



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(3): 1872-1877
Received: 24-03-2019
Accepted: 26-04-2019

Neerja Rana

Department of Basic sciences &
Department of Food science YSP
University of Horticulture and
Forestry, Nauni, Solan,
Himachal Pradesh, India

Arti Ghabru

Department of Basic sciences &
Department of Food science YSP
University of Horticulture and
Forestry, Nauni, Solan,
Himachal Pradesh, India

Devina Vaidya

Department of Food science YSP
University of Horticulture and
Forestry, Nauni, Solan,
Himachal Pradesh, India

Defensive function of fruits and vegetables

Neerja Rana, Arti Ghabru and Devina Vaidya

Abstract

Vegetables and fruit are low fat foods. They are also low in protein, and apart from bananas, have a low calorie and starch content. Fruits contain fructose, a natural fruit sugar.

Almost all fruit and vegetables are good sources of soluble and insoluble fiber. *Insoluble fibre* adds bulk to stools, keeps food moving through the digestive system, and helps in preventing bowel problems like constipation, irritable bowel syndrome and cancer. *Soluble fibre* in fruits, pulses, and some grains, helps lower cholesterol in blood and regulates blood sugar levels.

Vegetables and fruit contain a wide range of essential vitamins and minerals. For instance, many are good sources of beta-carotene, Vitamin C, folate and potassium. Leafy green vegetables contain calcium and iron. The best way to get the complete range of vitamins and minerals available from fruit and vegetables is to have at least five servings a day.

Vegetables and fruit are major sources of phytochemicals, natural plant chemicals that protect health.

Nutritional information wouldn't be complete without a mention of the all-important antioxidants, which protect us from many types of pollutants, including emissions from TVs and computers, UV light, pesticides, additives, burnt and fried foods and stress.

Top fruits: prunes, raisins, blueberries, blackberries, strawberries, raspberries, plums, oranges, red grapes, cherries, kiwi. Top vegetables: kale, spinach, Brussels sprouts, alfalfa, broccoli, beetroot, red peppers and onions.

Keywords: Function, fruits, vegetables

Introduction

Food is a necessity of life. The function of food is to supply us with the energy for the different activities of the body, the structural materials for every cell of the body and the thousands of regulatory substances essential for all the body processes. Food is the fuel for the body, various types of food for various types of functions of the body. Eating food should be a necessary function as breathing is, but most people regard it as a means of gratifying their desire for the nice things in life, which is a wrong thing to do and is very harmful. That is why it is said "eat to live" and not "live to eat". Proper eating habit or proper diet is a must for good health. Proper diet can also cure most of the diseases (Mozafar 1994) [22].

Food contains every type of necessary vitamins and minerals for the maintenance of good health but a misunderstanding of the vital functions of food has led modern day man to ignore the facts and rely on modern medicines. No therapy or drug known to modern medical science can rebuild tissue that has been damaged by disease or trauma. Food alone can achieve this feat. It is therefore that nutrition is an important and an indispensable weapon against disease (Southon, 2000; Seifried *et al.* 2003) [30, 26]. Food intake with inadequate calories is termed as under nourishment leads to starvation, disease or sometimes death (Joshiyura *et al.*, 1999; Hu *et al.*, 1999; Mitchels *et al.*, 2000) [17, 15, 21].

Energy is supplied by carbohydrates and fats. Minerals and vitamins are not sources of energy but are essential for many steps in the release of energy. Amino acids and mineral elements are constantly required for the growth and maintenance of body tissues. Food energy is reported as calories. A calorie is the unit to measure the amount of energy that protein, fat and carbohydrate furnish the body (Steinmetz & Jansen 1996) [31]. Alcohol also contributes to the calorie content of alcoholic beverages (Tohill *et al.*, 2004) [35].

