display a nutrient specific or summary symbol?*

See APPENDIX 1

Question 5 - *Are nutrition symbols presented together with front label nutrition claims such as "low fat" or "good source of calcium" and, if so, to what extent and for what types of claims?*

The answer to this specific question depends upon what type of product is being evaluated for a Dole Superfood icon.

- Fresh Fruit/Vegetables: e.g., bananas, pineapples, broccoli etc. If sold "loose" the products have no packaging and therefore can't practically display extensive nutrition information. It is precisely because of this that the symbols (on stickers or hang tags) are useful in conveying the highly nutritious nature of the fruit or vegetable.

- Packaged Products: e.g., frozen blackberries, packaged salads etc. The Dole Superfood symbols are placed on the front of the packaging in direct view of the consumer. They are not usually accompanied by nutrient content claims however we do encourage inclusion of the relevant nutrients in the mandatory nutrition facts panel which appears on the back of the product.

- Dole's company position is to include as much nutrition information as practicable on all of its products. Obviously, not all Dole products qualify as Dole Superfoods, but the DNI encourages each product to have at least one nutrition message front and center, whether that be a Dole Superfood symbol or simply a nutrient content or other qualified health claim.

Question 6 – *Are there programs to educate consumers to understand the nutrition symbols or is all information contained in the symbols? When education programs are available, how are they presented?*

- The Dole Superfoods website (www.dolesuperfoods.com) contains all relevant information explaining and substantiating the Superfood symbols. The site lists all the different categories, all the qualified foods (Dole products or not) along with the detailed criteria and scientific back up for nutrient benefits.

- This site is complimented by information contained in various Dole Superfood related articles in the *Dole Nutrition News*, Dole Superfood cooking videos, Dole Superfood cookbooks, Dole Superfood posters and even a Dole Superfood "wheel" providing a handy summary of the Dole Superfoods concept. All these materials are available to consumers on doledepot.com.

ISSUE 2 – Information on consumer research which supported the development of such programs and how the programs are understood by the consumer.

- The DNI conducted limited consumer research regarding the Superfoods concept – and used it to introduce the campaign to other internal Dole divisions. In contrast to many other symbols in use today, the Superfood symbols were originally designed by the Institute independently as a simple, eye catching means to promote the nutrition benefits of whole fruits and vegetables. The education of the public was and remains the primary concern of this campaign.

ISSUE 3 – Information of the economic impact of the utilization of such programs.

- As yet we have not reformulated any products to allow them to qualify for specific health categories, however, the criteria are considered in new product development.
- Printing stickers and applying them to bananas is minimal in cost, changing print plates for packaged items is also a minimal cost especially if done when packaging changes are due, so the economic impact is expected to be relatively low.
- If a product is designated as a Dole Superfood the addition of the Dole Superfood symbol does not impact the price of that food.
- We have no data relating to the impact of including Dole Superfood symbols on packaging and sales.

APPENDIX 1

Criteria:
A serving of the food must contain a minimum of three of the following heart healthy nutrients at 10% or higher of the adult labeling daily value ***OR*** contain two nutrients at this level and also contain antioxidant phytochemicals (carotenoids, high ORAC value etc.)

Heart Healthy Nutrients:
Fiber, potassium, folate, vitamin B6, magnesium, vitamin C and antioxidant phytochemicals.

The Science

- These individual nutrients are considered heart healthy based upon extensive scientific publications, in well respected journals, indicating positive associations between nutrient intake and various aspects of heart heath.

Fiber

- Dietary fiber intake is associated with a significant reduction in coronary heart disease (CHD) risk by lowering LDL "bad" cholesterol.

References

[1]. "*Dietary fiber and risk of coronary heart disease: a pooled analysis of cohort studies*." Pereira MA, O'Reilly E, Augustsson K, Fraser GE, Goldbourt U, Heitmann BL, Hallmans G, Knekt P, Liu S, Pietinen P, Spiegelman D, Stevens J, Virtamo J, Willett WC, Ascherio A. *Arch Intern Med.* **2004** Feb 23;164(4):370-6.

