

## Functional Foods Part 1

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*Let food be thy medicine  
and medicine be thy  
food . . .*

Hippocrates

### What is a Functional Food?

- ◆ "Foods or dietary components that may provide a health benefit beyond basic nutrition."
- ◆ Biologically active components impart health benefits or physiological effects.
- ◆ Ingredients that aid specific bodily functions in addition to being nutritious

### Functional Foods

- ◆ Term functional foods first introduced in Japan in mid-1980s
- ◆ Health-conscious baby boomers made functional foods the leading trend in the U.S. food industry
- ◆ Over \$30 billion annually
- ◆ Potential of functional foods to mitigate disease, promote health and reduce health care costs

### Research

- ◆ Overwhelming evidence from epidemiological studies and clinical trials indicate that a plant-based diet can reduce the risk of chronic disease
- ◆ Research shows there are components in a plant-based diet other than traditional nutrients (protein, fat, carbs, vitamins/minerals, etc.) that can reduce disease risk

### Phytochemicals


- ◆ Dozens of these biologically active plant chemicals, known as "phytochemicals"
- ◆ Plant foods contain thousands
- ◆ Difficult to assess one food and its benefits alone - synergy
- ◆ Actions of phytochemicals are complementary and overlapping



## Functional Components of Food

Component	Food Source	Benefit
Lycopene	Tomatoes and products	Prevent prostate cancer
Inulin	Whole grains	Improves GI tract health
Flavanols	Chocolate, tea	Circulatory/heart health
Sulforaphane	Broccoli, etc	Chemoprotective

BROCCOLI			
alanine	chlorophyll a	glutamic acid	linolenic acid
alpha-carotene	chlorophyll b	glycine	lutein
alpha-tocopherol	copper	histidine	lycopene
anthocyanin	coumarins	indoles	lysine
arginine	cryptoxanthin	iron	magnesium
ascorbic acid	cystine	isoleucine	manganese
aspartic acid	flavonoids	isothiocyanates	methionine
beta-carotene	folate	leucine	monoterpenes
calcium	fructose	lignin	niacin
cellulose	glucose	linoleic acid	oleic acid



BLACK PEPPER		
beta-caryophyllene	linolenic acid	piperonal
cadinene	magnesium	potassium
calcium	myristic acid	phytosterols
dietary fiber	niacin	riboflavin
dihydrocarveol	oleic acid	sodium
iron	palmitic acid	thiamin
lauric acid	phosphorus	water
linoleic acid	piperidine	zinc

## Functional Food

## Benefit

Stanol/sterols, psyllium fiber, soy protein, whole oats, garlic, nuts	Reduced blood levels of LDL cholesterol/blood pressure, reduce risk of heart disease
Omega-3 fatty acids	Reduced heart disease risk
Grapes, grape juice	Decrease blood clots in blood vessels
Cranberry juice	Decrease urinary tract infection
Green tea, cooked tomato products, cruciferous vegetables	Decreased risk of certain types of cancer
Folic acid-fortified foods	Decreased risk of heart disease
Probiotics	Decreased risk of infection, lactose intoler, food allergies

## Defending against Heart Disease

- ◆ **Flavonoids**
  - Powerful antioxidants
  - Protect against LDL cholesterol oxidation
  - Lowers risk of chronic diseases
  - Found in whole grains, legumes, soy, vegetables, fruits, herbs, spices, teas, chocolate, nuts, olive oil, red wines

## Defending against Heart Disease

- ◆ **Carotenoids**
  - Includes lutein and lycopene
  - Lower risk of heart disease
  - Found in fruits and vegetables
  - Red/Orange color: red peppers, carrots, cantaloupe, tomatoes, etc.