There are five major groups of foods that serve as source of nutrition for human beings. Fruits and vegetables are one of the major constituents of food group along with cereals, pulses, legumes, fats, sugars and animal products. Each group has its own significance. Cereals are the main source of carbohydrates but with low proteins; animal products are rich in proteins and fats. The vitamins and minerals are scarce in these two groups are present in abundance in fruits and vegetables in addition to carbohydrates and proteins. Thus fruits and vegetables are more important than other food groups being low caloric, low fat foods (Van Duyn & Pivonka, 2000) [37]. High consumption of tomatoes and tomato products have been associated with reduced carcinogenesis, especially of prostate cancer and is thought to be due to the presence

Correspondence**Arti Ghabru**

Department of Basic sciences &
Department of Food science YSP
University of Horticulture and
Forestry, Nauni, Solan,
Himachal Pradesh, India

of lycopene, which gives red tomatoes their colour (Giovannucci, 2002) [10]. Boileau *et al.* (2003) [3] observed that the use of tomato powder significantly reduced prostate carcinogenesis in rats. Examples of fruits and vegetables recommended for daily consumption include spinach, orange, mango, carrot, melon, pineapples red grapefruit etc (Van Duyn & Pivonka 2000) [37].

Carried out a study in respect of fruit and vegetable consumption and its relationship to weight management. Their study found that an increase in fruit and vegetable intake was associated with a 24% lower risk of becoming obese. Ness and Powles (1997) [23] reviewed evidence about fruit and vegetable intake and the development of coronary heart disease and found a significant inverse association between the amount of fruits and vegetables consumed and the incidence of coronary heart disease. Alonso *et al.* (2004) [1] also reported a similar association between fruit and vegetable consumption and decreased blood pressure. Lutein and zeaxanthin are carotenoids that are found in relatively high concentrations in the retina and could play a role in preventing damage to the retina which is caused by light or oxidants (Mares-Perlman *et al.*, 2002) [19].

In order to prevent or reduce the oxidative stress induced by free radicals, sufficient amounts of antioxidants need to be consumed and fruits and vegetables are known to contain a variety of antioxidant compounds such as phenolics and carotenoids which may help protect cellular systems from oxidative damage and reduce the risk of developing chronic diseases (Wang *et al.*, 1996; Vinson *et al.*, 2001) [40, 39]. It is known that carotenoids demonstrate photoprotection which originate from their ability to quench and inactivate reactive oxygen species (Britton, 1995) [4].

Phenolics provide essential functions in the reproduction and the growth of plants; acting as defense mechanisms against pathogens, parasites, and predators as well as contributing to the colour of plants and may also provide health benefits associated with reduced risk of chronic diseases in humans (Sun *et al.*, 2002) [32]. Different species and varieties of fruits, vegetables, and grains have different phytochemical profiles (Goldman *et al.*, 1999; Giskes *et al.*, 2002) [12, 11]. The combination of orange, apple, grape, and blueberry has been shown to display a synergistic effect in antioxidant activity and 124 Diabetes Mellitus – Insights and Perspectives obtaining antioxidants from dietary intake by consuming a wide variety of foods is of significant importance due to the fact that foods originating from plants contain many diverse types of phytochemicals in various quantities.

It is believed that fruits and vegetables are rich in precursors to bicarbonate ions which serve to buffer acids in the body, therefore if the concentration of bicarbonate ions is inadequate to maintain normal pH, the body is capable of mobilizing alkaline calcium salts from bone in order to

neutralize acids consumed in the diet and those generated by metabolism, thus increased consumption of fruits and vegetables reduces the net acid content of the diet and may preserve calcium in bones which might otherwise be mobilized to maintain normal pH (New, 2002) [24].

The relationship between fruit and vegetable consumption and obesity has also been envisaged. It is not clear how fruit and vegetable consumption prevent obesity or excessive weight gain. However, one possible mechanism could be that fruits and vegetables might serve as healthy substitutes for more calorie-dense foods (Field *et al.*, 2003) [7].

Fruit and vegetables are packed full of goodness and often contain a number of essential vitamins and minerals that cannot be found in other types of foods or they may contain higher levels of these nutrients than other foods. They play a significant role in human nutrition, especially as sources of vitamins [C (ascorbic acid), A, thiamine (B₁), niacin (B₃), pyridoxine (B₆), folacin (also known as folic acid or folate) (B₉), E], minerals, and dietary fiber. Their contribution as a group is estimated at 91% of vitamin C, 48% of vitamin A, 30% of folacin, 27% of vitamin B₆, 17% of thiamine, and 15% of niacin in the diet (Cho *et al.*, 2004; Seddon *et al.*, 1994; Tucker *et al.*, 2005) [5, 25, 36].

Fruits and vegetables also supply 16% of magnesium, 19% of iron, and 9% of the calories. Legume vegetables contribute about 5% of the per capita availability of proteins in the diet as their proteins are of high quality due to their content of essential amino acids. Other important nutrients supplied by fruits and vegetables include riboflavin (B₂), zinc, calcium, potassium, and phosphorus.