Potassium

- Higher dietary potassium intakes are associated with significantly lower blood pressures.

References

[1]. "*A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group*." Appel LJ, Moore TJ, Obarzanek E, Vollmer WM, Svetkey LP, Sacks FM, Bray GA, Vogt TM, Cutler JA, Windhauser MM, Lin PH, Karanja N.*N Engl J Med.* **1997** Apr 17;336(16):1117-24.

Folate

- Folate-rich diets have been associated with decreased risk of cardiovascular disease. This B vitamin works in conjunction with vitamin B6 to reduce homocysteine, an amino acid, which, at high levels, is a risk factor for artery blockage.

References

[1]. "*A quantitative assessment of plasma homocysteine as a risk factor for vascular disease. Probable benefits of increasing folic acid intakes.*" Boushey CJ, Beresford SA, Omenn GS, Motulsky AG. *J. A. M. A.* **1995** Oct 4;274(13):1049-57.

[2]. "*Folate and vitamin B6 from diet and supplements in relation to risk of coronary heart disease among women.*" Rimm EB, Willett WC, Hu FB, Sampson L, Colditz GA, Manson JE, Hennekens C, Stampfer MJ.*JAMA.* **1998** Feb 4;279(5):359-64.

Vitamin B6

- This vitamin works in conjunction with folate to reduce homocysteine, an amino acid which, at high levels, is a risk factor for artery blockage.

References

[1]. "*Folate and vitamin B6 from diet and supplements in relation to risk of coronary heart disease among women.*" Rimm EB, Willett WC, Hu FB, Sampson L, Colditz GA, Manson JE, Hennekens C, Stampfer MJ.*JAMA.* **1998** Feb 4;279(5):359-64.

Magnesium

- Increased serum magnesium levels are associated with a reduced risk of coronary heart disease.

References

[1]. "*Effects of long-term oral magnesium chloride replacement in congestive heart failure secondary to coronary artery disease.*" Bashir Y, Sneddon JF, Staunton HA, Haywood GA, Simpson IA, McKenna WJ, Camm AJ. *Am J Cardiol.* **1993** Nov 15;72(15):1156-62,

[2]. "*Is low magnesium concentration a risk factor for coronary heart disease? The Atherosclerosis Risk in Communities (ARIC) Study.*" Liao F, Folsom AR, Brancati FL. *Am Heart J.* **1998** Sep;136(3):480-90.

[3]. "*Dietary magnesium intake and the future risk of coronary heart disease (the Honolulu Heart Program).*" Abbott RD, Ando F, Masaki KH, Tung KH, Rodriguez BL, Petrovitch H, Yano K, Curb JD. *Am J Cardiol.* **2003** Sep 15;92(6):665-9.

Vitamin C

- This powerful water soluble antioxidant vitamin prevents oxidation of LDL "bad" cholesterol.

References

[1]. "*Ascorbic acid oxidation product(s) protect human low density lipoprotein against atherogenic modification. Anti- rather than prooxidant activity of vitamin C in the presence of transition metal ions.*" Retsky KL, Freeman MW, Frei B. *J. Biol. Chem.* **1993** Jan 15;268(2):1304-9.

Carotenoids

- Carotenoids are also antioxidants and may help reduce the buildup of LDL "bad" cholesterol on artery walls which may result in the kinds of blockages capable of causing heart attacks and strokes.

References

[1]. "*Dietary Lycopene, Tomato-Based Food Products and Cardiovascular Disease in Women.*" H.D. Sesso, S. Liu, J.M. Gaziano and J.E. Buring *J. Nutr.* 133, 2336-2341, **2003**.

[2]. "*Plasma lycopene, other carotenoids, and retinol and the risk of cardiovascular disease in women.*" H.D. Sesso, J.E. Buring, E.P. Norkus and J.M. Gaziano *Am J. Clin. Nutr.* 79, 47-53, **2004**.

[3]. *"Tomato juice decreases LDL cholesterol levels and increases LDL resistance to oxidation."* Silaste ML, Alfthan G, Aro A, Antero Kesäniemi Y, Hörkkö S*. Br J Nutr.* **2007**.