## Defending against Heart Disease

- ◆ Phytosterols
  - May protect against heart disease
  - Inhibit cholesterol absorption
  - Lower blood pressure
  - Act as antioxidants
  - Found in soybeans and other vegetables
  - Lignans, found in flaxseed, are converted to phytosterols by intestinal bacteria

## Plant Sterols or Phytosterols

- ◆ Occur naturally in parts of all plants
- ◆ Shown to lower cholesterol by up to 14%
- ◆ Block absorption of cholesterol in the intestine, leading to reduced levels in the blood
- ◆ Double the cholesterol-lowering power of statins – can take **WITH** statins
- ◆ Intake of 2 grams (or 2,000 mg) per day with meals

## Plant Sterols in food products

- ◆ Benecol, Promise Activ spreads
- ◆ Smart Balance Heart Right spread
- ◆ CocoaVia chocolates
- ◆ Minute Maid Heartwise orange juice
- ◆ Kroger Active Lifestyles FF Milk
- ◆ Yoplait Healthy Heart Yogurt
- ◆ Orowheat Whole Grain and Oat bread
- ◆ [www.corowise.com/wheretobuy](http://www.corowise.com/wheretobuy)

## Plant Sterol Supplements

- ◆ Supplements taken with meals
- ◆ Nature Made Cholest-off
- ◆ Twin Labs Cholesterol Success
- ◆ ModuChol by Wakunaga
- ◆ Can also be taken *with* statin drugs for a synergistic effect
- ◆ Must take correct dose: 2,000 – 3,000 mg

## Whole Grains as Functional Foods

- ◆ Provide many health benefits
- ◆ Relatively inexpensive, widely available
- ◆ Low in fat, cholesterol-free, 10-15% protein, good source of fiber, resistant starches, oligosaccharides, trace minerals, vitamins, antioxidants, phytochemicals, phytoestrogens

## Whole Grains

- ◆ Functional components
  - Fermentable carbohydrates: dietary fiber, resistant starch, oligosaccharides
  - Antioxidants: Vitamin E, selenium, phytic acid, phenolic acids, lignans



## Whole Grains

- ◆ Recommended intake: At least 3 servings/day
- ◆ Recommended intake of fiber: 20-40 grams/day
- ◆ Include variety: Amaranth, barley, buckwheat or kasha, corn, couscous, legume flour, millet, oats, quinoa, brown rice, rye, wheat

## Whole Grains

- ◆ Research of 7 major studies published in the journal Nutrition, Metabolism & Cardiovascular Disease in May, 2007: 285,000 men and women followed for 6-15 years
- ◆ People eating 3 servings per day of whole grains were 25% less likely to develop cardiovascular disease, stroke or die of CV causes

## Oats

- ◆ Can reduce total and LDL cholesterol
- ◆ Significant amount of research
- ◆ 3 grams of beta-glucan per day reduces cholesterol by 5%
- ◆ 60 grams of oatmeal (1 cup cooked) or 40 grams of oat bran



## Whole Grains

- ◆ Increasing Intake of Whole Grains
  - Read food labels – look for whole grain and whole wheat in ingredient listing
  - Be adventurous & try new grains
  - Choose whole grain cereals, crackers, breads
  - Plan vegetarian entrees 2 -3 times/week
  - Substitute whole-wheat flour for white flour, use brown rice flour, legume flour
  - Add oatmeal to cookies, quick breads, meatballs



## DASH Diet

- ◆ DASH – Dietary Approaches to Stop High Blood Pressure
- ◆ An eating plan, based on clinical studies, that includes nutrients found in foods that work together to lower blood pressure
- ◆ Diet is low in saturated fat, cholesterol and total fat and high in fruits/vegetables, low-fat dairy products
- ◆ Includes whole grains, fish, poultry and nuts
- ◆ VERY rich in potassium, magnesium and calcium

## Foods to lower blood pressure

- ◆ Potassium, calcium, magnesium
- ◆ Bananas, beans, citrus fruits, low-fat dairy, nuts, potatoes, tomatoes, whole grains



## DASH Diet

- ◆ 1500 mg sodium per day
- ◆ The lower your salt intake, the lower your blood pressure for most people
- ◆ Average American currently eats about 4,000-5,000 mg per day