Fruits and vegetables in the daily diet have been strongly associated with reduced risk for some forms of cancer, heart disease, stroke, and other chronic diseases. Although antioxidant capacity varies greatly among fruits and vegetables, it is better to consume a variety of commodities rather than limiting consumption to a few with the highest antioxidant capacity. There is increasing evidence that consumption of whole foods is better than isolated food components such as dietary supplements and nutraceuticals (Block *et al.*, 1992; Terry *et al.*, 2001; Ford & Mokdad 2001; Temple & Gladwin 2003; Daucher *et al.*, 2005) [2, 34, 8, 33, 6].

The Dietary Guidelines encourage consumers to:

- Enjoy five a day, ie, eat at least 2 servings of fruits and at least 3 servings of vegetables each day.
- Choose dark-green leafy vegetables, orange fruits and vegetables, and cooked dry beans and peas often.

Some components of fruits and vegetables (phytochemicals) (Table 1) are strong antioxidants and function to modify the metabolic activation and detoxification/disposition of carcinogens, or even influence processes that alter the course of the tumor cell. They are required for maintaining good health (Fung *et al.*, 2001; Shellen *et al.*, 2002) [9, 28].

Table 1: Nutritive constituents of fruits and vegetables that have a positive impact on human health and their sources

Constituent	Sources	Established or proposed effects on human-wellness
Vitamin C (ascorbic acid)	Broccoli, cabbage, citrus fruits, guava, kiwifruit, leafy greens, pepper, pineapple, potato, strawberry, tomato, watermelon	Prevents scurvy, aids wound healing, healthy immune- system, cardiovascular-disease
Vitamin A (carotenoids)	Dark-green vegetables (such as spinach, and turnip greens), orange vegetables (such as carrots, pumpkin, and sweet potato), orange-flesh fruits (such as apricot, mango, orange, papaya, peach and pineapple), tomato	Night blindness prevention, chronic fatigue, psoriasis, heart disease, stroke, cataracts
Vitamin K	Nuts, lentils, green onions, crucifers (cabbage, broccoli), leafy greens	Synthesis of pro-coagulant factors, osteoporosis
Vitamin E (tocopherols)	Nuts (such as almonds, cashew nuts, pistachios, peanuts, and walnuts), corn, dry beans, lentils and chickpeas, dark-green leafy	Heart-disease, ldl-oxidation, immune-system, diabetes,

	vegetables	Cancer
Fiber	Most fresh fruits and vegetables, nuts, cooked dry beans and peas	Diabetes, heart disease
Folate (folic acid)	Dark-green leafy vegetables (such as spinach, mustard greens, broccoli), legumes (cooked dry beans, lentils, chickpeas and green peas), asparagus	Birth defects, cancer Heart disease, nervous system
Calcium	Cooked vegetables (such as beans, tomatoes) peas, papaya, raisins, orange, pumpkin, cauliflower	Osteoporosis, muscular/ skeletal, teeth, blood pressure
Magnesium	Spinach, lentils, potato, banana, nuts, corn, cashews	Osteoporosis, nervous system, teeth, immune system
Potassium	Baked potato or sweet potato, banana, cooked dry beans, cooked greens, dried fruits (such as apricots and prunes).	Hypertension (blood pressure) stroke Arteriosclerosis

Red/Purple/Blue

Pigments called anthocyanins give red and purple fruits and vegetables their color and serve as powerful antioxidants in the body. "They're known for maintaining a healthy heart [and] memory function. Studies have also shown that anthocyanins decrease the risk of muscular degeneration, certain types of cancer, and stroke. Certain other red or purple fruits and vegetables are particularly important for people who have diabetes and therefore a greater risk for heart disease. Cherries, figs, and tomatoes are high in potassium—a mineral that helps lower blood pressure. (People with kidney disease may need to limit the amount of potassium in their diet.) Another component of these foods, lycopene, keeps your heart healthy. Great sources of the antioxidant include watermelon and tomatoes, even tomato sauce, which has more lycopene than raw tomatoes (Wang *et al.*, 1996; Kalt 2002) [40, 18].