Anthocyanins

- Anthocyanins are polyphenolic antioxidants that may help reduce the buildup of LDL "bad" cholesterol on artery walls which may result in the kinds of blockages capable of causing heart attacks and strokes.

References

[1]. "*Pomegranate juice consumption for 3 years by patients with carotid artery stenosis reduces common carotid intima-media thickness, blood pressure and LDL oxidation.*" Aviram M, Rosenblat M, Gaitini D, Nitecki S, Hoffman A, Dornfeld L, Volkova N, Presser D, Attias J, Liker H, Hayek T. *Clin Nutr.* **2004** Jun;23(3):423-33.

[2]. "*Grape polyphenols exert a cardioprotective effect in pre- and postmenopausal women by lowering plasma lipids and reducing oxidative stress.*" Zern TL, Wood RJ, Greene C, West KL, Liu Y, Aggarwal D, Shachter NS, Fernandez ML. *J Nutr.* **2005** Aug;135(8):1911-7.

[3]. "*Red grapefruit positively influences serum triglyceride level in patients suffering from coronary atherosclerosis: studies in vitro and in humans.*" Gorinstein S, Caspi A, Libman I, Lerner HT, Huang D, Leontowicz H, Leontowicz M, Tashma Z, Katrich E, Feng S, Trakhtenberg S. *J Agric Food Chem.* **2006** Mar 8;54(5):1887-92.

Criteria:
A serving of the food must have an ORAC score of greater than or equal to 3,400 ***OR*** contain glucosinolates.

The Science

- **ORAC Value:** Describes the antioxidant power of a food by measuring the oxygen radical absorbance capacity (ORAC). The ORAC value is usually expressed per gram or per serving. An ORAC value of greater than or equal to 3,400 per serving would rank the food at least as high as the 15th highest antioxidant containing fruits and vegetables according to the USDA's 2004 published ORAC values. Adequate antioxidant capacity of the blood is affected by the intake of high ORAC fruits and vegetables. Antioxidants can neutralize the kind of free radical damage that can accelerate aging and increase disease risk.

References

[1] *"Lipophilic and Hydrophilic Antioxidant Capacities of Common Foods in the United States"* Wu X., Beecher, G.R., Holden, J.M., Haytowitz, D.B., Gebhardt, S.E., Prior, R.L., *J. Agric. Food Chem.* **2004**, 52, 4026-4037.

- **Glucosinolates:** These compounds are commonly found in cruciferous vegetables and when activated are able to indirectly neutralize free radicals by stimulating the body's own natural Phase II detoxification enzyme systems. This cascade of antioxidant activity -- unlike the one-shot, finite amount you get from most direct antioxidants -- actually cycles over and over within the physiology, continuing to protect your system for as many as 3 to 4 days after the glucosinolate-containing food has been consumed.

References

[1] *"A major inducer of anticarcinogenic protective enzymes from broccoli: isolation and elucidation of structure"* Zhang, Y., Talalay, P., Cho, C.G., Posner, G.H. *Proc Natl Acad Sci U S A.* **1992** 89(6):2399-403.

[2] *"The chemical diversity and distribution of glucosinolates and isothiocyanates among plants"* Fahey, J.W., Zalcmann, A.T., Talalay, P. *Phytochemistry* **2001** 56(1):5-51.

Criteria:
A serving of the food must contain greater than or equal to 5000 IU's (≥ 100% of RDA) of pro-vitamin A carotenoids ***OR*** contain greater than or equal to 1,250 IU's (≥ 25% of RDA) of pro-vitamin A carotenoids <u>and</u> also contain greater than or equal to 1000 μg of combined lutein and zeaxanthin.

The Science

- **Pro - Vitamin A Carotenoids:** α- and β-carotenes, as well as β-cryptoxanthin, can be directly converted into vitamin A (retinol) by the body. Retinol is essential to the normal functioning of the eye. A deficiency can lead to "night blindness", as vitamin A is also needed for the proper functioning of the eye in dim light.

