Functional Food Qualities and Color

Conventional Wisdom
Surely you have heard of the old saying that “an apple a day keeps the doctor away”. According to the Centers for Disease Control and the International Institute of Food Technology, research has shown that a variety of the colors red, yellow/orange, green, blue/purple and white are critical to promoting good health.

Scientific research supports specific nutritional components in fruits and vegetables that do have health benefits. In fact, those eating small amounts of fruits and vegetables compared to those who ate generous amounts are most likely to have reduced risk of chronic diseases such as stroke, other cardiovascular problems and certain cancers. Try to select at least 2 ½ to 3 cups of vegetables and 1½ to 2 cups of fruit daily.

Color for Promoting Good Health
Colorful fruits and vegetables of red, orange/yellow, green, blue/purple and white provide essential vitamins A, C and folate; some carbohydrates and fiber, and the electrolyte potassium.

- Vitamin A keeps eyes and skin healthy and prevents infections.
- Vitamin C helps in wound healing and keeps teeth and gums healthy.
- Folate is necessary to reduce the risk of child being born with brain or spinal cord defects.
- Carbohydrates provide energy and help the body use other nutrients.
- Fiber in diet provides health benefits which may reduce the risk of coronary heart disease.
- Potassium-rich foods may help to maintain a healthy normal blood pressure.

Natural Substances with Protective Effect Against Chronic Disease
Specific components in fruits and vegetables promote health. These colorful fruits and vegetables have been touted as blueberries boosting memory, cranberries help prevent urinary tract infections or grape seed extract help to prevent heart disease. Why is this so? Phytochemicals or non-nutritive plant chemicals protect humans against disease. They differ from essential nutrients in that they are not required by body to function. Phytochemicals have roles as antioxidants to protect body against oxidative damage and to reduce certain cancers. They may act as hormones and reduce menopausal symptoms. They can stimulate enzymes that make estrogen less effective and reduce breast cancer. Phytochemicals can interfere with cell duplication and thus prevent cancer cells from increasing. Also they help the body to fight bacteria or have an anti-bacterial effect. Phytochemicals attach to the cell wall so harmful bacteria can’t attach themselves to human cell walls. Better known phytochemicals are the lycopenes in tomatoes, isoflavones in soy and flavanoids in fruit.

Benefits of Fruits and Vegetables According to Color
Red fruits and vegetables are colored by natural plant pigments called "lycopene" or "anthocyanins."
- Lycopene in tomatoes, watermelon and Texas pink grapefruit may help reduce risk of several types of cancer, especially prostate cancer. Lycopene in foods containing cooked tomatoes, such as spaghetti sauce, and a small amount of fat are absorbed better than lycopene from raw tomatoes.
- Anthocyanins in strawberries, raspberries, pomegranates, red grapes, acai, rhubarb and other fruits (red apples, cherries, cranberries) and vegetables (red peppers, red potatoes, radishes, beets and red cabbage) act as powerful antioxidants that protect cells from damage. Antioxidants are linked with keeping our hearts healthy.

Orange/yellow fruits and vegetables are usually colored by natural plant pigments called "carotenoids."
- Beta-carotene in vegetables (sweet potatoes, pumpkins, carrots, yellow peppers, butternut, winter or summer yellow squash, rutabagas, yellow tomatoes and sweet corn) and in fruits (apricots, cantaloupe, yellow apples, mangoes, Texas peaches, mangos, papayas, pineapple, pears and persimmons, yellow watermelon) is
converted to vitamin A. This vitamin helps maintain healthy mucous membranes and healthy eyes. Scientists have also reported that carotenoid-rich foods can help reduce risk of cancer, heart disease and can improve immune system function.

• Citrus fruits like oranges, grapefruit, tangerines, lemons are not a good source of vitamin A and an excellent source of vitamin C to help wound healing; and folate, a B vitamin that helps reduce risk of birth defects.

Green fruits and vegetables are colored by natural plant pigment called "chlorophyll."

• Lutein is found in green vegetables include zucchini squash, artichokes, other dark leafy greens, spinach, lettuce; green, chile, jalapeño or Serrano peppers; cucumbers, asparagus, avocados, green beans, green peas green onions, and celery. Lutein is also found in green fruits include green apples or grapes, honeydew melon, kiwi and limes. This phytochemical works with another chemical, zeaxanthin, found in corn, red peppers, oranges, grapes and egg yolks to help keep eyes healthy by reducing risk of cataracts and age-related macular degeneration, which can lead to blindness if untreated.

• The "indoles" in broccoli, cauliflower, broccoli, Brussels sprouts. green cabbage and other cruciferous vegetables may help protect against some types of cancer. Spinach and other dark leafy greens and broccoli are excellent sources of folate, a B vitamin that helps reduce risk of birth defects.

Blue/purple fruits and vegetables are colored by natural plant pigments called "anthocyanins." Anthocyanins in eggplant, blueberries, blackberries, plums, figs, prunes, purple grapes and raisins act as powerful antioxidants that protect cells from damage. They may help reduce risk of cancer, stroke and heart disease. Other studies have shown that eating more blueberries is linked with improved memory function and healthy aging.

White fruits and vegetables are colored by pigments called "anthoxanthins." They may contain health-promoting chemicals such as allicin, which may help lower cholesterol, blood pressure and may help reduce risk of heart disease as well as stomach cancer. Onions, cauliflower, leeks, parsnips, turnips, jicama and garlic contain allyl sulfides and serve as antioxidants. Some members of the white group, such as bananas and potatoes, are good sources of the mineral potassium and carbohydrates, too. Texas 1015 onion is rich in quercetin, an antioxidant which helps to boost the immune systems and prevents upper respiratory infections.

As more research becomes available, you can check with a registered dietitian and/or other health professionals for ways to increase your vegetable and fruit consumption. Also, visit MyPyramid.gov for more information on how to determine the exact amount of these foods that you need and how to know the serving sizes. Contact ____________________, Texas AgriLife Extension Service ______________ County agent at ____________________, for more information.

References:

Prepared by Mary Kinney Bielamowicz, PhD, RD, LD, Professor and Nutrition Specialist, Department of Nutrition and Food Science, Texas A&M University System, Summer, 2009.