## Sodium

- ◆ New England Journal of Medicine reports that if everyone consumed ½ teaspoon less salt per day – 54,000 and 99,000 *fewer heart attacks* each year
- ◆ 44,000 and 92,000 *fewer deaths*
- ◆ Study conducted by scientists at UC San Francisco, Stanford Medical Center and Columbia University Medical Center

## DASH Diet

- ◆ For 2,000 calorie diet:
- ◆ 60 grams of total fat
- ◆ 15 grams or less saturated fat
- ◆ 90 grams protein
- ◆ 275 grams carbs (whole grains, starchy vegetables, low-fat dairy)
- ◆ 150 mg cholesterol
- ◆ 1500 mg sodium
- ◆ 4700 mg potassium
- ◆ 1250 mg calcium
- ◆ 500 mg magnesium
- ◆ 30 grams fiber



## Soy

- ◆ High in quality protein
- ◆ Lowers cholesterol by approx 10% and LDL cholesterol by approx 13% and triglycerides by 10%
- ◆ 25 – 50 grams per day
- ◆ Soybeans contain isoflavones – act as weak estrogens and as anti-estrogens
- ◆ May also benefit bone health

## Flaxseed

- ◆ Contains omega 3 fatty acids as well as lignans
- ◆ Can reduce total and LDL cholesterol and reduces platelet aggregation
- ◆ Weak estrogenic as well as antiestrogenic activities – helps women regulate hormones
- ◆ 1-2 Tbsp per day ground/meal

## Tea

- ◆ Second only to water as most widely consumed beverage in world
- ◆ Polyphenols – catechins shown in research studies to reduce cancer risk
- ◆ Reduces LDL oxidation
- ◆ Research shows inverse association between tea consumption and CVD



## Wine and Grapes

- ◆ Growing evidence that wine can reduce risk of CVD
- ◆ Alcohol can raise good HDL cholesterol
- ◆ Also non-alcohol flavonoids in wine and grapes/grape juice can help prevent oxidation of LDL – a critical event in the process of atherogenesis
- ◆ Grape juice may boost memory in elderly



## Wine

- ◆ Resveratrol is a polyphenolic compound found in grapes, red wine, purple grape juice, peanuts, and some berries.
- ◆ Moderate alcohol consumption has been consistently associated with 20-30% reductions in coronary heart disease risk, but it is not yet clear whether red wine polyphenols, such as resveratrol, confer any additional risk reduction
- ◆ Resveratrol administration has increased the lifespans of yeast, worms, fruit flies, fish, and mice fed a high-calorie diet, but it is not known whether resveratrol will have similar effects in humans.

## Fish

- ◆ Omega 3 fatty acids in fatty fish: salmon, sardines, trout, herring
- ◆ Plant sources: walnuts, flaxseed, leafy greens



## Omega 3 Fats

- ◆ Increase HDL “good” cholesterol
- ◆ Reduce blood clot formation
- ◆ Suppresses inflammation in the body
- ◆ Decreases triglyceride levels in blood
- ◆ Decreases risk/incidence of sudden death and MI
- ◆ Inhibits growth of plaque
- ◆ Promote arterial relaxation, lowers BP
- ◆ Reduce susceptibility to arrhythmias

## Inflammation

- ◆ Omega 3 fatty acids act as an anti-inflammatory
- ◆ Inflammation has a profound effect on cardiovascular system
- ◆ Inflammation is one of the risk factors for heart disease

## Sources of Omega 3 fats

- ◆ Increase intake of Omega 3 fats
- ◆ Choose fatty fish (salmon, sardines, herring, trout)
- ◆ Flaxseed and flaxseed oil
- ◆ Edamame – green soybeans
- ◆ Omega-3 eggs
- ◆ Dark leafy greens, wheat germ
- ◆ Walnuts and walnut oil, pumpkin seeds

## Fish Oil Supplements

- ◆ Two omega-3 fatty acids – eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) found to help lower triglycerides, reduce blood clotting and decrease inflammation
- ◆ AHA: healthy people should get about 1 gram per day of EPA and DHA
- ◆ High triglycerides: 2-4 grams per day (under care of health care provider)
- ◆ Fish oil supplements – quality matters
- ◆ Omacor/Lovaza – prescription fish oils

