Nutrition Trends & Insights: An Analysis of Mango Nutrition Attributes Within the Context of Current Trends

National Mango Board

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SALT AND COMPANY

Overview

The National Mango Board (NMB) invests considerable resources in nutrition research with the goal of better understanding the compounds found in mangos and how they impact various conditions in the human body. The results of this research directly feed the marketing efforts of the NMB, fueling communications opportunities and developing the nutrition brand image of the mango fruit.

The goal of this report is to examine the predominant nutrition attributes of mangos within the context of current consumer and research trends, generating intelligence to help inform the NMB's nutrition research strategy.

Methodology

Salt & Co. determined the predominant nutrition attributes (nutrients, compounds, or characteristics with the greatest potential for future research) of fresh mangos by examining the NMB's existing nutrition data and selecting those attributes with the greatest concentration in fresh mangos. These attributes include vitamin C, beta carotene (vitamin A), folate, fiber, vitamin B6, and polyphenols.

Although mangos are a good source of the mineral copper, this nutrient was not included as one of the priority nutrition attributes because our research indicated that copper has low consumer awareness, does not appear to be contributing to any significant health trends, and does not appear to be a primary interest in terms of current nutrition research. This aligns with results from the NMB's 2013 Usage and Barriers Survey, which noted that respondents found copper to be "unfamiliar in the context of food" and that it "tends to be a turn-off as a nutritional claim."

After determining the predominant nutrition attributes, Salt & Co. gathered consumer trends data from a variety of sources including third party consumer research as well as news and keyword search analysis. In addition, we identified research trends pertaining to these attributes by conducting a high level review of existing published research (non-mango specific) and gathering input from other nutrition science experts.

Food & Health: What's Trending with Consumers?

There's no question that today's consumers value foods for their potential health benefits, and this is only growing in importance. In fact, recent data from the International Food Information Council's (IFIC) 2014 Food & Health Survey found that more than nine out of ten consumers have given at least "a little" thought to the healthfulness of their foods and beverages, and half of consumers have given "a lot." Seventy-one percent (71%) of consumers reported that health influenced their food and beverage selection—a 15 percent jump since 2010. This survey found the impact of healthfulness increased across all ages, ethnicities, education, and socioeconomic demographic groups with the greatest rise among younger consumers and men.

Increasingly, consumers expect their food choices to protect them from chronic diseases or specific conditions. The 2012 Gallup Study of Nutrient Knowledge & Consumption found that eight in ten consumers believe that functional foods can help prevent or delay the onset of heart disease, hypertension, osteoporosis, and type 2 diabetes. And six in ten associate functional foods with benefits linked to age-related memory loss, cancer, and Alzheimer's disease. According to Experian/Packaged Facts Spring 2013 Consumer Survey, 56% of consumers bought foods or beverages that targeted a specific condition. Twenty-nine percent (29%) of consumers purchased cholesterol-lowering foods/drinks, and 24% purchased products targeting weight control. Other condition-specific benefits sought out by consumers include blood pressure (20%), digestive health (17%), heart/circulatory (14%), diabetes (13%), and bone/joint (11%).

Based on our research, the following conditions are trending highest in terms of their influence on consumer food choices:

- Heart Health: Consumers are looking for cholesterol-lowering and blood pressure benefits most often, but emerging heart-related concerns include circulation, stroke, and plaque formation.
- Weight Management/Blood Sugar: There is also a good bit of overlap between concerns regarding weight management and diabetes since these two conditions are closely intertwined, and controlling blood sugar and insulin levels is believed to be an important part of both weight and diabetes management.
- Digestive Health: Consumers continue to have a strong interest in digestive health, especially as research is finding associations between gut health and other conditions, such as obesity, inflammation, and immune function. According to the Hartman Group, lower gastrointestinal issues are gaining prominence with digestive regularity becoming more important to consumers.
- Aging: A number of health conditions related to aging are of concern to consumers, including maintenance of energy levels, mental acuity, bone health, eye health, and cancer.

We are also seeing emerging opportunities for foods that offer benefits in the following areas:

- Satiety: Foods that naturally increase feelings of satiety (or, fullness) and help prevent hunger and overeating will become important. This is closely tied to concerns for weight management but overlaps with concerns for blood sugar control and diabetes.
- Skin Health: According to Datamonitor, consumer familiarity with the benefits of fruit and vegetable consumption is extending to beauty innovation (such as use of “superfruits” as ingredients in skincare products). There appears to be a growing interest in the relationship between diet and skin health, a topic frequently covered by consumer media. This has long been the subject of debate, however in recent years we have seen an uptick in research investigating the role of diet and skin health.

An important macro-trend with consumers as well as nutrition research is to focus on the health effects of consuming the whole food as opposed to isolated nutrients or extracted compounds from the food. There is research to indicate that consuming nutrients in isolation above and beyond established daily recommendations may have unintended consequences, such as increased risks of certain cancers, impaired nutrient balance, etc.

Predominate Mango Nutrition Attributes

The following nutrition attributes of fresh mangos are the focal points of this report: vitamin C, beta carotene/vitamin A, folate, fiber, vitamin B6, and polyphenols (Table 1). These attributes were selected because they have well-documented functions in the human body; are found in the flesh of fresh mangos in concentrations deemed to be of significance to human health; and most have emerging health benefits demonstrated by third-party research.

Regarding beta carotene and vitamin A, as noted in Table 1, mangos contain the vitamin A precursor beta carotene. Often, the relationship between beta carotene and vitamin A is misrepresented by consumer literature, and is thus misunderstood by the majority of consumers. As such, we discuss trends related to both beta carotene and vitamin A throughout his report since the two are related within the context of mango nutrition.

Table 1: Mango's Predominant Nutrition Attributes

Nutrition Attribute	Amount Contained in 1 Cup of Fresh Mango	Function
Vitamin C	60 mg (100% Daily Value)	Vitamin C is an antioxidant with numerous functions in the human body, including supporting healthy cognitive and neurologic function, collagen formation, and wound healing. In addition, it plays an important role in immune function, keeping gums and teeth healthy, and increasing the absorption of non-heme iron.
Beta Carotene/Vitamin A	1785 IU (35% Daily Value)	Vitamin A in mango occurs in the form of beta carotene, an antioxidant pigment which the body converts to vitamin A. Beta carotene is often referred to as a "vitamin A precursor" or "provitamin A". Vitamin A is critical for vision and plays an important role in immune function, reproductive health, bone growth, and the maintenance of healthy skin.