References

[1] Saari, J.C. 1994 ***"Retinoids in photosensitive systems."*** In: Sporn M.B., Roberts, A.B., Goodman, D.S. eds. *The Retinoids: Biology, Chemistry, and Medicine*, 2nd ed. New York: Raven Press Pp. 351-385.

- **Lutein and Zeaxanthin:** These two carotenoids, which cannot be converted into retinol, do however efficiently absorb blue light. Reducing the amount of blue light that reaches the structures of the eye that are critical to vision may protect them from light-induced oxidative damage. Low dietary intakes are also associated with an increased risk of developing age related macular degeneration.

References

[1] ***"Macular pigments lutein and zeaxanthin as blue light filters studied in liposomes."*** Junghans A, Sies H, Stahl W. *Arch Biochem Biophys.* **2001 Jul** 15;391(2):160-4.

[2] ***"A2E and blue light in the retina: the paradigm of age-related macular degeneration."***
Shaban H, Richter C. *Biol Chem.* **2002 Mar-Apr**;383(3-4):537-45.

[3] ***"Biologic mechanisms of the protective role of lutein and zeaxanthin in the eye."***
Krinsky NI, Landrum JT, Bone RA. *Annu Rev Nutr.* **2003**;23:171-201. Epub 2003 Feb 27.

[4] ***"The Relationship of Dietary Carotenoid and Vitamin A, E, and C Intake With Age-Related Macular Degeneration in a Case-Control Study: AREDS Report No. 22."***
Age-Related Eye Disease Study Research Group *Arch Ophthalmol*. **2007 Sep**;125(9):1225-32

[5] *"Effect of dietary lutein and zeaxanthin on plasma carotenoids and their transport in lipoproteins in age-related macular degeneration."*
Wang W, Connor SL, Johnson EJ, Klein ML, Hughes S, Connor WE. *Am J Clin Nutr.* 2007 Mar;85(3):762-9

[6] *"A prospective study of carotenoid and vitamin A intakes and risk of cataract extraction in US women."*
Chasan-Taber L, Willett WC, Seddon JM, Stampfer MJ, Rosner B, Colditz GA, Speizer FE, Hankinson SE. *Am J Clin Nutr.* 1999 Oct;70(4):509-16.

[7] *"Dietary carotenoids, vitamins A, C, and E, and advanced age-related macular degeneration. Eye Disease Case-Control Study Group."*
Seddon JM, Ajani UA, Sperduto RD, Hiller R, Blair N, Burton TC, Farber MD, Gragoudas ES, Haller J, Miller DT, et al. *JAMA*. 1994 Nov 9;272(18):1413-20

Criteria:
A serving of the food must have an ORAC score of greater than or equal to 2,500 and contain greater than or equal to 25% of one of the following brain healthy nutrients: folate, vitamin C.

The Science

- ORAC Value: Describes the antioxidant power of a food by measuring the oxygen radical absorbance capacity (ORAC). The ORAC value is usually expressed per gram or per serving. An ORAC value of greater than or equal to 2,500 per serving would rank the food at least as high as the 20th highest antioxidant containing fruits and vegetables according to the USDA's 2004 published ORAC values. Studies have shown that foods high in antioxidants can prevent or even reverse the kinds of declines in cognitive and motor skills as the brain ages.

References

[1] *"Lipophilic and Hydrophilic Antioxidant Capacities of Common Foods in the United States"* Wu X., Beecher, G.R., Holden, J.M., Haytowitz, D.B., Gebhardt, S.E., Prior, R.L., *J. Agric. Food Chem.* **2004**, 52, 4026-4037.

[2] *"Antioxidant-rich diets improve cerebellar physiology and motor learning in aged rats."* Bickford PC, Gould T, Briederick L, Chadman K, Pollock A, Young D, Shukitt-Hale B, Joseph J. *Brain Res.* **2000**; 866(1-2): 211-7.

[3] *"Fruit polyphenolics and brain aging: nutritional interventions targeting age-related neuronal and behavioral deficits."* Galli RL, Shukitt-Hale B, Youdim KA, Joseph JA. *Ann. N. Y. Acad. Sci.* **2002**; 959: 128-32.