Orange/Yellow

As kids we're told to eat our carrots to protect our vision. The antioxidant is converted to vitamin A in the body and maintains eye health (preventing macular degeneration and improving night vision), fights cancer, and is necessary for healthy skin. Other nutrients found in orange and yellow fruits and veggies include vitamin C, potassium, folic acid, and bromelain. Oranges might be the most common fruit we eat for vitamin C, but it's also present in orange bell peppers, sweet potatoes, cantaloupe, peaches, mangoes, and papaya. For folic acid, eat carrots, cantaloupe, summer squash, and corn. And make sure you eat plenty of pumpkin, sweet potatoes, and butternut squash—they're all high in blood pressure—lowering potassium. Finally, bromelain, an enzyme in pineapple, can help indigestion and reduce swelling and infection. It may also fight atherosclerosis, though the research is still inconclusive (Goldman *et al.*, 1999; Cho *et al.*, 2004) [12, 5].

Green

Leafy greens (think kale, romaine lettuce, spinach, and collard greens) should be a regular part of your diet. "We always want to eat things that are as dark as possible, and greens are very dark. Aside from being high in vitamin A, leafy greens are also a good source of calcium. Cruciferous vegetables, like broccoli and brussels sprouts, are also high in vitamin A. Other green foods, like kiwis, green bell peppers, broccoli, and cabbage, are great sources of vitamin C. In fact, most green foods have some mix of vitamins and nutrients.

White

Includes: Onions, cauliflower, mushrooms, even bananas. "There are nutrients in white foods." So a monochromatic dinner of white fish, roasted cauliflower, and white beans is preferable to one of fried chicken, mashed potatoes, and French bread. Aside from cauliflower, white beans, and fish, try turnips, which are high in vitamin C, folic acid, and fiber.

Potatoes, bananas, and fennel are all high in potassium. And fennel is also packed with vitamin C and fiber. Studies suggest mushrooms, which are a good source of riboflavin (vitamin B2) and niacin, may help you feel full and satisfied.

Health Benefits of Apple

- Eating an apple daily can lower cholesterol and reduce skin diseases.
- Apple is a rich source of flavonoid and polyphenols both are powerful antioxidant, 100g of apple can give an antioxidant effect equal to taking about 1500mg of vitamin C.
- Apple contains a large amount of minerals and vitamins that can strengthen the blood.
- Apple contains malic acid and tartaric acid that can help prevent disturbances of the liver and digestion.
- Apple cider vinegar when used as beverage can help to prevent the formation of kidney stone.
- The skin of Apple contains pectin that can help remove toxic substances from the system by supplying galacturonic acid.
- Apples have been recommended for: Obesity, Headache, Arthritis, bronchial asthma, Inflammation of the bladder, Gallbladder stones and Worms.

Health Benefits of Apricot

- Apricot has high mineral content that makes it beneficial in cases of anaemia, tuberculosis, asthma, bronchitis, and toxemia.
- Apricot is high in vitamin A therefore it is very helpful in the removal of skin pimples and other skin disorder.
- Apricot contain lycopene, help to protect LDL cholesterol from oxidation, which may help prevent heart disease.
- It helps in preventing cancer in organs lined by epithelial tissue, due to its high vitamin A content.

Health Benefits of Banana

- Banana is an energy booster.
- Banana is a rich source of iron, thus it is helpful in cases of anaemia.
- The skin of the banana is said to help remove warts (cover the warts with the inner skin of banana).
- Banana is good for people who have high blood pressure because it is low in salt.
- Banana is also helpful in the following cases: Stomach ulcer (banana has a natural antacid), Colitis, Digestive disorder, Diarrhoea and Constipation (banana is high in fibre).

Health Benefits of Grapes

- Grapes are rich source of flavonoids, this gives the vibrant purplish colour to grapes, grape juice and red wine, the stronger the colour, the higher the flavonoid content.

- Good blood and body builder, it is also a quick source of energy.
- Grape juice is easily assimilated and called the "nectar of the gods" used in cases of constipation, gout, rheumatism, skin and liver disorders.
- Grape juice, red wines and raisin tea showed strong antiviral activity against poliovirus, herpes simplex virus.

Health Benefits of Lemon

- The juice of the lemon destroys harmful bacteria found in the cuts and other areas of infection.
- For toothache, apply fresh lemon juice on the painful area.
- The juice is also good for the removal of blackheads, freckles and wrinkles.
- Lemon juice helps to prevent and cure osteoarthritis.
- Helps to prevent diabetes and is a great liver tonic.
- Lemon juice helps in preventing the development and progression of atherosclerosis.