Nutrition Attribute	Amount Contained in 1 Cup of Fresh Mango	Function
Folate	71 ug (35% Daily Value)	Folate is a B vitamin which helps the body make red blood cells and DNA, supports healthy cardiovascular function, and helps reduce a woman's risk of neural tube defects during pregnancy.
Fiber	3 g (12% Daily Value)	Fiber aids in digestion, helps control constipation, slows the absorption of sugar into the bloodstream, and can increase feelings of satiety after eating.
Vitamin B6	.2 mg (10% Daily Value)	Vitamin B6 is involved in immune function, plays an important role in cognitive development, helps the body maintain normal blood sugar levels, helps the body make hemoglobin, and helps maintain normal nerve function.
Polyphenols	236-1395 mg/kg GAE (Gallic Acid Equivalent), no Daily Value established (Perkins, et al 2009)	Polyphenols are a large and diverse class of phytochemicals with various antioxidant and anti-inflammatory properties.

Mango Nutrition: What is Trending with Consumers?

The predominant nutrition attributes of mango are very relevant to consumers, as confirmed through third party consumer research reports and web search data.

- Consumer Research
- Consumer research indicates that several nutrition attributes are important to consumers, especially fiber, vitamin C, B vitamins (mango contains two B vitamins: folate and vitamin B6), vitamin A/beta carotene, and polyphenols, specifically:
- According to the 2012 Gallup Study of Nutrient Knowledge & Consumption, 40% of consumers say they are making a strong effort to get more vitamin C, with 34% reporting the same for B vitamins, and 24% for vitamin A.

- Fifty-three percent (53%) of consumers are seeking more fiber (2014 International Food Information Council Food & Health Survey). Sales of foods with a fiber health claim totaled $8 billion in 2013 (Neilsen).
- Carotenoids (such as beta carotene) have joined polyphenols as mass market phytochemical opportunities (Sloan, A.E. 2014. TrendSenseTM predictive model report. Sloan Trends Inc., Escondido, Calif. www.sloantrend.com).
- The NMB's 2013 Mango Usage and Barriers research found that respondents seem most impressed by knowing fiber and folate are in mangos and that vitamins C, A, and B6 are nice to know for mangos as well.

Media Coverage of Predominant Nutrition Attributes and Health

Salt & Co. examined media coverage of the priority nutrition attributes to determine general associations with specific health concerns/conditions (Table 2). Although we recognize that the association of a nutrition attribute with a health condition in the media does not mean there is a scientifically valid association, this exercise gives us a glimpse into how popular culture views mango's predominant nutrition attributes, which helps us better understand the trends at play.

TABLE 2: Health Conditions Associated with Mango's Predominant Nutrition Attributes in the Media

Predominant Nutrition Attribute	Health Conditions Associated Within the Media
Vitamin C	Skin health, endurance exercise recovery, cold fighting, immune health, cholesterol lowering
Beta Carotene/Vitamin A	Skin health, aging, vision
Folate	Birth defect prevention, Alzheimer's, cancer
Fiber	Beneficial bacteria in the gut, heart health, weight management, cholesterol lowering
Vitamin B6	Neurotransmitters (serotonin, melatonin, dopamine), increased blood flow
Polyphenols	Glucose metabolism, anti-inflammatory, anti-aging/longevity

Mango Nutrition: What is Trending in Health Research?

Salt & Co. conducted a high level review of research studies pertaining to predominate nutrition attributes and health that have been published in peer-reviewed scientific journals over the last five years (Table 3). In doing so, we've gained considerable insight and perspective on both the volume of published research as well as trends within this research. This research was not mango-specific, however, and mostly examined each nutrition attribute in isolation. It is important to note that we did not evaluate study design as part of this exercise as this was not critical to our intended goal of identifying trends and gaining a better understanding of where the scientific community is placing emphasis with regards to these nutrition attributes.

Many of mango's predominant nutrition attributes are well-established in terms of their function within the human body, namely, the vitamins and minerals found in mango. However, nutrition is an evolving science and research continues to uncover potential benefits and mechanisms of action of these highly-recognized micronutrients. Polyphenols, on the other hand, could still be considered "emerging" beneficial compounds as the body of research, although robust, is still in the early stages. Based on our review, research regarding mango's predominant nutrition attributes appears to be clustering in the following areas:

- Vitamin C

Vitamin C has many well-established health benefits, however there are a few areas where recent research appeared concentrated, including:

  - » Circulatory benefits
  - » Role in glucose metabolism
  - » Bone health
  - » Immune support

- Beta Carotene/Vitamin A

Beta carotene and vitamin A are specific, distinguishable compounds, however they are interrelated since beta carotene serves as a precursor for vitamin A. Most of the vitamin A research focused on consequences of deficiency in developing countries and strategies to address. Because beta carotene is the form found in mango, it makes sense to pay greater attention to this research, specifically.

  - » Beta carotene relationship with cancer (there is conflicting evidence here)
  - » Beta carotene potential for cardiovascular protection (due to beta carotene's antioxidant activity)

- Folate

Folate has many well-established benefits during pregnancy, and these benefits and the mechanisms involved are still the subject of much research. However, there are several additional areas of research into folate's potential benefits, including:

  - » Cancer protection (research addresses a variety of cancer types)
  - » Cognitive health (protection against age-related memory loss, depression, etc.)
  - » Cardiovascular benefits

- Fiber

There are many well-documented health benefits of fiber, however fiber research continues to grow with new research into specific types of fiber and the role of these fibers on gut microbiota. In addition, there is still much fiber research underway regarding various chronic diseases, including:

  - Cancer protection (research addresses a variety of cancer types)
  - Obesity protection
  - Cardiovascular benefits
  - Prebiotic fibers and gut health/microbiome effects
  - Inflammation
  - Immune health
  -

- Vitamin B6

Only a few studies of significance were identified for vitamin B6, and these addressed the following areas:

  - Colorectal cancer survival
  - Association with depressive symptoms in elderly
  - Protection against active disease in Lupus patients
  - Cardiovascular disease protection (this study specifically looked at B6 from supplements, not food)

- Polyphenols

The field of polyphenol research is literally exploding. As mentioned in Table 1, this is a large and very diverse class of phytochemicals, and the research spans the spectrum of basic science to human clinical trials. Over the past five years, there was notable polyphenol research published for several types of food including green tea, cocoa, berries, tree nuts, olives, olive oil, grapes, soybeans, cranberries, and coffee. The following general areas appear to be where most of the polyphenol research has focused:

  - Relationship between polyphenol and fiber digestion/metabolism
  - Effect on gut microbiome
  - Immune function
  - Absorption and metabolism of polyphenols
  - Gene interactions of polyphenols
  - Neuroprotective effects
  - Cardioprotective effects
  - Skin protection (this is an emerging area)

Analysis & Recommendations

Based on our review of consumer and research trends, Salt & Co. believes there are numerous opportunities to further develop the NMB's nutrition research pipeline to generate results that will support on-trend marketing messages. Specifically, the NMB should consider the following directions for future nutrition research:

Composition, Bioavailability, and Mechanistic Studies

This research will further elucidate mango's nutrition attribute composition, bioavailability, and mechanisms of action.