[4] *"Nutritional intervention in brain aging: reducing the effects of inflammation and oxidative stress."* Lau FC, Shukitt-Hale B, Joseph JA. *Subcell Biochem.* **2007**; 42: 299-318.

Folate

- Normal brain function depends upon folates role in nucleic acid synthesis, particularly methylation reactions. In addition folate rich diets have been associated with lower homocysteine, an amino acid which, at high levels, may damage nerves in the brain.

References

[1] *"Folate, homocysteine, and neurological function"* Moriss, M.S., *Nutr Clin Care.* 2002;5(3):124-32.

[2] *"Depression and folate status in the US population"* Morris, M.S., Fava, M., Jacques, P.F., Selhub, J., Rosenberg, I.H. *Psychother Psychosom.* 2003 72(2):80-7.

[3] *"The homocysteine hypothesis of depression"* Folstein, M., Liu, T., Peter, I., Buell, J., Arsenault, L., Scott, T., Qiu, W.W. *Am J Psychiatry*. 2007 Jun;164(6):861-7.

[4] *"Dietary folate and depressive symptoms are associated in middle-aged Finnish men."* Tolmunen T, Voutilainen S, Hintikka J, Rissanen T, Tanskanen A, Viinamäki H, Kaplan GA, Salonen JT. *J Nutr.* 2003; 133(10): 3233-6.

Vitamin C

- Vitamin C plays an important role in the synthesis of norepinephrine, a neurotransmitter important for the brains ability to hold attention and focus. Norepinephrine metabolism is also known to affect mood.

References

[1] *"Dietary reference intakes for vitamin C, vitamin E, selenium and carotenoids"* Institute Of Medicine, Chapter 5, Pg 95, National Academy Press, 2000.

Criteria:
A serving of the food must contain greater than or equal to 25% of the adult labeling daily value for **both** vitamin A and vitamin C ***OR*** contain greater than or equal to 100% of the adult labeling daily value for **one** of these vitamins **and** be greater than 10% in the other **and** greater than 5% in vitamin E.

The Science

Vitamin A

- Pro - Vitamin A carotenoids either as α-, β-carotene or β-cryptoxanthin are directly converted into vitamin A by the body. Studies show that vitamin A helps maintain the epithelial tissues that make up the skin surface. Carotenoids have also been shown to help enhance protection of the skin from damaging UV rays.

References

[1] ***"β-carotene inhibits UVA-induced matrix metalloprotease 1 and 10 expression in keratinocytes by a singlet oxygen-dependent mechanism"*** Wertz, K., Seifert, N., Hunziker, P.B., Riss, G., Wyss, A., Lankin, C., Goralczyk, R. *Free Radical Biology and Medicine* 37(5): **2004**, 654-670.

[2] ***"Skin bioavailability of dietary vitamin E, carotenoids, polyphenols, vitamin C, zinc and selenium."*** Richelle M, Sabatier M, Steiling H, Williamson G. *Br J Nutr.* **2006** 96(2):227-38.

[3] ***"Dietary reference intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium and zinc."*** Institute Of Medicine, Chapter 4, Pg 85, National Academy Press, **2002**.

Vitamin C

- This powerful, water soluble antioxidant encourages skin cell turnover and supports the formation of collagen - the connective tissues that give the skin its elasticity and fullness.

References

[1] ***"Dietary reference intakes for vitamin C, vitamin E, selenium and carotenoids"*** Institute Of Medicine, Chapter 5, Pgs 96 and 98, National Academy Press, **2000**.

[2] ***"Skin bioavailability of dietary vitamin E, carotenoids, polyphenols, vitamin C, zinc and selenium."*** Richelle M, Sabatier M, Steiling H, Williamson G. *Br J Nutr.* **2006** 96(2):227-38.

[3] "***Biological role of vitamin C in keratinocytes."*** Catani MV, Savini I, Rossi A, Melino G, Avigliano L. *Nutr Rev.* **2005** 63(3):81-90.

Vitamin E

- An extremely potent antioxidant that research shows protects skin cells from free radical damage caused by the sun.