Health Benefits of Mango

- Mangoes contain phenols, this phenolic compound have powerful antioxidant and anticancer abilities.
- Mango is high in iron, pregnant women and people with anaemia are advised to eat this fruit regularly.
- Mango is effective in relieving clogged pores of the skin.
- It is also valuable to combat acidity and poor digestion.
- Mango is high in antioxidant and low in carbohydrates.
- Mango is a rich source of vitamin A (beta-carotene), E and Selenium which help to protect against heart disease and other ailments.

Health Benefits of Papaya

- Papaya contains the digestive enzyme papain that is why it is valuable for aiding digestion. The ripe fruits are easily digestible and prevent constipation.
- Papaya juice helps in relieving infections of the colon and can help break down pus and mucus.
- May help prevent cancer in organs and glands with epithelial tissue.
- Prevents nausea (includes morning sickness and motion sickness).
- Slices of green fruits rubbed over meat and boiled with tough meat, make the meat more tender.

Health Benefits of Pineapple

- It contains a proteolytic enzyme bromelain, which helps in the digestion of protein.
- Pineapple can prevent blood clot formation because of its bromelain content.
- It regulates the gland and found to be helpful in cases of goiter (enlargement of the thyroid gland).
- Dyspepsia (chronic digestive disturbance).
- Bronchitis (inflammation of the bronchial tubes.)
- High Blood pressure.
- Fresh pineapple juice is also used in removing intestinal worms.
- Fresh pineapple juice has been used to combat diphtheria and other infections of the throat or other parts of the body.
- Prevents nausea (includes morning sickness and motion sickness), Take 230 cc. of pineapple juice or papaya juice.

Health Benefits Walnut

- Walnut is a good source of all important omega-3 fatty acids. Omega-3 fatty acids has a lot of health benefits ranging from cardiovascular protection, better mental function, anti-inflammatory benefits in asthma, rheumatoid arthritis and inflammatory diseases like eczema and psoriasis.
- Walnut contain an antioxidant compound (ellagic acid) that helps supports the immune system and contain several anticancer properties.
- Walnut helps improve body's metabolism.
- Walnut is recommended for patients with liver ailments.

Health Benefits of Beans

- Beans are cholesterol free, contain no saturated fat and are low in total fat.
- Bean can help prevent anaemia because it is rich in vitamins and minerals especially iron.
- Bean is very helpful in constipation.
- It is recommended for people who want to build their muscle and make their body stronger because beans contain at least 20% protein and are high in carbohydrates.
- Beans are an excellent to prevent and treat diabetes. Beans have a low glycemic index (rate at which a food raises the blood sugar).

Health Benefits of Carrot

Carrot is a vegetable grown for its edible root. Raw carrots are eaten in salads. Carrot contain carotene, a chemical that is converted into vitamin A by the body, it helps prevent night blindness.

- Carrot can enhance the quality of breast milk.
- Carrot can improve the appearance of the skin, hair and nails.
- When taken daily it can lower cholesterol and blood pressure.
- Raw contain beta-carotene, a strong antioxidant that can prevent cancer.
- Carrot can help improve eyesight.
- Carrots can regulate blood sugar.
- Carrot is also helpful in the following cases: Obesity, poisoning of the blood, Gum disease, Insomnia, Inflamed Kidneys, Liver, Colitis, Ulcer Painful urination.

Health Benefits of Cauliflower

- Cauliflower just like the other cruciferous vegetables (cabbage, broccoli, kale) contains a substance that can help prevent cancer.
- Cauliflower contains glucosinolates and thiocyanates which help increase the liver's ability to neutralize a potentially toxic substance.
- Cauliflower is a blood and liver detoxifier.
- Cauliflower with turmeric could be an effective therapy to prevent and also to inhibit the spread of established prostate cancer.
- Cauliflower and other cruciferous vegetables contain indole-3-carbinol, a substance that can affect the metabolism of estrogens in the body and can prevent breast and ovarian cancer.
- Caution: Cauliflower contains goitrogens, natural substances in certain foods that can interfere with the function of thyroid gland. Cooking may help inactivate the goitrogenic compounds found in cauliflower.