## Fruits & Vegetables

- ◆ Fruits – Excellent source of Vitamin A and C, many minerals, hundreds of phytochemicals, fiber, naturally occurring sugars, and water
- ◆ Fat free, do not contain protein
- ◆ Vegetables – Excellent source of vitamins, minerals, antioxidants, phytochemicals, fiber, not sweet, almost no fat

## Fruits and Vegetables

Fruits/Vegetables – Those who average 8 or more servings/day are 30% less likely to have had a heart attack or stroke



## Fruits and Vegetables

- ◆ **What does 8 servings a day look like?**
- ◆ Breakfast: 6 oz. low-sodium V-8 and an orange
- ◆ Lunch: 2 cups salad and an apple
- ◆ Snack: 1 cup baby carrots/cherry tomatoes
- ◆ Dinner: 1 cup broccoli

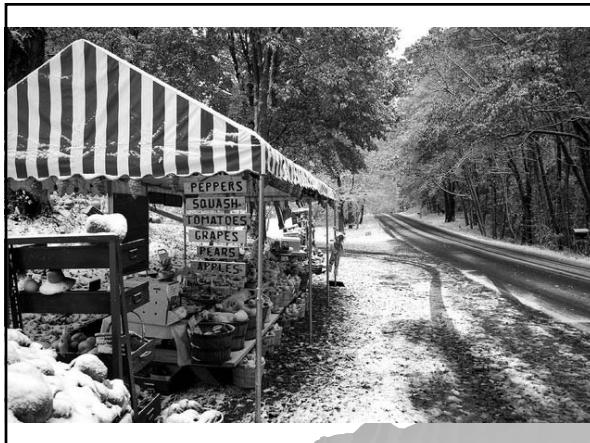
## Increasing Fruits & Vegetables

- ◆ Eat fresh while in season
- ◆ Frozen is good too
- ◆ Plan ahead –buy, prepare
- ◆ Join a CSA
- ◆ Stir-fry/steam different vegetables together
- ◆ Keep dried fruit available for snacking – watch portions



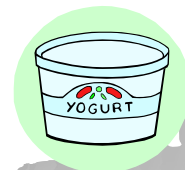
## Increasing Fruits & Vegetables

- ◆ Try vegetarian versions of favorite casseroles by omitting meat, sub legumes
- ◆ Vegetarian sandwiches
- ◆ Add to soups, pasta, rice dishes
- \*\*6oz juice, ½ cup cooked  
1 cup raw



## Functional Foods

- ◆ Foods as Pharmacy
  - Yogurt and probiotics – use w/antibiotics
  - Globally, soy-based products and drinkable yogurts fastest growing segments of market
  - U.S., whole-grain products and products with omega-3 fatty acids growing segments of market



## Isothiocyanates

- ◆ Found in cruciferous vegetables: broccoli, cauliflower, cabbage, kale, Brussels sprouts
- ◆ Improve antioxidant defense
- ◆ Prevent oxidation of LDL
- ◆ Neutralize free radicals
- ◆ Chemoprotective – prevent cancer

## Vitamins C and E

- ◆ Lower LDL
- ◆ Antioxidants –prevent oxidation
- ◆ Cherries, citrus fruit, kiwi, strawberry, red peppers, almonds, hazelnuts, sunflower seeds, turnip greens

## Cooking with Whole Foods

- ◆ Ingredients in a Wendy's hamburger
- ◆ "If you can't grow it – don't eat it!"
- ◆ If your grandmother would not recognize it as a food – don't eat it!
- ◆ We eat a lot of edible "food-like stuff" that is NOT really food!
- ◆ Diet of humans has changed more in the last 50 years than the previous 50,000!!!!!!!!!!!!!!



## Functional Foods

- ◆ Unanswered questions
  - Consumer questions to ask
  - 1) Does it work? Look at the research.
  - 2) How often should I eat this food?
  - 3) How much of the "functional food" does this product contain?

***"Let nothing which can be treated by diet be treated by other means."***

***- Maimonides***