- **Fiber**

Composition studies to determine fiber make-up of mangos, including presence of prebiotics

- **Polyphenols**
  - » Composition studies measuring content of various polyphenols in one serving of mango (this data may exist, need to verify with current mango researchers)
    - Example: the amount of mangiferin (or any other polyphenol found in mango) is found in a 100 grams of fresh mango
  - » Mechanistic studies
    - Example: the mechanisms by which polyphenols exert specific effects within the human body)
  - » Bioavailability, including brain bioavailability
    - Example: are polyphenols or their metabolites absorbed into the blood stream from the gut and do they cross the blood-brain barrier)
  - » Microbiome impact of mango polyphenols
    - Example: how do mango polyphenols affect bacterial environment in the gut
  - » Impact on fat absorption and energy expenditure
    - Example: do mango polyphenols impact the amount and types of fat absorbed into the blood stream

Health Impact Studies

This research will specifically investigate the role of mango consumption of various health endpoints.

- **Digestive Health**
  - » Microbiome impact of mango consumption, including analysis of colonic metabolism of mango fibers and polyphenols
  - » Impact of mango consumption on indices of gut health other than microbiome, such as regularity, inflammation, etc.
- **Inflammatory Response**
  - » Impact of mango consumption on various indices of inflammation
- **Immune Function**
  - » Impact of mango consumption on various indices of immune function
- **Heart Health**
  - » Impact of mango consumption on various indices of cardiovascular health, such as lipid profile, blood pressure, circulation/blood flow, etc.
- **Weight Management/Blood Sugar**
  - » Research from Dr. Edralin Lucas at Oklahoma State University has already demonstrated the potential blood sugar benefit of mango consumption in obese. This

research should be replicated and further explored.

  - Impact of mango consumption on insulin levels

- **Aging**
  - Impact of mango consumption on various indices of cognitive health, including neuroprotective effects of mango polyphenols
  - Impact of mango consumption on self-reported indices of “energy level”
  - Continued research into impact of mango consumption on various types of cancers
- **Satiety**
  - Impact of mango consumption on self-reported measures of satiety
  - Impact of mango consumption on levels of hormone and/or neurotransmitters associated with satiety
- **Skin Health**
  - Because mangos contain multiple nutrients with potential skin-health benefits and one animal study has been conducted with positive results, research investigating the skin health impact of mango consumption should be explored, including appropriate human trials.

Special Population Studies

- **Children and Adolescents**
  - Impact of mango consumption on many of the aforementioned health impacts, such as blood sugar, weight management, immune function, etc.
- **Pregnancy**
  - Impact of mango consumption on maternal folate status
  - Impact of mango consumption during pregnancy and nutritional status of newborn
- **Athletes**
  - Impact of mango consumption pre/post-event on indices of inflammation, muscle recovery, etc.

Prioritizing these research opportunities based on available budget is obviously a critical consideration. Salt & Co. recommends that the NMB fund composition, bioavailability, and mechanistic studies as soon as possible as these generate important baseline understandings which are critical not only for future research studies but also for nutrition message approval by the United States Department of Agriculture (USDA). These studies can be conducted concurrently with health impact studies.

The NMB’s nutrition research program is at a point where it is time to consider additional areas of health impact that have not been explored with regards to mango consumption. Digestive health and heart health should be considered new priority health areas, and research studies investigating these health areas may also be able to address impact on inflammatory and immune markers as part of the study design. Additional research attempting to validate the potential blood sugar benefits of mango consumption should also be consid-

ered sooner rather than later since this pilot research was recently accepted for publication. This research could also be expanded and built upon to further explore potential weight management benefits of mango consumption. The opportunity to research potential skin health benefits should be further explored with experts in dermatology as this is an emerging area of consumer interest. And because it does not appear to be an area where other commodity organizations are placing an emphasis, it could potentially provide a competitive advantage for mangos if positive associations were identified.

Appendix A: Research Associated with Mango's Predominate Nutrition Attributes (2009 to present)

Vitamin C

- Benefits to endothelial function
- Higher levels of vitamin C needed by diabetics
- Consumption of vitamin C to improve exercise-induced bronchoconstriction
- Benefits to muscle damage recovery in athletes
- Association with fatigue, heart rate, and perception of exertion after exercise in obese individuals
- Synergistic relationship with folate
- Association with decreased post-prandial oxidative stress in diabetes
- Decrease in cold symptoms when combined with zinc supplement
- Potential glycemic control benefits
- Compromised vitamin C status in diabetic smokers
- Deficiency and alterations in physical and mental growth and immune health in children
- Role in bone health

Beta Carotene/Vitamin A

- Beta carotene associated with improved bone health while high intake of vitamin A associated with fractures and osteoporosis
- Beta carotene supplementation associated with decreased oxidative stress
- Beta carotene deficiency associated with certain cancers
- Increased serum beta carotene in Mediterranean Diet
- Low serum beta carotene associated with congestive heart failure, cardiovascular disease, and total mortality (emphasis in obese)
- High serum beta carotene associated with increased risk of prostate cancer
- Beta carotene consumption during pregnancy and carotenoid status of newborns
- Dietary supplementation with plant sources of beta carotene as strategy for addressing vitamin A deficiency
- Vitamin A consumption associated with delayed onset/prevention of amyotrophic lateral sclerosis (ALS)
- Issues related to vitamin A deficiency in developing countries

- Strategies to address vitamin A deficiency in developing countries
- Vitamin A supplementation and positive/negative association with a variety of issues (cystic fibrosis, tuberculosis, bone health, iron deficiency, mortality risk, post operative oxidative stress, hypothyroidism, hyperuricemia)

Folate

- Low serum folate associated with antenatal depression
- Smoking during pregnancy associated with low serum folate levels
- Folate supplementation during pregnancy associated with lower risk of stillbirth
- Increased dietary folate may decrease breast cancer risk, especially among smokers
- Low plasma folate status associated with decreased cognitive performance in elderly
- High folate levels and prostate cancer risk
- Many studies looking at cancer relationship and potential mechanisms (colorectal, breast, and other cancers)
- Folate deficiency exacerbates cardiovascular risk by augmenting inflammation
- Higher folate status associated with improved cognitive test scores in children and adolescents
- Benefits of folate supplementation during pregnancy
- Folate supplementation to help with iron deficiency anemia in adolescent girls
- Folate and prevention of depressive symptoms
- Folate status during pregnancy and risk of childhood leukemia in offspring