Health Benefits of Spinach

- Spinach contains choline and inositol, the substances that help to prevent atherosclerosis or thickening and hardening of arteries.
- Spinach and alfalfa help stabilize blood sugar among diabetics.
- Spinach is loaded with flavonoid that functions as antioxidant and anti-cancer agent.
- Spinach contains carotenoid that help fights cancer.
- Spinach is a rich source of Vitamins C and A and acts as an anti-aging vegetable.
- Spinach is a good source of Vitamin K, which aids in the formation of the blood substance required for clotting of blood.

Health Benefits of Tomato

- A large consumption of tomato can help improve skin texture and color.
- Tomato is a good blood purifier.
- Tomato helps in cases of congestion of the liver (protects the liver from cirrhosis).
- Tomato is a natural antiseptic therefore it can help protect against infection.
- Nicotinic acid in tomatoes can help to reduce blood cholesterol thus helps prevent heart diseases.
- Tomato contain lycopene (the red pigment in tomato), this pigment is a powerful antioxidant that can also fight cancer cells.

Health problems and beneficial fruits and vegetables (Michaud *et al.*, 1999; Jacques *et al.*, 2001; Smith-Warner *et al.*, 2003; Tohill *et al.*, 2004; Vent'veer *et al.*, 2000) ^[35]:

- 1) **Hypertension:** Asparagus, Bamboo Shoots, Broccoli, Cauliflower, Cucumber, Celery, Cherries, Guava, Jackfruit, Orange, Peach, Pear, Pepper (green), Pineapple, Spinach and Tomato.
- 2) **Hypotension:** Date, Peas, Potato (sweet), Pumpkin and Raisins.
- 3) **Impotence:** Avocado, Date, Pumpkins and Squash Seeds.
- 4) **Indigestion:** Apple, Banana, Broccoli, Cucumber, Grapefruit, Papaya, Peach, Pineapple, Plum and Spinach.
- 5) **Inflamed Stomach:** Avocado, Banana, Papaya, Pear, Sweet Potato and Pumpkin.
- 6) **Insomnia:** Apple, Avocado, Cabbage, Celery, Lettuce, Onion, Spinach.
- 7) **Kidney and Bladder Problems (stones etc):** Apple, Carrot, Celery, Cherries, Coconut, Cucumber, Grape, Lettuce, mango, Mustard, Peach, Pear, pumpkin Seeds, Spinach, Squash, Strawberry and Watermelon.
- 8) **Liver Disease:** Apple, Beets (red), Carrot, Celery, Cherries, Grape, Grapefruit, Lime, Pepper (green), Plum, Strawberry, Tamarind, Tomato and Walnut.
- 9) **Nervousness:** Avocado, Celery, Date, Eggplant, Jackfruit and Lettuce.
- 10) **Pneumonia:** Onion, Orange and Tangerine.
- 11) **Pyorrhoea:** Apple, Chestnuts, Cucumber and Date
- 12) **Skin Problems:** Apple, Carrot, Coconut oil, Grape, Grapefruit, Lemon, Mango, Peach, Pear, Plum, Sesame oil and Tomato
- 13) **Tuberculosis:** Apple, Apricot, Cabbage, Celery, Date, Lettuce, Onion, Orange, Pineapple, Radish, Raisins and Tomato
- 14) **Ulcer (Stomach):** Avocado, Banana, Cabbage, Carrot, Date, Eggplant, Peach, and Pumpkin.

- 15) **Underweight and Malnutrition:** Avocado, Beans, Cabbage, Cashew nuts, Chestnuts, Chickpeas, Coconut, Corn, Millet, Peanuts, Peas, Potato and Soybeans.
- 16) **Weight Reduction:** Apricot, Bamboo Shoots, Broccoli, Carrot, Cauliflower, Celery, Cherries, Grapefruit, Guava, Jackfruit, Lettuce, Mushroom, Onion, Pear, Pepper (green), Plum, Radish and Spinach.
- 17) **Anaemia:** Apricot, Beans (lima), Beets, Celery, Cherries, Corn, Date, Grape and Lettuce.
- 18) **Arthritis and Rheumatism:** Apple, Cabbage, Cauliflower, Celery, Cherries, Corn, Cucumber, Grape, Grapefruit, Lettuce, Lime, Pepper (green), Pineapple, Strawberry and Tangerine.
- 19) **Asthma:** Apricot, Cauliflower, Celery, Cherries, Guava, Onion, Orange, Peach and Pepper (hot).
- 20) **Diabetes:** Alfalfa, Celery (roots), Cucumber, Onion, Radish, Soybean and Spinach.
- 21) **Eye-strengtheners:** Cabbage, Carrot and Onion.
- 22) **Hair Growth:** Cabbage, Carrot, Cucumber, Lettuce, Onion, Radish and Spinach.