References

[1] ***"Skin bioavailability of dietary vitamin E, carotenoids, polyphenols, vitamin C, zinc and selenium."*** Richelle M, Sabatier M, Steiling H, Williamson G. *Br J Nutr.* **2006** 96(2):227-38.

[2] ***"Antioxidant supplements improve parameters related to skin structure in humans."*** Heinrich U, Tronnier H, Stahl W, Béjot M, Maurette JM. *Skin Pharmacol. Physiol.* **2006**; 19(4): 224-31.

Criteria:
Contains either the enzyme bromelain *OR* antioxidant anthocyanins and is the subject of a published clinical trial demonstrating that consumption of food that contains these two phytochemicals has a positive association with a reduction in joint swelling or pain.

The Science

Bromelain

- Evidence suggests this proteolytic enzyme acts as a COX-2 enzyme inhibitor blocking the inflammation cascade and therefore reducing swelling and pain.

References

[1] *"Bromelain"* Orsini RA; Plastic Surgery Educational Foundation Technology Assessment Committee. *Plast Reconstr Surg.* **2006**;118(7):1640-4.

[2] *"Bromelain reduces mild acute knee pain and improves well-being in a dose-dependent fashion in an open study of otherwise healthy adults."* Walker AF, Bundy R, Hicks SM, Middleton RW. *Phytomedicine.* **2002**;9(8):681-6.

[3] *"Bromelain as a Treatment for Osteoarthritis: a Review of Clinical Studies."* Brien S, Lewith G, Walker A, Hicks SM, Middleton D. *Evid Based Complement Alternat Med.* **2004**;1(3):251-257.

[4] *"Bromelain as an adjunctive treatment for moderate-to-severe osteoarthritis of the knee: a randomized placebo-controlled pilot study."* Brien S, Lewith G, Walker AF, Middleton R, Prescott P, Bundy R. *QJM.* **2006**; 99(12):841-50.

Anthocyanins

- These polyphenolic compounds are thought to inhibit the inflammatory pathways observed in gout.

References

[1] *"Consumption of Cherries Lowers Plasma Urate in Healthy Women."* Jacob, R.A., Spinozzi, G.M., Simon, V.A., Kelley, D.S., Prior, R.L., Hess-Pierce, B., Kader, A.A. *J. Nutr.* **2003**; 133:1826-1829.

[2] *"Dietary factors and hyperuricaemia."* Schlesinger N. *Curr Pharm Des.* **2005**; 11(32): 4133-8.

[3] *"Consumption of Bing sweet cherries lowers circulating concentrations of inflammation markers in healthy men and women."* Kelley DS, Rasooly R, Jacob RA, Kader AA, Mackey BE. *J Nutr.* **2006**; 136(4): 981-6.

Criteria:
A serving of the food must contain a minimum of four of the following bone healthy nutrients at 10% or higher of the adult labeling daily value *OR* contain a minimum of three of the following bone healthy nutrients at 10% or higher of the adult labeling daily value and contain greater than or equal to 5% of the daily value for calcium.

Bone Healthy Nutrients:
Calcium, vitamin D, vitamin K, folate, manganese, magnesium, vitamin C and potassium.

The Science

- These individual nutrients are considered bone healthy due to the scientific publication, in peer reviewed journals, of positive associations between intake and the various aspects of bone heath.

Calcium

- This mineral is the major structural component of bones and teeth.

References

[1] *"Dietary reference intakes for calcium, phosphorous, magnesium, vitamin D and fluoride"* Institute Of Medicine, Chapter 4, Pg 71, National Academy Press, 1997.

[2] *"The role of nutrients in bone health, from A to Z."* Palacios C. *Crit Rev Food Sci Nutr.* 2006; 46(8): 621-8.

Vitamin D

- This vitamin is essential for the body's efficient utilization of calcium, where maintenance of serum calcium levels within a narrow range is vital for normal bone growth and maintenance of bone density governed by the constant and dynamic mineralization/demineralization of bone.