Fiber

- Fiber intake associated with decreased risk of breast cancer
- Fiber intake associated with decreased risk of kidney stones
- Fiber intake not associated with arterial stiffness and inflammation in type-1 diabetes
- Prebiotic fiber intake associated with decreased risk of metabolic syndrome
- Fiber intake inversely associated with prostate cancer risk
- Fiber intake influences gut microbiota and decreases risk of lung allergy symptoms
- Fiber intake associated with lower cardiovascular disease risk
- Fiber intake associated with decreased kidney cancer risk
- Increased fiber intake associated with decreased risk of stroke
- Mangos contain prebiotic fiber (unpublished research out of India)
- Prebiotic fibers associated with health benefits
- Fiber intake associated with decreased inflammation in the gut
- Increased fiber intake associated with risk of zinc deficiency
- Fiber intake can improve gut bacteria profile
- Fiber intake made modulate immune response
- High fiber associated with decreased inflammation and all-cause mortality in chronic kidney disease
- Fiber intake may protect against obesity, constipation, and diabetes in children
- Fiber assists in the transport of antioxidants (primarily polyphenols) through intestinal tract
- Higher intakes of fiber and B6 may prevent active disease in lupus patients

Vitamin B6

- Serum B6 and protection against oxidative DNA damage
- Higher serum levels of B6 not associated with improved colorectal cancer survival
- B6 deficiency common in nursing home environment
- Marginal B6 status associated with depressive symptoms in elderly
- Higher intakes of B6 and fiber may prevent active disease in lupus patients
- B6 intake from dietary supplements associated with decreased heart disease risk

Polyphenols

- Intake from plant sources can improve gut bacteria profile
- Polyphenols transported by fiber through small intestine
- Polyphenols can decrease fat accumulation in liver disease
- Role of polyphenols in modulating immune system
- Tea polyphenols associated with increased energy expenditure
- Cardioprotective and anti-inflammatory effects of cocoa polyphenols
- Role of polyphenols in reproductive health in obese women
- Potential for polyphenol consumption to modify gene expression
- Grape polyphenols as possible prevention/treatment for cognitive diseases including Alzheimer's
- Cocoa polyphenols may decrease obesity-related disorders leading to decreased inflammation
- Extensive mechanistic studies investigating green tea and cocoa polyphenols
- Cranberry polyphenols increase activity of immune cells which may decrease cold and flu symptoms
- Polyphenols in brassica species identified
- Role of polyphenols in modulating gut microbiota
- Green tea polyphenols protect against inflammatory bowel disease issues
- Green tea, cocoa, and citrus polyphenol mechanisms for improving metabolic and cardiovascular issues
- Higher intakes of flavonoids associated with decreased risk of metabolic syndrome
- Health effects of olive oil polyphenols
- Neuroprotective effects of olive polyphenols
- Apple polyphenol gastrointestinal absorption and metabolism
- Absorption and metabolism of pistachio polyphenols
- Colonic metabolism of polyphenols from green tea, coffee and hazelnut skin
- Plant polyphenol impact on gut microbiome
- Green tea polyphenol protective effect on lipid profile, inflammation, antioxidant capacity
- Polyphenols as important compounds in emerging field of nutricosmetics to promote skin health
- Tea polyphenols and cancer protection
- Mechanisms for neuroprotective effects of polyphenols
- Anti-allerg effects of polyphenols
- Neuroprotective effects of blueberry polyphenols
- Soybean and green tea polyphenols improve immune function
- Colonic metabolism of berry polyphenols
- Brain bioavailability of grape polyphenols and neurologic protection
- Role of polyphenols in energy metabolism
- Cardioprotective effects of green tea polyphenols
- Polyphenol effect on gene expression and relationship to cardiovascular health
- Polyphenol impact on carbohydrate metabolism
- Inhibition of platelet aggregation by polyphenols
- Neuroprotective effects of green tea polyphenols
- Consumption of nuts increases plasma polyphenol concentration

VITAMIN C

Ashor AW, Lara J, Mathers JC, Siervo M. Effect of vitamin C on endothelial function in health and disease: a systematic review and meta-analysis of randomised controlled trials. Atherosclerosis. 2014 Jul;235(1):9-20.

Mahmoudabadi MM, Rahbar AR. Effect of EPA and vitamin C on superoxide dismutase, glutathione peroxidase, total antioxidant capacity and malondialdehyde in type 2 diabetic patients. Oman Med J. 2014 Jan;29(1):39-45.

Pourabbas A, Fallah F, Mahdavi R, Aliasgarzadeh A. Correlation of Serum Free Carnitine with Serum Ferritin and Vitamin C Levels in Type II Diabetic Men. Iran J Public Health. 2013 Jul 1;42(7):767-74.

Hemilä H. Vitamin C may alleviate exercise-induced bronchoconstriction: a meta-analysis. BMJ Open. 2013 Jun 20;3(6).

Ros MM, Bueno-de-Mesquita HB, Kampman E, Aben KK, Büchner FL, Jansen EH, van Gils CH, Egevad L, Overvad K, Tjønneland A, Roswall N, Boutron-Ruault MC, Kvaskoff M, Perquier F, Kaaks R, Chang-Claude J, Weikert S, Boeing H, Trichopoulou A, Lagiou P, Dilis V, Palli D, Pala V, Sacerdote C, Tumino R, Panico S, Peeters PH, Gram IT, Skeie G, Huerta JM, Barricarte A, Quirós JR, Sánchez MJ, Buckland G, Larrañaga N, Ehrnström R, Wallström P, Ljungberg B, Hallmans G, Key TJ, Allen NE, Khaw KT, Wareham N, Brennan P, Riboli E, Kiemeney LA. Plasma carotenoids and vitamin C concentrations and risk of urothelial cell carcinoma in the European Prospective Investigation into Cancer and Nutrition. Am J Clin Nutr.
2012 Oct;96(4):902-10.

Huck CJ, Johnston CS, Beezhold BL, Swan PD. Vitamin C status and perception of effort during exercise in obese adults adhering to a calorie-reduced diet. Nutrition. 2013 Jan;29(1):42-5.

Lucock M, Yates Z, Boyd L, Naylor C, Choi JH, Ng X, Skinner V, Wai R, Kho J, Tang S, Roach P, Veysey M. Vitamin C-related nutrient-nutrient and nutrient-gene interactions that modify folate status. Eur J Nutr. 2013 Mar;52(2):569-82.

Mazloom Z, Hejazi N, Dabbaghmanesh MH, Tabatabaei HR, Ahmadi A, Ansar H. Effect of vitamin C supplementation on postprandial oxidative stress and lipid profile in type 2 diabetic patients. Pak J Biol Sci. 2011 Oct 1;14(19):900-4.