References

1. Alonso A, de la Fuente C, Martin-Arnau AM, de Irala J, Martinez JA, Gonzalez MA. Fruit and vegetable consumption is inversely associated with blood pressure in a Mediterranean population with a high vegetable-fat intake. *Brit J Nutr.* 2004; 92:311-319.
2. Block G, Patterson BH, Subar AF. Fruit, vegetables and cancer prevention: a review of the epidemiological evidence. *Nutr Cancer.* 1992; 18:1-4.
3. Boileau TW, Liao Z, Kim S, Lemeshow S, Erdman JW, Clinton SK. Prostate carcinogenesis in N-methyl-N-nitrosourea (NMU)-testosterone-treated rats fed tomato powder, lycopene or energy-restricted diets. *J Natl Cancer Inst.* 2003; 95:1578-1586.
4. Britton G. Structure and properties of carotenoids in relation to function. *FASEB J.* 1995; 9:1551-1558.
5. Cho E, Seddon JM, Rosner B, Willett WC, Hankinson SE. Prospective study of intake of fruits, vegetables, vitamins and carotenoids and the risk of age-related maculopathy. *Arch Ophthalmol.* 2004; 122(6):883-892.
6. Daucher L, Amouye P, Dallongeville J. Fruit and vegetable consumption and risk of stroke: a meta-analysis of cohort studies. *Neurol.* 2005; 65:1193-1197.
7. Field AE, Gillman MW, Rosner B, Rockett HR, Colditz GA. Association between fruit and vegetable intake and change in body mass index among a large sample of children and adolescents in the United States. *Int J Obesity.* 2003; 27:821-826.
8. Ford ES, Mokdad AH. Fruit and vegetable consumption and diabetes mellitus incidence among USA adults. *Prev Med.* 2001; 32(1):33-39.
9. Fung TT, Willett WC, Stampfer MJ, Manson JE, Hu FB. Dietary patterns and the risk of coronary heart disease in women. *Arch Intern Med.* 2001; 161:1857-1862.
10. Giovannucci EL, Rimm EB, Liu Y, Stampfer MJ, Willett WC. A prospective study of tomato products, lycopene and prostate cancer risk. *J Natl Cancer Inst.* 2002; 94(5):391-398.
11. Giskes K, Turrell G, Patterson C, Newman B. Socio-economic differences in fruit and vegetable consumption among Australian adolescents and adults. *Publ Health Nutr.* 2002; 5(5):663-669.