References

[1] *"Dietary reference intakes for calcium, phosphorous, magnesium, vitamin D and fluoride"* Institute Of Medicine, Chapter 7, Pg 257, National Academy Press, 1997.

[2] *"The role of nutrients in bone health, from A to Z."* Palacios C. *Crit Rev Food Sci Nutr.* 2006; 46(8): 621-8.

Vitamin K

- This vitamin is required to make at least three proteins that are essential for bone formation. Studies have also linked diets adequate in vitamin K with a reduced risk of hip fracture in the elderly.

References

[1] *"Dietary vitamin K intakes are associated with hip fracture but not with bone mineral density in elderly men and women."* Sarah L Booth, Katherine L Tucker, Honglei Chen, Marian T Hannan, David R Gagnon, L Adrienne Cupples, Peter WF Wilson, Jose Ordovas, Ernst J Schaefer, Bess Dawson-Hughes and Douglas P Kiel. *American Journal of Clinical Nutrition*, 71(5); **2000**: 1201-1208.

[2] *"Dietary reference intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium and zinc."* Institute Of Medicine, Chapter 5, Pg 162, National Academy Press, **1997**.

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Folate

- Folate-rich diets have been associated with homocysteine, an amino acid, high levels of which, are associated with an increased risk of bone fracture.

References

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Manganese

- This lesser known mineral is a cofactor for enzymes involved in the formation of healthy cartilage and bone.

References

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Magnesium

- This mineral promotes bone density, approximately 50-60% of the body's magnesium is found in bone. Studies have shown low serum magnesium concentration to be a risk factor for osteoporosis in women.

References

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Vitamin C

- Vitamin C promotes collagen formation, needed to build strong bones. Higher vitamin C intakes have also been linked with greater forearm bone mineral content in post-menopausal women.

References

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Potassium

- This mineral promotes bone health by inhibiting calcium excretion and studies have shown positive associations between higher intakes of dietary potassium and greater bone mineral density (BMD).

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[6] *"Dietary influences on bone mass and bone metabolism: further evidence of a positive link between fruit and vegetable consumption and bone health?"* New SA, Robins SP, Campbell MK, Martin JC, Garton MJ, Bolton-Smith C, Grubb DA, Lee SJ, Reid DM. *Am J Clin Nutr.* **2000**; 71(1): 142-51.

Criteria:
A serving of the food must contain greater than or equal to 25% of the adult labeling daily value for **both** vitamin A and vitamin C ***OR*** contain greater than or equal to 100% of the adult labeling daily value for **one** of these vitamins **and** be greater than 10% in the other **and** greater than 5% in vitamin E.

The Science

- These individual nutrients are considered healthy for immune function due to the scientific publication, in peer reviewed journals, of positive associations between intake and the various aspects of immune function.

Vitamin A

- The pro-vitamin A carotenoids (α- and β-carotene and β -cryptoxanthin) can be directly converted into vitamin A by the body. Vitamin A is commonly called the "anti-infective" vitamin because its metabolic derivatives (retinoids) help maintain active levels of circulating natural "killer" cells which have antiviral and anti-tumor properties. Vitamin A derivatives also support the integrity of epithelial cells that line the airways, urinary and digestive tracts – comprising the body's first line of immune defense.

References

[1] ***"Dietary reference intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium and zinc."*** Institute Of Medicine, Chapter 4, Pg 85, National Academy Press, **2002**.

Vitamin C

- This common antioxidant vitamin enhances the immune function of white blood cells which contain some of the highest amounts of vitamin C of any tissues in the body. Vitamin C protects WBC's during free radical mediated cell destruction. Vitamin C may also reduce the severity and duration of colds by lowering levels of free radicals and histamine (responsible for congestion and stuffiness) through its antioxidant properties. In addition vitamin C also regenerates "used" vitamin E back into its active form.

References

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[3] *"Treatment of the common cold."* Simasek M, Blandino DA. *Am Fam Physician.* **2007**; 75(4): 515-20.

Vitamin E

- This very powerful antioxidant vitamin directly shields immune cells by stopping free radicals in their tracks. Studies also show that vitamin E intakes improve overall immunity by improving white blood cell function.

References

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