Kositsawat J, Freeman VL. Vitamin C and A1c relationship in the National Health and Nutrition Examination Survey (NHANES) 2003-2006. J Am Coll Nutr. 2011 Dec;30(6):477-83.

Mahmoudabadi MM, Djalali M, Djazayery SA, Keshavarz SA, Eshraghian MR, Yaraghi AA, Askari G, Ghiasvand R, Zarei M. Effects of eicosapentaenoic acid and vitamin C on glycemic indices, blood pressure, and serum lipids in type 2 diabetic Iranian males. J Res Med Sci. 2011 Mar;16 Suppl 1:S361-7.

Shim JE, Paik HY, Shin CS, Park KS, Lee HK. Vitamin C nutriture in newly diagnosed diabetes. J Nutr Sci Vitaminol (Tokyo). 2010;56(4):217-21.

Maggini S, Wenzlaff S, Hornig D. Essential role of vitamin C and zinc in child immunity and health. J Int Med Res. 2010 Mar-Apr;38(2):386-414.

Kennedy DO, Veasey R, Watson A, Dodd F, Jones E, Maggini S, Haskell CF. Effects of high-dose B vitamin complex with vitamin C and minerals on subjective mood and performance in healthy males. Psychopharmacology (Berl). 2010 Jul;211(1):55-68. doi: 10.1007/s00213-010-1870-3.

Saito M. [Nutrition and bone health. Roles of vitamin C and vitamin B as regulators of bone mass and quality]. Clin Calcium. 2009 Aug;19(8):1192-9.

Sahni S, Hannan MT, Gagnon D, Blumberg J, Cupples LA, Kiel DP, Tucker KL. Protective effect of total and supplemental vitamin C intake on the risk of hip fracture--a 17-year follow-up from the Framingham Osteoporosis Study. Osteoporos Int. 2009 Nov;20(11):1853-61.

BETA CAROTENE

Peng HC, Chen YL, Yang SY, Ho PY, Yang SS, Hu JT, Yang SC. The antiapoptotic effects of different doses of β-carotene in chronic ethanol-fed rats. Hepatobiliary Surg Nutr. 2013 Jun;2(3):132-41.

Huang GL, Yang L, Su M, Wang SK, Yin H, Wang JS, Sun GJ. Vitamin D3 and beta-carotene deficiency is associated with risk of esophageal squamous cell carcinoma - results of a case-control study in China. Asian Pac J Cancer Prev.2014;15(2):819-23.

Witkowska A, Zujko ME, Mirończuk-Chodakowska I. The effect of a Mediterranean diet model on serum beta-carotene concentration. A preliminary assessment.

Karppi J, Kurl S, Mäkikallio TH, Ronkainen K, Laukkanen JA. Serum β-carotene concentrations and the risk of congestive heart failure in men: a population-based study. Int J Cardiol. 2013 Oct 3;168(3):1841-6.

Karppi J, Laukkanen JA, Mäkikallio TH, Ronkainen K, Kurl S. Serum β-carotene and the risk of sudden cardiac death in men: a population-based follow-up study. Atherosclerosis. 2013 Jan;226(1):172-7.

Haskell MJ. The challenge to reach nutritional adequacy for vitamin A: β-carotene bioavailability and conversion--evidence in humans. Am J Clin Nutr. 2012 Nov;96(5):1193S-203S.

Karppi J, Laukkanen JA, Mäkikallio TH, Ronkainen K, Kurl S. Low β-carotene concentrations increase the risk of cardiovascular disease mortality among Finnish men with risk factors. Nutr Metab Cardiovasc Dis. 2012 Oct;22(10):921-8.

Karppi J, Kurl S, Laukkanen JA, Kauhanen J. Serum β-carotene in relation to risk of prostate cancer: the Kuopio Ischaemic Heart Disease Risk Factor study. Nutr Cancer. 2012 Apr;64(3):361-7.

Goldberg JS. Monitoring maternal Beta carotene and retinol consumption may decrease the incidence of neurodevelopmental disorders in offspring. Clin Med Insights Reprod Health. 2011 Dec 19;6:1-8.

Choi WJ, Ford ES, Curhan G, Rankin JI, Choi HK. Independent association of serum retinol and β-carotene levels with hyperuricemia: A national population study. Arthritis Care Res (Hoboken). 2012 Mar;64(3):389-96.

Villaça Chaves G, Gonçalves de Souza G, Cardoso de Matos A, Abrantes Peres W, Pereira SE, Saboya CJ, D'Almeida CA, Ramalho A. Serum retinol and β-carotene levels and risk factors for cardiovascular disease in morbid obesity. Int J Vitam Nutr Res. 2010 Jun;80(3):159-67.

FOLATE

Chong MF, Wong JX, Colega M, Chen LW, van Dam RM, Tan CS, Lim AL, Cai S, Broekman BF, Lee YS, Saw SM, Kwek K, Godfrey KM, Chong YS, Gluckman P, Meaney MJ, Chen H; GUSTO study group. Relationships of maternal folate and vitamin B12 status during pregnancy with perinatal depression: The GUSTO study. J Psychiatr Res. 2014 Aug;55:110-6.

Chen P, Li C, Li X, Li J, Chu R, Wang H. Higher dietary folate intake reduces the breast cancer risk: a systematic review and meta-analysis. Br J Cancer. 2014 Apr 29;110(9):2327-38.

Doets EL, Ueland PM, Tell GS, Vollset SE, Nygård OK, Van't Veer P, de Groot LC, Nurk E, Refsum H, Smith AD, Eussen SJ. Interactions between plasma concentrations of folate and markers of vitamin B(12) status with cognitive performance in elderly people not exposed to folic acid fortification: the Hordaland Health Study. Br J Nutr. 2014 Mar 28;111(6):1085-95.

Kim SE, Cole PD, Cho RC, Ly A, Ishiguro L, Sohn KJ, Croxford R, Kamen BA, Kim YI. γ-Glutamyl hydrolase modulation and folate influence chemosensitivity of cancer cells to 5 fluorouracil and methotrexate. Br J Cancer. 2013 Oct 15;109(8):2175-88.

Nguyen CT, Gracely EJ, Lee BK. Serum folate but not vitamin B-12 concentrations are positively associated with cognitive test scores in children aged 6-16 years. J Nutr. 2013 Apr;143(4):500-4.

Nguyen CT, Gracely EJ, Lee BK. Serum folate but not vitamin B-12 concentrations are positively associated with cognitive test scores in children aged 6-16 years. J Nutr. 2013 Apr;143(4):500-4.