12. Goldman IL, Kader AA, Heintz C. Influence of production, handling and storage on phytonutrient content of foods. *Nutr Rev.* 1999; 57:46-52.
13. Gross J. Pigments in vegetables: chlorophylls and carotenoids. AVI Book, Van Nostrand Reinold Pub New York NY. He FJ, Nowson CA & Macgregor GA Fruit and vegetable consumption and stroke: meta-analysis of cohort studies. *Lancet.* 2006; 367:320-326.
14. Hu FB, Rimm EB, Stamper MJ, Ascherio A, Spiegelman D, Willett WC. Prospective study of major dietary patterns and risk of coronary heart disease in men. *Am J Clin Nutr.* 2000; 72:912-921.
15. Hu FB, Stamper MJ, Manson JE, Ascherio A, Colditz GA, Speizer FE. Dietary saturated fats and their food sources in relation to the risk of coronary heart disease in women. *Am J Clin Nutr.* 1999; 70:1001-1008.
16. Jacques PF, Chylack LTJR, Hankinson SE. Long-term nutrient intake and early age-related nuclear lens opacities. *Arch Ophthalmol.* 2001; 119(7):1009-1019.
17. Joshipura KJ, Ascherio A, Manson JE, Stamper MJ, Rimm EB. Fruit and vegetable intake in relation to the risk of ischaemic stroke. *Jama.* 1999; 282:1233-1239.
18. Kalt W. Health functional phytochemicals of fruits. *Hort Rev.* 2002; 27:269-315.
19. Mares-Perlman JA, Millen AE, Ficek TL, Hankinson SE. The body of evidence to support a protective role for lutein and zeaxanthin in decaying chronic disease. *J Nutr.* 2002; 132(3):518-524.
20. Michaud DS, Spiegelman D, Clinton SK, Rimm EB, Willett WC, Giovannucci EL. Fruit and vegetable intake and incidence of bladder cancer in a male prospective cohort. *J Natl Cancer Inst.* 1999; 91(7):605-613.
21. Mitchels KB, Giovannucci E, Joshipura KJ. Prospective study of fruit and vegetable consumption and incidence of colon and rectal cancers. *J Natl Cancer Inst.* 2000; 92:1740.
22. Mozafar A. Plant vitamins: agronomic, physiological and nutritional aspects. CRC Press, Boca Raton FL, 1994.
23. Ness AR, Powles JW. Fruit and vegetables and cardiovascular disease: a review. *Int J Epidemiol.* 1997; 26(1):1-13.
24. New SA. Nutrition society medal lecture: The role of the skeleton in acid-base homeostasis. *Proc Nutr Soc.* 2002; 61(2):151-164.
25. Seddon JM, Ajani UA, Sperduto RD. Dietary carotenoids, vitamins A, C, and E, and advanced age-related macular degeneration. Eye Disease Case-Control Study Group. *JAMA.* 1994; 272(18):1413-1420.
26. Seifried HE, McDonald SS, Anderson DE, Greenwald P, Milner JA. The antioxidant conundrum in cancer. *Cancer Res.* 2003; 63:4295-4298.
27. Shatenstein B, Ghadirian P. Influences on diet, health behaviours and their outcome in select ethnocultural and religious groups. *Nutr.* 1998; 14(2):223-230.
28. Shellen EL, Verbeek AL, Van Den Hoogen GW, Cruysberg JR, Hoyng CB. Neovascular age-related macular degeneration and its relationship to antioxidant intake. *Acta Ophthalmol Scand.* 2002; 80(4):368-371.
29. Smith-Warner SA, Spiegelman D, Yaun SS. Fruits, vegetables and lung cancer: a pooled analysis of cohort studies. *Int J Cancer.* 2003; 107(6):1001-1011.
30. Southon S. Increased fruit and vegetable consumption within EU: potential health benefits. *Food Res Intl.* 2000; 33:211-217.
31. Steinmetz KA, Jansen JD. Vegetables, fruit and cancer prevention: a review. *J Am Diet Assoc.* 1996; 96:1027.
32. Sun J, Chu YF, Wu X, Liu RH. Antioxidant and antiproliferative activities of fruits. *J Agric Food Chem* 2002; 50:7449-7454.
33. Temple NJ, Gladwin KK. Fruit, vegetables and the prevention of cancer: research challenges. *Nutr* 2003; 19:467-470.
34. Terry P, Giovannucci E, Mitchels KB. Fruit, vegetables, dietary fibre and risk of colorectal cancer. *J Natl Cancer Inst* 2001; 93:525.
35. Tohill BC, Seymour J, Serdula M, Kettel-Khan L, Rolls BJ. What epidemiological studies tell us about the relationship between fruit and vegetable consumption and body weight. *Nutr Rev.* 2004; 62:365-374.
36. Tucker KL, Hallfrisch J, Qiao N, Muller D, Andres R, Fleg JL. The combination of high fruit and vegetable and low saturated fat intakes is more protective against mortality in aging men. *J Nutr.* 2005; 135:556-5561.
37. Van Duyn MA, Pivonka E. Overview of the health benefits of fruit and vegetable consumption for the dietetics professional. *J Am Diet Assoc.* 2000; 99(10):1241-1248.
38. Van't Veer P, Jansen MC, Klerk K, Kok FJ. Fruits and vegetables in the prevention of cancer and cardiovascular disease. *Publ Health Nutr.* 2000; 3:103.
39. Vinson JA, Hao Y, Su X, Zubik L, Bose P. Phenol antioxidant quantity and quality in foods: fruits. *J Agric Food Chem.* 2001; 49:5315-5321.
40. Wang H, Cao GH, Prior RL. Total antioxidant capacity of fruits. *J Agric Food Chem.* 1996; 44:701-705.
41. Wang Y, Bentley ME, Zhai F, Popkin BM. Tracking dietary intake patterns of Chinese from childhood to adolescence over a six-year follow-up period. *J Nutr.* 2002; 132(93):430-438.