Branum AM, Bailey R, Singer BJ. Dietary supplement use and folate status during pregnancy in the United States. J Nutr. 2013 Apr;143(4):486-92.

van Uitert EM, Steegers-Theunissen RP. Influence of maternal folate status on human fetal growth parameters. Mol Nutr Food Res. 2013 Apr;57(4):582-95.

Joshi M, Gumashta R. Weekly iron folate supplementation in adolescent girls--an effective nutritional measure for the management of iron deficiency anaemia. Glob J Health Sci. 2013 Mar 20;5(3):188-94.

Rosati R, Ma H, Cabelof DC. Folate and colorectal cancer in rodents: a model of DNA repair deficiency. J Oncol. 2012;2012:105949.

Razzak AA, Oxentenko AS, Vierkant RA, Tillmans LS, Wang AH, Weisenberger DJ, Laird PW, Lynch CF, Anderson KE, French AJ, Haile RW, Harnack LJ, Potter JD, Slager SL, Smyrk TC, Thibodeau SN, Cerhan JR, Limburg PJ. Associations between intake of folate and related micronutrients with molecularly defined colorectal cancer risks in the Iowa Women's Health Study. Nutr Cancer. 2012;64(7):899-910.

Bailey HD, Miller M, Langridge A, de Klerk NH, van Bockxmeer FM, Attia J, Scott RJ, Armstrong BK, Milne E. Maternal dietary intake of folate and vitamins B6 and B12 during pregnancy and the risk of childhood acute lymphoblastic leukemia. Nutr Cancer. 2012;64(7):1122-30.

Duthie SJ. Folate and cancer: how DNA damage, repair and methylation impact on colon carcinogenesis. J Inherit Metab Dis. 2011 Feb;34(1):101-9.

Beydoun MA, Shroff MR, Beydoun HA, Zonderman AB. Serum folate, vitamin B-12, and homocysteine and their association with depressive symptoms among U.S. adults. Psychosom Med. 2010 Nov;72(9):862-73.

Eussen SJ, Vollset SE, Igland J, Meyer K, Fredriksen A, Ueland PM, Jenab M, Slimani N, Boffetta P, Overvad K, Tjønneland A, Olsen A, Clavel-Chapelon F, Boutron-Ruault MC, Morois S, Weikert C, Pischon T, Linseisen J, Kaaks R, Trichopoulou A, Zilis D, Katsoulis M, Palli D, Berrino F, Vineis P, Tumino R, Panico S, Peeters PH, Bueno-de-Mesquita HB, van Duijnhoven FJ, Gram IT, Skeie G, Lund E, González CA, Martínez C, Dorronsoro M, Ardanaz E, Navarro C, Rodríguez L, Van Guelpen B, Palmqvist R, Manjer J, Ericson U, Bingham S, Khaw KT, Norat T, Riboli E. Plasma folate, related genetic variants, and colorectal cancer risk in EPIC. Cancer Epidemiol Biomarkers Prev. 2010 May;19(5):1328-40.

Nelson C, Wengreen HJ, Munger RG, Corcoran CD. Dietary folate, vitamin B-12, vitamin B-6 and incident Alzheimer's disease: the cache county memory, health and aging study. J Nutr Health Aging. 2009 Dec;13(10):899-905.

FIBER

Bradbury KE, Appleby PN, Key TJ. Fruit, vegetable, and fiber intake in relation to cancer risk: findings from the European Prospective Investigation into Cancer and Nutrition (EPIC). Am J Clin Nutr. 2014 Jun 11;100(Supplement 1):394S-398S.

WHI Writing Group, Sorensen MD, Hsi RS, Chi T, Shara N, Wactawski-Wende J, Kahn AJ, Wang H, Hou L, Stoller ML. Dietary Intake of Fiber, Fruit, and Vegetables Decrease the Risk of Incident Kidney Stones in Women: A Women's Health Initiative (WHI) Report. J Urol. 2014 May 21.

Jaacks LM, Crandell J, Liese AD, Lamichhane AP, Bell RA, Dabelea D, D'Agostino RB Jr, Dolan LM, Marcovina S, Reynolds K, Shah AS, Urbina EM, Wadwa RP, Mayer-Davis EJ. No association of dietary fiber intake with inflammation or arterial stiffness in youth with type 1 diabetes. J Diabetes Complications. 2014 May-Jun;28(3):305-10.

Jakobsdottir G, Nyman M, Fåk F. Designing future prebiotic fiber to target metabolic syndrome. Nutrition. 2014 May;30(5):497-502.

Deschasaux M, Pouchieu C, His M, Hercberg S, Latino-Martel P, Touvier M. Dietary total and insoluble fiber intakes are inversely associated with prostate cancer risk. J Nutr. 2014 Apr;144(4):504-10.

Trompette A, Gollwitzer ES, Yadava K, Sichelstiel AK, Sprenger N, Ngom-Bru C, Blanchard C, Junt T, Nicod LP, Harris NL, Marsland BJ. Gut microbiota metabolism of dietary fiber influences allergic airway disease and hematopoiesis. Nat Med. 2014 Feb;20(2):159-66.

Ning H, Van Horn L, Shay CM, Lloyd-Jones DM. Associations of dietary fiber intake with long-term predicted cardiovascular disease risk and C-reactive protein levels (from the National Health and Nutrition Examination Survey Data [2005-2010]). Am J Cardiol. 2014 Jan 15;113(2):287-91.

Daniel CR, Park Y, Chow WH, Graubard BI, Hollenbeck AR, Sinha R. Intake of fiber and fiber-rich plant foods is associated with a lower risk of renal cell carcinoma in a large US cohort. Am J Clin Nutr. 2013 May;97(5):1036-43.

Threapleton DE, Greenwood DC, Evans CE, Cleghorn CL, Nykjaer C, Woodhead C, Cade JE, Gale CP, Burley VJ. Dietary fiber intake and risk of first stroke: a systematic review and meta-analysis. Stroke. 2013 May;44(5):1360-8.

Slavin J. Fiber and prebiotics: mechanisms and health benefits. Nutrients. 2013 Apr 22;5(4):1417-35.

Ferrari P, Rinaldi S, Jenab M, Lukanova A, Olsen A, Tjønneland A, Overvad K, Clavel-Chapelon F, Fagherazzi G, Touillaud M, Kaaks R, von Rüsten A, Boeing H,Trichopoulou A, Lagiou P, Benetou V, Grioni S, Panico S, Masala G, Tumino R,Polidoro S, Bakker MF, van Gils CH, Ros MM, Bueno-de-Mesquita HB, Krum-Hansen S, Engeset D, Skeie G, Pilar A, Sánchez MJ, Buckland G, Ardanaz E, Chirlaque D, Rodriguez L, Travis R, Key T, Khaw KT, Wareham NJ, Sund M, Lenner P, Slimani N, Norat T, Aune D, Riboli E, Romieu I. Dietary fiber intake and risk of hormonal receptor-defined breast cancer in the European Prospective Investigation into Cancer and Nutrition study. Am J Clin Nutr. 2013 Feb;97(2):344-53.

Kuo SM. The interplay between fiber and the intestinal microbiome in the inflammatory response. Adv Nutr. 2013 Jan 1;4(1):16-28.

Foster M, Karra M, Picone T, Chu A, Hancock DP, Petocz P, Samman S. Dietary fiber intake increases the risk of zinc deficiency in healthy and diabetic women. Biol Trace Elem Res. 2012 Nov;149(2):135-42.

Tuohy KM, Conterno L, Gasperotti M, Viola R. Up-regulating the human intestinal microbiome using whole plant foods, polyphenols, and/or fiber. J Agric Food Chem. 2012 Sep 12;60(36):8776-82.

Kaczmarczyk MM, Miller MJ, Freund GG. The health benefits of dietary fiber: beyond the usual suspects of type 2 diabetes mellitus, cardiovascular disease and colon cancer. Metabolism. 2012 Aug;61(8):1058-66.

Krishnamurthy VM, Wei G, Baird BC, Murtaugh M, Chonchol MB, Raphael KL, Greene T, Beddhu S. High dietary fiber intake is associated with decreased inflammation and all-cause mortality in patients with chronic kidney disease. Kidney Int. 2012 Feb;81(3):300-6.

Kranz S, Brauchla M, Slavin JL, Miller KB. What do we know about dietary fiber intake in children and health? The effects of fiber intake on constipation,obesity, and diabetes in children. Adv Nutr. 2012 Jan;3(1):47-53.

Dong JY, He K, Wang P, Qin LQ. Dietary fiber intake and risk of breast cancer: a meta-analysis of prospective cohort studies. Am J Clin Nutr. 2011Sep;94(3):900-5.

Saura-Calixto F. Dietary fiber as a carrier of dietary antioxidants: an essential physiological function. J Agric Food Chem. 2011 Jan 12;59(1):43-9.

VITAMIN B6
1: Kuwahara K, Nanri A, Pham NM, Kurotani K, Kume A, Sato M, Kawai K, Kasai H, Mizoue T. Serum vitamin B6, folate, and homocysteine concentrations and oxidative DNA damage in Japanese men and women. Nutrition. 2013 Oct;29(10):1219-23.

Je Y, Lee JE, Ma J, Zhang X, Cho E, Rosner B, Selhub J, Fuchs CS, Meyerhardt J, Giovannucci E. Prediagnostic plasma vitamin B6 (pyridoxal 5'-phosphate) and survival in patients with colorectal cancer. Cancer Causes Control. 2013 Apr;24(4):719-29.

Pan WH, Chang YP, Yeh WT, Guei YS, Lin BF, Wei IL, Yang FL, Liaw YP, Chen KJ, Chen WJ. Co-occurrence of anemia, marginal vitamin B6, and folate status and depressive symptoms in older adults. J Geriatr Psychiatry Neurol. 2012 Sep;25(3):170-8.

Minami Y, Hirabayashi Y, Nagata C, Ishii T, Harigae H, Sasaki T. Intakes of vitamin B6 and dietary fiber and clinical course of systemic lupus erythematosus: a prospective study of Japanese female patients. J Epidemiol. 2011;21(4):246-54.

Ishihara J, Iso H, Inoue M, Iwasaki M, Okada K, Kita Y, Kokubo Y, Okayama A, Tsugane S; JPHC Study Group. Intake of folate, vitamin B6 and vitamin B12 and the risk of CHD: the Japan Public Health Center-Based Prospective Study Cohort I. J Am Coll Nutr. 2008 Feb;27(1):127-36.

POLYPHENOLS
Aguirre L, Portillo MP, Hijona E, Bujanda L. Effects of resveratrol and other polyphenols in hepatic steatosis. World J Gastroenterol. 2014 Jun 21;20(23):7366-80.

Del Cornò M, Scazzocchio B, Masella R, Gessani S. Regulation of dendritic cell function by dietary polyphenols. Crit Rev Food Sci Nutr. 2014 Jun 18.

Most J, Goossens GH, Jocken JW, Blaak EE. Short-term supplementation with a specific combination of dietary polyphenols increases energy expenditure and alters substrate metabolism in overweight subjects. Int J Obes (Lond). 2014 May;38(5):698-706.

Khan N, Khymenets O, Urpí-Sardà M, Tulipani S, Garcia-Aloy M, Monagas M, Mora-Cubillos X, Llorach R, Andres-Lacueva C. Cocoa polyphenols and inflammatory markers of cardiovascular disease. Nutrients. 2014 Feb 21;6(2):844-80.

Santangelo C, Varì R, Scazzocchio B, Filesi C, Masella R. Management of reproduction and pregnancy complications in maternal obesity: which role for dietary polyphenols? Biofactors. 2014 Jan-Feb;40(1):79-102.

Joven J, Micol V, Segura-Carretero A, Alonso-Villaverde C, Menéndez JA; Bioactive Food Components Platform. Polyphenols and the modulation of gene expression pathways: can we eat our way out of the danger of chronic disease? Crit Rev Food Sci Nutr. 2014;54(8):985-1001. doi: 10.1080/10408398.2011.621772. PubMed PMID: 24499117.

Wang J, Bi W, Cheng A, Freire D, Vempati P, Zhao W, Gong B, Janle EM, Chen TY, Ferruzzi MG, Schmeidler J, Ho L, Pasinetti GM. Targeting multiple pathogenic mechanisms with polyphenols for the treatment of Alzheimer's disease-experimental approach and therapeutic implications. Front Aging Neurosci.

2014 Mar 14;6:42.

Ali F, Ismail A, Kersten S. Molecular mechanisms underlying the potential antiobesity-related diseases effect of cocoa polyphenols. Mol Nutr Food Res. 2014 Jan;58(1):33-48.

Kim HS, Quon MJ, Kim JA. New insights into the mechanisms of polyphenols beyond antioxidant properties; lessons from the green tea polyphenol, epigallocatechin 3-gallate. Redox Biol. 2014 Jan 10;2:187-95.

Nantz MP, Rowe CA, Muller C, Creasy R, Colee J, Khoo C, Percival SS. Consumption of cranberry polyphenols enhances human γδ-T cell proliferation and reduces the number of symptoms associated with colds and influenza: a randomized, placebo-controlled intervention study. Nutr J. 2013 Dec 13;12:161.

Sun J, Xiao Z, Lin LZ, Lester GE, Wang Q, Harnly JM, Chen P. Profiling polyphenols in five Brassica species microgreens by UHPLC-PDA-ESI/HRMS(n.). J Agric Food Chem. 2013 Nov 20;61(46):10960-70.

Etxeberria U, Fernández-Quintela A, Milagro FI, Aguirre L, Martínez JA, Portillo MP. Impact of polyphenols and polyphenol-rich dietary sources on gut microbiota composition. J Agric Food Chem. 2013 Oct 9;61(40):9517-33.

Barnett MP, Cooney JM, Dommels YE, Nones K, Brewster DT, Park Z, Butts CA, McNabb WC, Laing WA, Roy NC. Modulation of colonic inflammation in Mdr1a(-/-) mice by green tea polyphenols and their effects on the colon transcriptome and proteome. J Nutr Biochem. 2013 Oct;24(10):1678-90.

Munir KM, Chandrasekaran S, Gao F, Quon MJ. Mechanisms for food polyphenols to ameliorate insulin resistance and endothelial dysfunction: therapeutic implications for diabetes and its cardiovascular complications. Am J Physiol Endocrinol Metab. 2013 Sep 15;305(6):E679-86.

Sohrab G, Hosseinpour-Niazi S, Hejazi J, Yuzbashian E, Mirmiran P, Azizi F. Dietary polyphenols and metabolic syndrome among Iranian adults. Int J Food Sci Nutr. 2013 Sep;64(6):661-7.

Martín-Peláez S, Covas MI, Fitó M, Kušar A, Pravst I. Health effects of olive oil polyphenols: recent advances and possibilities for the use of health claims. Mol Nutr Food Res. 2013 May;57(5):760-71.

De Nicoló S, Tarani L, Ceccanti M, Maldini M, Natella F, Vania A, Chaldakov GN, Fiore M. Effects of olive polyphenols administration on nerve growth factor and brain-derived neurotrophic factor in the mouse brain. Nutrition. 2013 Apr;29(4):681-7.

Deusser H, Rogoll D, Scheppach W, Volk A, Melcher R, Richling E. Gastrointestinal absorption and metabolism of apple polyphenols ex vivo by the pig intestinal mucosa in the Ussing chamber. Biotechnol J. 2013 Mar;8(3):363-70.

Mandalari G, Bisignano C, Filocamo A, Chessa S, Sarò M, Torre G, Faulks RM, Dugo P. Bioaccessibility of pistachio polyphenols, xanthophylls, and tocopherols during simulated human digestion. Nutrition. 2013 Jan;29(1):338-44.

Calani L, Dall'Asta M, Derlindati E, Scazzina F, Bruni R, Del Rio D. Colonic metabolism of polyphenols from coffee, green tea, and hazelnut skins. J Clin Gastroenterol. 2012 Oct;46 Suppl:S95-9.

Tuohy KM, Conterno L, Gasperotti M, Viola R. Up-regulating the human intestinal microbiome using whole plant foods, polyphenols, and/or fiber. J Agric Food Chem. 2012 Sep 12;60(36):8776-82.

Bornhoeft J, Castaneda D, Nemoseck T, Wang P, Henning SM, Hong MY. The protective effects of green tea polyphenols: lipid profile, inflammation, and antioxidant capacity in rats fed an atherogenic diet and dextran sodium sulfate. J Med Food. 2012 Aug;15(8):726-32.

Anunciato TP, da Rocha Filho PA. Carotenoids and polyphenols in nutricosmetics, nutraceuticals, and cosmeceuticals. J Cosmet Dermatol. 2012 Mar;11(1):51-4.

Thakur VS, Gupta K, Gupta S. The chemopreventive and chemotherapeutic potentials of tea polyphenols. Curr Pharm Biotechnol. 2012 Jan;13(1):191-9.

Singh A, Holvoet S, Mercenier A. Dietary polyphenols in the prevention and treatment of allergic diseases. Clin Exp Allergy. 2011 Oct;41(10):1346-59.

Scapagnini G, Vasto S, Abraham NG, Caruso C, Zella D, Fabio G. Modulation of Nrf2/ARE pathway by food polyphenols: a nutritional neuroprotective strategy for cognitive and neurodegenerative disorders. Mol Neurobiol. 2011 Oct;44(2):192-201.

van Duynhoven J, Vaughan EE, Jacobs DM, Kemperman RA, van Velzen EJ, Gross G, Roger LC, Possemiers S, Smilde AK, Doré J, Westerhuis JA, Van de Wiele T. Metabolic fate of polyphenols in the human superorganism. Proc Natl Acad Sci U S A. 2011 Mar 15;108 Suppl 1:4531-8.

Baeza I, De Castro NM, Arranz L, De la Fuente M. Soybean and green tea polyphenols improve immune function and redox status in very old ovariectomized mice. Rejuvenation Res. 2010 Dec;13(6):665-74.

Vauzour D, Rodriguez-Mateos A, Corona G, Oruna-Concha MJ, Spencer JP. Polyphenols and human health: prevention of disease and mechanisms of action. Nutrients. 2010 Nov;2(11):1106-31. doi: 10.3390/nu2111106. Epub 2010 Nov 8.

Williamson G, Clifford MN. Colonic metabolites of berry polyphenols: the missing link to biological activity? Br J Nutr. 2010 Oct;104 Suppl 3:S48-66.

Janle EM, Lila MA, Grannan M, Wood L, Higgins A, Yousef GG, Rogers RB, Kim H, Jackson GS, Ho L, Weaver CM. Pharmacokinetics and tissue distribution of 14C-labeled grape polyphenols in the periphery and the central nervous system following oral administration. J Med Food. 2010 Aug;13(4):926-33.

Meydani M, Hasan ST. Dietary polyphenols and obesity. Nutrients. 2010 Jul;2(7):737-51.

Nicholson SK, Tucker GA, Brameld JM. Physiological concentrations of dietary polyphenols regulate vascular endothelial cell expression of genes important in cardiovascular health. Br J Nutr. 2010 May;103(10):1398-403.

Hanhineva K, Törrönen R, Bondia-Pons I, Pekkinen J, Kolehmainen M, Mykkänen H, Poutanen K. Im-

pact of dietary polyphenols on carbohydrate metabolism. Int J Mol Sci. 2010 Mar 31;11(4):1365-402.

Ostertag LM, O'Kennedy N, Kroon PA, Duthie GG, de Roos B. Impact of dietary polyphenols on human platelet function--a critical review of controlled dietary intervention studies. Mol Nutr Food Res. 2010 Jan;54(1):60-81.

Torabian S, Haddad E, Rajaram S, Banta J, Sabaté J. Acute effect of nut consumption on plasma total polyphenols, antioxidant capacity and lipid peroxidation. J Hum Nutr Diet. 2009 Feb;22(1):64-71.